November 30, 2018

Ms. Kirsten Walli
Ontario Energy Board
2300 Yonge Street, 27th Floor
Toronto, ON
M4P 1E4

Dear Ms. Walli:

Re: EB-2018-0300 - Union Gas Limited - 2016 Disposition of Demand Side Management Deferral and Variance Accounts

Enclosed is the application and evidence submitted by Union Gas Limited ("Union") concerning the final disposition and recovery of certain 2016 year-end deferral and variance account balances.

Union proposes that the impacts which result from the disposition of the deferral and variance account balances be implemented on April 1, 2019 to align with other rate changes implemented through the Quarterly Rate Adjustment Mechanism.

If you have any questions concerning this application and evidence please contact me at (519) 436-4558.

Yours truly,

[*Original Signed by*]

Adam Stiers
Specialist, Regulatory Initiatives

cc: Myriam Seers (Torys)
EB-2017-0323 Intervenors

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 Union Gas Limited for an order or orders clearing certain non-commodity related deferral accounts;

APPLICATION

1. Enbridge Gas Distribution Inc. ("EGD") and Union Gas Limited ("Union") are Ontario corporations incorporated under the laws of the Province of Ontario carrying on the business of selling, distributing, transmitting, and storing natural gas within within the meaning of the Ontario Energy Board Act, 1998 (the "Act"). EGD and Union will amalgamate effective January 1, 2019 to become Enbridge Gas Inc. ("Enbridge Gas").

2. EGD and Union (the "Utilities") filed an application dated November 2, 2017 with the Ontario Energy Board ("OEB" or the "Board") pursuant to section 43(1) of the OEB Act for an order or orders granting leave to amalgamate into a single company, referred to as "Amalco", effective January 1, 2019.[1] On November 23, 2017, the Utilities applied to the Board, pursuant to section 36 of the OEB Act, for an order approving a rate setting mechanism and associated parameters for the deferred rebasing period, effective January 1, 2019.[2] The Board issued its Decision and Order for the amalgamation and rate setting mechanism (the "MAADs Decision") on August 30, 2018.

3. In Union's 2016 Rates Application and Evidence (EB-2015-0116), Union applied to the Ontario Energy Board (the "OEB") for an order approving or fixing just and reasonable rates

1 EB-2017-0306.
2 EB-2017-0307.

and other charges for the sale, distribution, storage and transmission of gas by Union effective January 1, 2016. The OEB approved Union's request. In doing so, the OEB approved the continuation of certain deferral and variance accounts.

4. Union applies to the OEB, pursuant to section 36 of the OEB Act and pursuant to the MAADs Decision and Order, for an order or orders approving final balances for all 2016 Demand Side Management deferral and variance accounts as listed in Exhibit A, Tab 3, Appendix A, Schedule 1 and for an order for final disposition of those balances. Union requests that the Board issue the final rate order in the name of Enbridge Gas conditional upon the Utilities filing a Certificate of Status of Amalgamation with the Board as soon as reasonably practicable in early January 2019.

5. Union also applies to the OEB for such interim order or orders approving interim rates or other charges and accounting orders as may, from time to time, appear appropriate or necessary.

6. Union further applies to the OEB for all necessary orders and directions concerning pre-hearing and hearing procedures for the determination of this application.

7. This application is supported by written evidence. This evidence may be amended, from time to time, as required by the OEB or as circumstances may require.

8. The persons affected by this application are the customers resident or located in the municipalities, police villages, and First Nations reserves served by Union, together with those to whom Union sells gas, or on whose behalf Union distributes, transmits or stores gas.

It is impractical to set out in this application the names and addresses of such persons because they are too numerous.

9. The address of service for Union is:

Union Gas Limited
P.O. Box 2001
50 Keil Drive North
Chatham, Ontario
N7M 5M1

Attention: Adam Stiers
Telephone: (519) 436-4558
Fax: (519) 436-4641

- and -

Torys LLP
Suite 3000, TD South Tower
P.O. Box 270
Toronto, Ontario
M5K 1N2

Attention: Myriam Seers
Telephone: (416) 865-7535
Fax: (416) 885-7380

DATED: November 30, 2018

UNION GAS LIMITED

[Original signed by]

Adam Stiers
Specialist, Regulatory Initiatives

2016 DSM DEFERRAL AND VARIANCE ACCOUNT DISPOSITION:

REQUESTED APPROVALS

Union Gas Limited ("Union") is applying to the Ontario Energy Board (the "Board" or "OEB") for approval to dispose of the 2016 balances in its Demand Side Management ("DSM") deferral and variance accounts (the "Application"). Please see Table 1 for a summary of Union's 2016 DSM deferral and variance accounts and the corresponding balances that Union proposes to dispose of through this Application, referred to as the Audit-Adjusted balances.[1] Union supports the application of the OEB Staff-coordinated 2016 DSM evaluation, measurement and verification ("EM&V" or "audit") results with the exception of OEB Staff's failure to direct the evaluation contractor ("EC") to update 2016 targets based on the best available information. Union requests that the OEB approve the 2016 Audit-Adjusted results as presented on the basis of the arguments described in further detail herein. Union proposes to dispose of the account balances with the first available Quarterly Rate Adjustment Mechanism ("QRAM") following OEB approval. For purposes of calculating bill impacts, Union assumes implementation with the April 1, 2019 QRAM.

Union's Audit-Adjusted balances reflect the final 2016 audited DSM results, adjusted to update the 2016 Resource Acquisition and Low-Income scorecard targets to reflect:

[1] These balances as presented do not include interest. Interest will be accrued up to the disposition date in accordance with the applicable accounting orders and reflected in the draft rate order filed following the Board's Decision in this proceeding.

1. the prescriptive input assumptions that were updated in December 2015 as part of the Technical Reference Manual ("TRM");[2] and,
2. custom project Commercial/Industrial ("CI") and Large Volume ("LV") Net-to-Gross ("NTG") adjustment factors ("NTG Factors") that were updated in December 2017 and May 2018 as part of the 2015 Natural Gas Demand Side Management Custom Savings Verification and Free-ridership Evaluation report and the CPSV Participant Spillover Results report (collectively, the "2015 NTG Study").[3]

The impact of Union's adjustments to 2016 targets is reflected in the Demand Side Management Incentive Deferral Account ("DSMIDA") balance (see Table 1). Union's Audit-Adjusted balances are consistent with the OEB's confirmation that input assumptions and NTG Factors used for target setting are finalized for a given year based on the previous year's final DSM audit.[4] Union's Audit-Adjusted balances are also consistent with Union's OEB-approved 2015-2020 DSM Plan (EB-2015-0029) where Union advised that it would update its 2016 natural gas savings targets upon completion of the December 2015 TRM update and the 2015 NTG Study.[5]

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[2] EB-2015-0344, New and Updated DSM Measures – Joint Submission from Union Gas Ltd. And Enbridge Gas Distribution (dated December 16, 2015).
[3] 2015 Natural Gas Demand Side Management Custom Savings Verification and Free-Ridership Evaluation (dated October 12, 2017), https://www.oeb.ca/sites/default/files/2015-DSM-Custom-Savings-Verification-Report.pdf; CPSV Participant Spillover Results report (dated May 23, 2018), https://www.oeb.ca/sites/default/files/OEB-CPSV-Participant-Spillover-Report.pdf.
[4] EB-2017-0323, OEB Decision and Order (dated July 12, 2018), pp. 6-7; EB-2015-0029, Decision and Order (dated January 20, 2016), p. 75; EB-2015-0029, Union Gas Limited 2015-2020 DSM Plan – Written Comments (dated February 3, 2016), pp. 2-3; EB-2015-0029, Revised OEB Decision and Order (dated February 24, 2016), p. 3.
[5] EB-2015-0029, Union Gas Limited 2015-2020 DSM Plan, Exhibit A, Tab 3, pp. 17, 21, 47.

The net balance in the Audit-Adjusted accounts is a credit of $1.547 million for refund to ratepayers and relates primarily to DSM activities in 2016.[6]

Table 1

2016 DSM Deferral and Variance Account Balances

($ million)	**Audited**	**Audit-Adjusted**
Lost Revenue Adjustment Mechanism Variance Account	$0.488	$0.488
Demand Side Management Variance Account (1)	$(6.156)	$(6.156)
Demand Side Management Incentive Deferral Account	$3.886	$4.121
Total 2016 DSM Account Balances	**$(1.782)**	**$(1.547)**

Notes:
(1) The Demand Side Management Variance Account balance (Audited and Audit-Adjusted) includes a credit of $0.137 million related to tracking and reporting system upgrades as detailed in Exhibit A, Tab 3, Section 2.1.

Discussion of the adjustments to Union's 2016 targets and supporting rationale is contained at Exhibit A, Tab 2. The allocation to rate classes and unit rates for disposition of the Audit-Adjusted DSM deferral and variance account balances is provided at Exhibit A, Tab 4, Appendix A, Schedule 1 and Schedule 2.

In accordance with Section 11.0 of the OEB's 2015-2020 Demand Side Management Filing Guidelines to the DSM Framework for Natural Gas Distributors (2015-2020) (the "Guidelines"), Union has also provided: (i) audited DSM deferral and variance account balances at Exhibit A, Tab 3, Appendix B; and, (ii) the allocation of the audited DSM balances at Exhibit A, Tab 4, Appendix B.[7]

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[6] The LRAM account balance includes volume variances related to 2015 and 2016 audited results at 2016 rates. This is discussed in further detail in Exhibit A, Tab 3.

[7] EB-2014-0134, Filing Guidelines to the Demand Side Management Framework for Natural Gas Distributors (2015-2020), Section 11.0, p.37, states that, "*The natural gas utilities should apply annually for the disposition of any*

The evidence supporting Union's requested approvals is organized as follows:

Exhibit A

Tab 1 Requested Approvals

Tab 2 2016 Evaluation, Measurement and Verification

Tab 3 2016 DSM Deferral and Variance Account Balances

Tab 4 Allocation and Disposition of 2016 DSM Deferral and Variance Account Balances

Exhibit B

Tab 1 2016 DSM Final Annual Report

Tab 2 Summary Responses to the 2016 Natural Gas Demand Side Management Annual Verification Recommendations

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balances in their LRAMVA and DSMVA and, if applicable, apply for a shareholder incentive amount associated with the previous DSM program year and disposition of any resulting DSMIDA balance. This application should include the final results as outlined in the Final Evaluation and Audit Reports, and information setting out the allocation across rate classes of the balances in the LRAMVA, DSMVA and DSMIDA."

2016 DSM DEFERRAL AND VARIANCE ACCOUNT DISPOSITION:

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2016 DSM DEFERRAL AND VARIANCE ACCOUNT DISPOSITION:

GLOSSARY OF ACRONYMS AND TERMS

The glossary serves as a reference for the benefit of stakeholders in their overall understanding of the DSM terminology in Union's evidence. It is intended to provide guidance to a broad audience, recognizing that more detailed definitions may apply to specific terms when used by DSM practitioners.

2008 NTG Study
The 2008 Custom Projects Attribution Study (dated October 31, 2008) and all further amendments to the report issued at a later date.

2015 Annual Volumes
Audited volume savings for contract rate classes related to 2015 full-year DSM activities.

2015 NTG Study
The 2015 Natural Gas Demand Side Management Custom Savings Verification and Free-ridership Evaluation (dated October 12, 2017) and the CPSV Participant Spillover Results (dated May 23, 2018), and all further amendments to the reports issued at a later date.

2016 Rates
Union's OEB-approved 2016 rates for the distribution, transmission and storage of natural gas effective January 1, 2016 (EB-2015-0116).

2017 Rates
Union's OEB-approved 2017 rates for the distribution, transmission and storage of natural gas effective January 1, 2017 (EB-2016-0245).

2018 Rates
Union's OEB-approved 2018 rates for the distribution, transmission and storage of natural gas effective January 1, 2018 (EB-2017-0087).

Audit
The audit is an annual Evaluation, Measurement and Verification ("EM&V") process to assess Union's reported DSM results. OEB Staff is responsible for retaining the auditor, also known as the Evaluation Contractor ("EC"), whom ultimately serves to protect the interests of ratepayers with respect to Union's DSM claims.

Audited
The output of the 2016 DSM Audit or EM&V process is the Audit results or Audited deferral and variance account balances.

Audit-Adjusted
The 2016 DSM Audit results or Audited deferral and variance account balances, adjusted to update the 2016 Resource Acquisition and Low-Income scorecard targets to reflect best available information.

Audit Committee ("AC")
In the previous DSM Framework, the AC ensured an effective and thorough audit of the utilities' DSM results each year. Each utility had a respective AC that consisted of three intervenor members and one utility representative. The ACs have been replaced by the Evaluation Advisory Committee ("EAC") as part of the 2015-2020 evaluation governance structure.

Commercial and Industrial Customers ("CI")
Union's Commercial and Industrial customers.

Custom DSM Project
A custom DSM project is a natural gas savings project that is based on customer-specific information and considerations, and includes new capital equipment and O&M energy savings measures.

Custom Project Savings Verification ("CPSV")
The annual process by which the gross savings estimates of Union's custom DSM projects are verified. A statistically significant sample of low-income, commercial/industrial, and large volume custom projects are verified by a third party consultant.

Demand Side Management ("DSM")
DSM is the modification in end-use customer demand for natural gas through conservation programs. While the focus of Union's DSM is natural gas savings and the reduction in greenhouse gas emissions, it may also result in the saving of a number of other resources such as electricity, water, propane, and heating fuel oil.

Demand Side Management Incentive Deferral Account ("DSMIDA")
The account used to record the DSM shareholder incentive amount earned by Union as a result of its DSM programs.

Demand Side Management Variance Account ("DSMVA")
The account used to track the variance between actual DSM spending by rate class versus the budgeted amount included in rates by rate class. Union may record in the DSMVA in any one year, a variance amount of no more than 15% above its DSM budget for that year.

DSM Shareholder Incentive
The incentive available to Union for achieving OEB-approved performance targets.

Evaluation Advisory Committee ("EAC")
As part of the new 2015-2020 evaluation governance structure, the EAC provides input and advice to OEB Staff on the evaluation and audit of DSM results. The EAC consists of representatives from Union, Enbridge, non-utility stakeholders, independent experts and observers, all working with OEB Staff. The EAC replaces the ACs and TEC from the previous DSM framework.

Evaluation Contractor ("EC")
As part of the new 2015-2020 evaluation governance structure, the EC is a third party who carries out the evaluation and audit processes of Union's DSM programs. The EC, also known as the auditor, is retained by OEB Staff.

Evaluation, Measurement & Verification ("EM&V")
EM&V is the collection of methods and processes used to assess the implementation and performance of energy efficiency activities. The main objective of EM&V is to assess the performance of a program and to measure (through data collection, analysis, and reporting of data) and verify program impacts to ensure the expected level of savings are being achieved. EM&V data, in addition to various evaluation studies, such as Net-to-Gross ("NTG") or persistence studies, inform recommendations for improvements in program performance.

Free Ridership
Free Riders are program participants who would have installed an energy efficient measure without the influence of Union's DSM programs. Free Ridership is not a binary concept and consequently, different levels of Free Ridership exist. Free Rider rates are estimated based on research, market penetration studies, through negotiations in prior evaluation processes or by surveying participants. The Free Rider rates are applied to the gross program savings results to derive savings generated by the program.

Guidelines
The OEB's 2015-2020 Demand Side Management Filing Guidelines to the DSM Framework for Natural Gas Distributors (2015-2020).

Input Assumptions
Assumptions such as operating characteristics and associated units of resource savings for DSM technologies and measures. These cover a range of typical DSM activities, measures and technologies with residential, commercial and industrial applications.

Large Volume Customers ("LV")
Union's Large Volume customers.

Lifetime Cumulative Cubic Meters ("cumulative m^3")
Total natural gas savings over the effective useful life of a DSM measure. Frequently used at the measure or program level and can also summarize the benefits of an entire portfolio.

Lost Revenue Adjustment Mechanism ("LRAM")
The LRAM is the OEB's approved method by which utilities recover the lost distribution revenues associated with DSM activity.

Lost Revenue Adjustment Mechanism Variance Account ("LRAMVA")
The LRMVA captures the differences between the actual contract market margin reductions (distribution revenues) related to Union's DSM plans and the contract market margin reduction included in gas delivery rates as approved by the Board.

Measure
A measure is any particular energy efficient technology (e.g. an energy recovery ventilator, condensing boiler, etc.).

NTG Factors
Custom project Commercial/Industrial ("CI") and Large Volume ("LV") Net-to-Gross ("NTG") adjustment factors.

Net-to-Gross ("NTG") Ratio
Gross impacts are the program impacts prior to accounting for program attribution effects. These effects include Free Ridership and Spillover. Net impacts are the program impacts once program attribution effects have been accounted for. The NTG Ratio is defined as 1 – Free Rider Rate + Spillover Rate.

Normalized Average Consumption ("NAC")

Ontario Energy Board (the "OEB" or the "Board")

Offering
A DSM offering exists where there are either bundles of energy efficiency measures or performance/maintenance based enhancements to existing measures marketed together (e.g. energy savings kits, home retrofit measures, custom equipment/process/O&M) or where support is delivered through a suite of services (e.g. customer engagement, site energy assessments, etc.).

Participants
The units used by Union to measure participation in its DSM programs. Participant units of measurement may include customers, projects and measures or technologies installed depending on the metric. Not all participants result in energy savings.

Prescriptive Offering
A prescriptive DSM offering includes natural gas savings from various measures or technologies that are based on previously substantiated and pre-approved inputs. Prescriptive DSM measures apply to all of Union's customer market segments including residential, low-income, commercial and industrial.

Program
A program is the utility specific approach to providing one or more DSM offerings to customers.

Quarterly Rate Adjustment Mechanism ("QRAM")

Realization Rate
A realization rate compares verified audited results for a sample of custom projects with the original savings claimed. This rate is then used to adjust the savings for the full population of custom projects to reflect the sample.

Resource Acquisition
Programs that seek to achieve direct, measurable savings customer-by-customer through the incenting or promotion of specific energy efficiency upgrades.

Spillover
Spillover effects refer to customers that adopt energy efficiency measures because they are influenced by a utility's program-related information and marketing efforts, but do not actually participate in the utility's program.

Technical Evaluation Committee ("TEC")
In the previous framework, the TEC established DSM technical and evaluation standards for the natural gas utilities in Ontario. The TEC consisted of seven individuals: three intervenor members, a representative from Union Gas Limited ("Union"), a representative from Enbridge Gas Distribution, and two independent members with technical and other relevant expertise. The TEC was replaced by the EAC as part of the 2015-2020 evaluation governance structure.

Union Gas Limited ("Union")

Verification Report
The Final Natural Gas Demand Side Management Annual Verification Report issued by the EC.

2016 DSM DEFERRAL AND VARIANCE ACCOUNT DISPOSITION:

2016 EVALUATION, MEASUREMENT AND VERIFICATION

The purpose of this evidence is to explain why updating Union's 2016 DSM targets for the Resource Acquisition and Low-Income scorecards is appropriate and consistent with the OEB's Decisions on Union's 2015-2020 DSM Plan (EB-2015-0029), and the OEB's Decision on Union's 2015 Disposition of DSM Deferral and Variance Accounts Application (EB-2017-0323). In these Decisions, the OEB confirmed that input assumptions and NTG Factors used for target setting are finalized for a given year based on the previous year's final DSM audit. These Decisions also confirm that for prescriptive programs, targets and achievements are to be based on the same set of input assumptions and NTG Factors. Accordingly, Union filed a letter with the OEB on July 30, 2018 (see Exhibit A, Tab 2, Appendix A) providing Union's updated 2016 DSM targets that reflected the outcomes of the 2015 EM&V process including updated prescriptive input assumptions and the NTG Factors that resulted from the 2015 NTG Study (the "Letter").[1]

OEB Staff did not direct the EC to apply Union's updated 2016 DSM targets (as provided by Union in its Letter), and as such the EC did not use Union's updated 2016 DSM targets in completing its 2016 Natural Gas Demand Side Management Annual Verification report

[1] The draft Achievements contained within Union's July 30, 2018 Letter have been superseded by those contained within the 2016 Natural Gas Demand Side Management Annual Verification (dated October 30, 2018), https://www.oeb.ca/sites/default/files/OEB-2016-Natural-Gas-DSM-Annual-Verification-Report-20181030-2.pdf.

("Verification Report").[2] Instead, the Audited 2016 shareholder incentive amounts put forward by the EC in its Verification Report are calculated using targets that are not based on the previous year's EM&V results. Union accepts all of the EC's findings applied to its 2016 DSM program achievements and lost revenue amounts including changes to prescriptive input assumptions and updated Commercial/Industrial ("CI") and Large Volume ("LV") (together "CI/LV") custom program NTG Factors. However, the 2016 scorecard targets for Resource Acquisition and Low-Income used by the EC are inconsistent with the OEB's direction to set targets based on the previous year's EM&V results and findings. Union therefore requests that the OEB approve its Audit-Adjusted shareholder incentive amounts.

This evidence also discusses the compounding issues resultant from the persistent delays in the EM&V process, and summarizes Union's conclusions. This exhibit of evidence is organized as follows:

1. Union's 2016 DSM Program Year Targets
    1.1. Alignment with OEB Decisions & Directives
    1.2. Union's Audit-Adjusted Targets
2. Persistent Delay in the EM&V Process
3. Conclusions

[2] 2016 Natural Gas Demand-Side Management Annual Verification (dated October 30, 2018), https://www.oeb.ca/sites/default/files/OEB-2016-Natural-Gas-DSM-Annual-Verification-Report-20181030-2.pdf.

1. UNION'S 2016 DSM PROGRAM YEAR TARGETS

Union's Application advocates for updating 2016 targets using input assumptions and NTG Factors from the previous year's EM&V results, consistent with past OEB Decisions and directives. The updated targets include the application of revised prescriptive input assumptions that were updated in December 2015 and CI/LV custom NTG Factors that were updated as part of the 2015 NTG Study. These same assumptions and factors were used to calculate Union's 2015 LRAMVA balance during the 2015 EM&V process. The result of Union's proposed updates is a reduction of Union's Resource Acquisition gas savings scorecard target and an increase of Union's Low-Income multi-family scorecard targets. As discussed in Section 2, while setting targets after a program year has been launched is not ideal, it is not unique to this Application and has in fact occurred in a number of previous DSM program years.

1.1 ALIGNMENT WITH OEB DECISIONS AND DIRECTIVES

In setting its original 2016 DSM targets, as part of its OEB-approved 2015-2020 DSM Plan, Union applied the prescriptive input assumptions and NTG Factors that resulted from Union's 2014 EM&V process, which were the most recent OEB-approved adjustment factors available at the time.[3] These included: (i) OEB-approved prescriptive input assumptions established in March 2015; and (ii) a 46% NTG Factor established in 2008.[4]

[3] The final OEB-approved targets included a 10% stretch factor in addition to the input assumptions described herein.
[4] EB-2015-0029, Union Gas Limited 2015-2020 DSM Plan, Exhibit A, Tab 3, p. 43; EB-2015-0029, Union Gas Limited 2015-2020 DSM Plan, Exhibit A, Tab 3, Appendix B, p. 169.

As noted in Section 1, following Union's initial 2015-2020 DSM Plan Application, both prescriptive input assumptions and NTG Factors applicable to Union's DSM programs have been updated. These updates were included in the 2015 EM&V process and applied to Union's 2015 LRAM. As part of the 2016 EM&V process, the EC correctly applied the updated prescriptive input assumptions and NTG Factors to Union's 2016 program achievements for the purpose of calculating Union's shareholder incentive and LRAMVA balance. However, at the direction of OEB Staff, the EC failed to apply these same updated prescriptive input assumptions and NTG Factors to Union's 2016 targets.

In its Decision on Union's 2015-2020 DSM Plan, the OEB stated that targets for prescriptive programs should be set based on the previous year's EM&V results, including best available information for both input assumptions and NTG Factors:[5]

> *"To calculate next year's targets, the OEB directs the utilities to use the new, updated input assumptions and net-to-gross factors that are the result of the annual evaluation process. The OEB finds it appropriate to use the best available information to determine subsequent targets for prescriptive programs."*

To reinforce and confirm its interpretation of the OEB's statement regarding the information to use in setting targets, Union requested clarification from the Board in its written comments on the

[5] EB-2015-0029, Decision and Order (dated January 20, 2016), p. 75.

OEB's Decision on Union's 2015-2020 DSM Plan. Specifically, Union asked the OEB to confirm that the best available information for prescriptive programs, including input assumptions and NTG Factors, should be used in a consistent manner to determine the following year's annual targets and results:[6]

> *"Consistent with the Board's previous EB-2006-0021 Decision, Union interprets the above to mean that input assumptions and net-to-gross adjustment factors are finalized for a given year based on the previous year's final DSM audit. By way of example, upon the completion of the 2016 audit in June 2017, the best available input assumptions and net-to-gross adjustment factors used to determine the 2016 LRAM results will be used to determine the 2017 scorecard targets and the final 2017 savings results for the purpose of determining the 2017 DSM Incentive. This process ensures that targets and achievements are based on the same set of input assumptions and net-to-gross adjustment factors."*
>
> *"…"*
>
> *"Lastly, for the purpose of determining Union's 2016 DSM Incentive, the 2016 results will use the same input assumptions and net-to-gross adjustment factors that were used to determine Union's 2016 targets."*

In response to Union's written comments, the OEB's revised Decision stated:[7]

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[6] EB-2015-0029, Union Gas Limited 2015-2020 DSM Plan - Written Comments (dated February 3, 2016), pp. 2-3. [emphasis added]
[7] EB-2015-0029, Revised Decision and Order (dated February 24, 2016), p. 3.

"Union interpreted the OEB's Decision to mean that input assumptions and net-to-gross adjustment factors are finalized for a given year based on the previous year's final DSM audit.

Decision

The OEB confirms that Union's interpretation is correct."

Similarly, the OEB's Decision on Union's 2015 DSM Deferral and Variance Account Application also directed Union to use the best available information resulting from the EM&V process to calculate Union's 2015 LRAMVA balance.[8] The OEB cited its own Decision on Union's 2015-2020 DSM Plan to support its conclusion:[9]

"To calculate lost revenues, the OEB directs the utilities to use the final natural gas savings amounts calculated from the use of the best available information that are the result of the annual evaluation process."

The OEB also clarified that the best available information includes free ridership and spillover values from the 2015 Annual Verification Report.[10]

[8] EB-2017-0323, Decision and Order (dated July 12, 2018), pp. 7-8.
[9] EB-2015-0029, Decision and Order (dated January 20, 2016), p. 75. [emphasis added]
[10] EB-2017-0323, Decision and Order (dated July 12, 2018), p. 7.

The OEB's Decision on Union's 2015 DSM Deferrals and Variance Account Application also addressed and clarified the differences in how program results for prescriptive and custom programs should be treated:[11]

> *"Prescriptive programs are to use the net-to-gross values, namely free ridership and spillover values that are known at the start of the program year to calculate the program results. However, for custom programs, the result of the most recent program evaluation, including all updates to net-to-gross values, are to be used to derive custom program results."*

The OEB indicated that it agreed with this approach for future years beyond 2015.[12] Union confirms that its proposed Audit-Adjusted results are consistent with the OEB's guidance. Prescriptive program results use the best available NTG Factors, namely free ridership and spillover values that were known at the start of the 2016 program year (i.e. following the close of 2015 EM&V activities) and CI/LV custom program savings are determined using the results of the most recent 2016 EM&V process, including all updates to NTG Factors. Since NTG Factors were not updated in 2016, NTG Factors are those from the 2015 EM&V process.

Summary

The culmination of the OEB's prior related Decisions provide the basis for how prescriptive input assumptions and NTG Factors are to be used for the 2016 DSM program year and beyond.

[11] EB-2017-0323, Decision and Order (dated July 12, 2018), p. 6. [emphasis added]
[12] EB-2017-0323, Decision and Order (dated July 12, 2018), p. 6.

For the purposes of calculating shareholder incentive:

- Targets for both prescriptive and custom programs are to rely upon the best available information and NTG Factors from the prior year's EM&V process (i.e. 2015 in this instance). This coincides with the best available information and NTG Factors used to calculate the prior year's LRAMVA balances.
- Results for prescriptive programs are to rely upon the same set of input assumptions and NTG Factors as those used to set targets (i.e. 2016 targets use same prescriptive input assumptions as 2016 results, which are reflected in Union's Audit-Adjusted results).
- Results for custom programs are to use NTG Factors from the most recent EM&V process (i.e. 2015 in this instance since NTG Factors were not updated as part of the 2016 EM&V process).

For the purposes of calculating LRAMVA balances:

- LRAMVA balances for prescriptive programs are to rely upon the best available information and NTG Factors from the most recent EM&V process (i.e. 2016).
- LRAMVA balances for custom programs are to use the best available information and NTG Factors from the most recent EM&V process (i.e. 2015 in this instance since NTG Factors were not updated as part of the 2016 EM&V process).

The EC's calculation of 2016 LRAMVA balances and 2016 actual achievements used for shareholder incentive amounts are consistent with the OEB's Decisions and guidance. However,

the EC's calculation of 2016 targets used for shareholder incentive amounts contradicts the OEB's Decisions and guidance. Union's Audit-Adjusted targets and subsequent shareholder incentive claim are consistent with all of the OEB's Decisions and guidance and therefore should be approved.

1.2 UNION'S AUDIT-ADJUSTED TARGETS

Table 1 below details the data sources used for prescriptive input assumptions and NTG Factors by the EC to calculate the 2016 Audited shareholder incentive amounts, in contrast to the updated data sources used for prescriptive input assumptions and NTG Factors by Union to calculate its 2016 Audit-Adjusted shareholder incentive amounts.

Table 1

Data Sources Underlying 2016 Audited vs. Audit-Adjusted Targets and Achievements

2016 EC Audited Source Data

	2016 Targets	**2016 Achievements**
Prescriptive Input Assumptions	March 2015 filing	December 2015 filing
Custom CI NTG Factors	2008 NTG Study [(1)]	2015 NTG Study

Notes:
[(1)] For Union's 2016 Resource Acquisition Scorecard's gas savings target.

2016 Union Audit-Adjusted Source Data

	2016 Targets	**2016 Achievements**
Prescriptive Input Assumptions	December 2015 filing	December 2015 filing
Custom CI NTG Factors	2015 NTG Study	2015 NTG Study

While Union applied the custom NTG Factors resulting from the 2008 Custom Projects Attribution Study ("2008 NTG Study") to its 2015 DSM program year targets and achievements to determine its 2015 Audit-Adjusted DSM Deferrals balances, the OEB agreed that it was only appropriate to do so for the 2015 DSM program year because of its unique nature as a roll-

forward or transition year.[13] This treatment does not apply to 2016 because it is not a transition year. Despite Union's previously-expressed concerns with the 2015 NTG Study methodology, Union accepts the OEB's Decision to use the conclusions of the 2015 NTG Study in the calculation of 2015 LRAMVA and to determine Union's 2016 DSM achievements. Union also accepts that the conclusions of the 2015 NTG Study should be used beyond the 2015 DSM program year rather than the 2008 NTG Study. However, consistent with the jurisdictional review conducted by Navigant and included in Union's 2015 DSM Deferrals proceeding,[14] any future NTG study should:

i) use best available methodologies such as fast-feedback surveying to determine free-riders;
ii) include a sensitivity analysis on the scoring and weighting of answers; and,
iii) include a more complete measurement of the effects that Union's DSM activities have had on customer participation, such as training, engineering studies and support of customer policy development that occurred in the past that influenced customers to participate in a DSM program in the study year.[15]

Union's original 2016 Resource Acquisition scorecard target relies on the outdated March 2015 prescriptive input assumptions and NTG Factors from the 2008 NTG Study. Similarly, Union's

[13] EB-2017-0323, Decision and Order (dated July 12, 2018), p. 6.
[14] EB-2017-0323, Exhibit A, Tab 2, Appendix E, Navigant Net-to-Gross Policies: Cross-Cutting Jurisdictional Review, pp. 5-6.
[15] This more fulsome assessment of influence was referred to in Union's 2015 Disposition of DSM Deferral and Variance Accounts application and elsewhere as secondary attribution.

original 2016 Low-Income scorecard targets rely on the outdated March 2015 prescriptive input assumptions. Union's 2016 Large Volume scorecard target is formulaic and its Market Transformation and Performance-Based scorecards do not rely upon input assumptions or NTG Factors. The difference between Audited and Audit-Adjusted targets driven by the updated input assumptions and NTG Factors is discussed for each scorecard below.

Union's 2016 Resource Acquisition Scorecard

Union's original 2016 Resource Acquisition scorecard target was based upon the now-outdated March 2015 prescriptive input assumptions and NTG Factors from the 2008 NTG Study.[16] Unlike Union's 2017-2020 Resource Acquisition scorecard targets, Union's 2016 Resource Acquisition scorecard target is not formulaically tied to 2015 DSM program year results. However, as part of its 2015-2020 DSM Plan, Union developed the 2016 Resource Acquisition scorecard target from the bottom-up in sufficient granularity to account for both specific prescriptive input assumptions and NTG Factors. For reference, Union's original bottom-up approach can be found at Exhibit A, Tab 2, Appendix B, Schedules 1 and 2, and a high-level summary is presented in Table 2 below.

[16] EB-2015-0029, Union Gas Limited 2015-2020 DSM Plan, Exhibit A, Tab 3, p. 43

Table 2

Union's Originally-Approved 2016 Resource Acquisition Cumulative m^3 Target

2016 Offering	**Forecasted Gross Cumulative Gas Savings** (m^3)	**Average NTG Factor** (%)	**Forecasted Net Cumulative Gas Savings Used for Target Setting** (m^3)
Residential Home Reno Rebate	82,053,158	95%(1)	77,950,500
CI Prescriptive	313,130,544 (2)	88% (3)	274,596,193
Direct Install	N/A	N/A	6,699,181 (4)
CI Custom	1,619,770,389	46% (5)	745,094,379
Original RA Scorecard Gas Savings Target (pre-escalation factor)			**1,104,340,253**

Notes:
(1) EB-2015-0029, Union Gas Limited 2015-2020 DSM Plan, Exhibit A, Tab 3, Appendix D
(2) Reflects outdated March 2015 prescriptive input assumptions
(3) Average NTG as per outdated March 2015 prescriptive input assumptions
(4) Fixed target added following OEB Decision
(5) NTG value from the outdated 2008 NTG Study

In its Decision regarding Union's original 2016 targets, the OEB stated that it *"…agree[d] with the intervenors that 2016 targets are not sufficiently aggressive."* Subsequently, the Board *"…consider[ed] a 10% increase to all target metrics to be reasonable."*[17] After a 10% increase, Union's original 2016 Resource Acquisition scorecard target was approved to be 1,214,104,360 m^3.[18]

[17] EB-2015-0029, Decision and Order (dated January 20, 2016), p. 66.
[18] EB-2015-0029, Decision and Order (dated January 20, 2016), Schedule C; As per the Board's EB-2015-0029 Decision and Order (dated January 20, 2016), p. 18, a 10% escalation factor was not applied to the Direct Install component. Thus, the originally-approved Resource Acquisition target was calculated from values in Table 2 as (77,950,500 + 274,596,193 + 745,094,379) × 1.1 + 6,699,181 = 1,214,104,360.

Union's proposed Audit-Adjusted bottom-up approach, which reflects the December 2015 prescriptive input assumptions and NTG Factors from the 2015 NTG Study, can be found at Exhibit A, Tab 2, Appendix B, Schedule 3, and a high level summary is presented in Table 3 below.

Table 3

Union's Proposed Audit-Adjusted 2016 Resource Acquisition Cumulative m^3 Target

2016 Offering	**Forecasted Gross Cumulative Gas Savings** (m^3)	**Average NTG Factor** (%)	**Forecasted Net Cumulative Gas Savings Used for Target Setting** (m^3)
Residential Home Reno Rebate	82,053,158	95%	77,950,500
CI Prescriptive	293,017,870 (1)	90% (2)	263,754,529
Direct Install	N/A	N/A	6,699,181 (3)
CI Custom	1,619,770,389	41% (4)	670,622,623
Updated RA Scorecard Gas Savings Target (pre-escalation factor)			**1,019,026,834**

Notes:
(1) Reflects updated December 2015 prescriptive input assumptions
(2) Average NTG as per updated December 2015 prescriptive input assumptions
(3) Fixed target added following OEB Decision
(4) Average NTG from the updated 2015 NTG Study

Consistent with the OEB's Decision regarding Union's original 2016 Resource Acquisition scorecard target, Union's proposed Audit-Adjusted target includes a 10% escalation factor. Union's proposed Audit-Adjusted 2016 Resource Acquisition scorecard gas savings target is 1,120,259,599 m^3.[19]

[19] Consistent with the Originally-approved 2016 Resource Acquisition scorecard, Union has not applied the 10% escalation factor to Direct Install.

Union's 2016 Low-Income Scorecard

Union's original 2016 Low-Income scorecard target correctly reflects the OEB-approved 95% NTG Factor but still relies upon outdated March 2015 prescriptive input assumptions.[20] Unlike Union's 2017-2020 Low-Income scorecard targets, Union's original 2016 Low-Income scorecard target is not formulaically tied to 2015 DSM program year results. However, as part of its 2015-2020 DSM Plan, Union developed the 2016 Low-Income scorecard target from the bottom-up in sufficient granularity to account for specific prescriptive input assumptions. For reference, Union's original bottom-up approach can be found at Exhibit A, Tab 2, Appendix B, Schedule 4 and a high-level summary is presented in Table 4 below.

Table 4

Union's Originally-Approved 2016 Low-Income Cumulative m^3 Target

Low-Income Scorecard Metric	**Forecasted Gross Cumulative Gas Savings** (m^3)	**OEB-Approved [(1)] Low-Income NTG Factor** (%)	**Forecasted Net Cumulative Gas Savings Used for Target Setting** (m^3) (pre-escalation factor)
Single Family	34,351,225	100%	34,351,225
Social & Assisted Multi-Family	15,517,724 [(2)]	95%	14,741,838
Market Rate Multi-Family	2,526,141 [(2)]	95%	2,399,834

Notes:
[(1)] EB-2015-0029, Union Gas Limited 2015-2020 DSM Plan, Exhibit A, Tab 3, Appendix D
[(2)] Reflects outdated March 2015 prescriptive input assumptions

[20] EB-2015-0029, Union Gas Limited 2015-2020 DSM Plan, Exhibit A, Tab 3, p. 43

Union's original Low-Income scorecard targets also included a 10% escalation factor. Therefore, Union's original 2016 Low-Income scorecard gas savings targets were as follows:[21]

Single Family = 37,786,348 m^3

Social and Assisted Multi-Family = 16,216,022 m^3

Market Rate Multi-Family = 2,639,817 m^3

Union's proposed Audit-Adjusted bottom-up approach, which reflects updated December 2015 prescriptive input assumptions, can be found at Exhibit A, Tab 2, Appendix B, Schedule 5, and a high level summary is presented in Table 5 below.

Table 5

Union's Proposed Audit-Adjusted 2016 Low-Income Cumulative m^3 Target

Low-Income Scorecard Metric	**Forecasted Gross Cumulative Gas Savings** (m^3)	**OEB-Approved (1) Low-Income NTG Factor** (%)	**Forecasted Net Cumulative Gas Savings Used for Target Setting** (m^3) (pre-escalation factor)
Single Family	34,351,225	100%	34,351,225
Social & Assisted Multi-Family	17,654,045 (2)	95%	16,771,342
Market Rate Multi-Family	2,873,914 (2)	95%	2,730,219

Notes:
(1) EB-2015-0029, Union Gas Limited 2015-2020 DSM Plan, Exhibit A, Tab 3, Appendix D
(2) Reflects updated December 2015 prescriptive input assumptions

[21] EB-2015-0029, Decision and Order (dated January 20, 2016), Schedule C.

Consistent with the Board's Decision regarding Union's original 2016 Low-Income scorecard targets, Union's proposed Audit-Adjusted target includes a 10% escalation factor. Union's proposed Audit-Adjusted 2016 Low-Income scorecard gas savings targets are:

Single Family = 37,786,348 m^3

Social and Assisted Multi-Family = 18,448,477 m^3

Market Rate Multi-Family = 3,003,240 m^3

Union's 2016 Large Volume Scorecard

Union's original 2016 Large Volume scorecard target is based on the formula stipulated by the OEB in its Revised Decision on Union's 2015-2020 DSM Plan.[22] Although Union does not believe it is appropriate to consider NTG for a self-direct, self-access program like Large Volume, Union agrees with the EC on how 2016 targets and achievements are calculated for this scorecard. This includes a consistent application of the 2015 NTG Study findings to both targets and achievements, as this is the best information available since NTG Factors were not updated as part of the 2016 EM&V process. However, Union is unable to recreate the EC's target value. Union arrives at a target value of 890,048,620 m^3 while the EC arrives at a target of 890,890,721 m^3 which differs from Union's target value by less than 1%.[23] Consequently, there is no material

[22] EB-2015-0029, Revised Decision and Order (dated February 24, 2016), Schedule C. The 2016 Large Volume 100% target is calculated as a three-year rolling average (2013-2015) Rate T2/Rate 100 cost effectiveness × 2016 budget without overheads × 1.1 × 0.75. Cost-effectiveness is defined as final verified metric achievement used for LRAMVA purposes for a given year divided by actual program spend for the same year.

[23] Union's target of 890,048,620 m^3 was calculated with unrounded values as (627.35 + 308.79 + 91.33) / 3 * 3,150,000 * 1.1 * 0.75.

difference between the EC's and Union's 2016 Large Volume scorecard targets. Union set its Audit-Adjusted 2016 Large Volume scorecard target to match the EC's audited value.

Union notes that the EC's use of the NTG Factors from the 2015 NTG Study for the 2016 Large Volume scorecard targets, is inconsistent with the EC's use of the NTG Factors from the 2008 NTG Study as the basis for Union's 2016 Resource Acquisition scorecard gas savings target. This further supports Union's proposal that the Resource Acquisition gas savings target should be updated to reflect the NTG Factors resulting from the 2015 NTG Study.

Union's 2016 Market Transformation & Performance-Based Scorecards

Union's 2016 Market Transformation and Performance-Based Scorecards do not rely upon input assumptions or NTG Factors. Union agrees with the EC on how targets and achievements are calculated for these scorecards. Consequently, there is no difference between Audited and Audit-Adjusted 2016 Market Transformation and Performance-Based Scorecards.

2. PERSISTENT DELAY IN THE EM&V PROCESS

Compounding the issues detailed in Section 1 is the persistent delay of the EM&V process. Table 6 below summarizes the dates that the audits were finalized for the 2008-2016 DSM program years.

Table 6

DSM Program Year Audit Dates

Program Year	**Audits Finalized**	**Approximate Time Lapse:** DSM Program Year End to Final Audit Report
2008	May 25, 2009	5 months
2009	July 16, 2010	6.5 months
2010	July 29, 2011	7 months
2011	June 12, 2012	5.5 months
2012	September 13, 2013	8.5 months
2013	October 2, 2014	9 months
2014	October 29, 2015	10 months
2015[(1)]	December 20, 2017	24 months
2016	October 30, 2018	22 months

Notes:
(1) 2015 was the first DSM program year subject to the OEB Staff-coordinated EM&V process.

For the time period preceding the recent transition of EM&V coordination to the OEB (starting with the 2015 DSM program year), audit reports were issued and targets were finalized within the program year for which they applied (e.g. 2014 targets were finalized in Q4 of 2014). Not having targets to start a program year makes focused execution of DSM programs within a year challenging, but it was a natural consequence of the previous DSM Frameworks, where formulaic targets based on prior year's audited results have been made available mid-year or later. Therefore, as discussed in Section 1, Union is accustomed to not having final targets established at the beginning of each DSM program year.

However, it is highly problematic for Union to only receive final targets after a program year has concluded. For the 2015, 2016 and 2017 program years, targets were not finalized until after the program year had ended, and the same is anticipated for the 2018 program year. As a result,

Union has not had the opportunity to adapt its ratepayer-funded DSM program delivery strategy within these program years to changes in targets and EM&V-related findings.

The consequences of persistent EM&V-related delays include: (i) inhibiting Union's ability to optimize DSM program delivery to ratepayers who fund Union's programs; (ii) customers impacted by clearance of Union's 2016 DSM deferral and variance account balances in 2019 (i.e. a net refund of $1.547 million for the 2016 DSM program year) are less likely to be the same customers that benefitted from these programs; (iii) accumulation of carrying charges; (iv) customers are required to remember project details that occurred approximately two years previous in many cases, which risks increasing recall bias and subsequently decreases the quality of information underpinning the custom project savings verification ("CPSV"); and, (v) customers cannot benefit from improvements to DSM programs stemming from 2016 audit findings until 2019.

It is imperative that the annual EM&V process correct persistent and accumulative delays in order for Union to: (i) establish certainty of its targets in time for the 2019 and 2020 DSM program years; (ii) ensure that the most recent information is available for consideration in the planning of the next DSM framework; and, (iii) to facilitate the timely clearance of DSM-related deferral and variance accounts.

Union recognizes that efforts have been made to improve the EM&V process in the past 12 months, including the development of a more efficient CPSV process. However, Union remains

concerned that the two-year delay between completion of a DSM program year and the subsequent completion of the related EM&V process has not been significantly improved since the OEB assumed control of the process in 2015. Further, with the 2016 EM&V process spanning over one year, Union fears that the annual EM&V process timeline is lagging further and further behind.

Union's CPSV results have demonstrated stable and high realization rates in the two most recent audits, as shown in Table 7.

Table 7

2015 and 2016 DSM Program Year Realization Rates

Program Area	2015 Realization Rate	2016 Realization Rate
Custom C/I	98%	101%
Custom LV	135%	101%
Custom LI	96%	121%[(1)]

Notes:
[(1)] 2016 custom Low-Income realization rate is taken from the 2015 CPSV study and adjusted for weighting in accordance with the 2016 measure-mix.

Given the strength of Union's 2015 and 2016 CPSV results, which have been acknowledged by the EC to be well documented and well-engineered, Union proposed that the 2016 CPSV results, or a blend of 2015/2016 results, be applied to the 2017 program results – similar to the way that the 2015 CI custom NTG Study was applied to 2016. Despite Union's recommendations to expedite the 2017 EM&V process by adopting an average of 2015/2016 CPSV results, OEB Staff have elected to combine the scope of work for 2017 and 2018 CI CPSV and CI Custom NTG studies, which will run concurrently. Accordingly, and as noted in OEB Staff's draft request for proposal ("RFP") timeline, the 2017 CPSV will not be finalized until December 2019. It is also

worth noting that the 2017 EM&V process contains incremental scope, compared to previous EM&V processes, around CI prescriptive installation verification for four top gas saving measures as well as a NTG study for those measures, and Union is concerned that the scope could be further expanded for both 2017 and 2018 EM&V work. This incremental scope could potentially delay the completion/results of the 2017 EM&V process beyond December 2019.

OEB Staff's decisions in this regard do not demonstrate continuous improvement of the EM&V process. On the contrary, Union expects these decisions to exacerbate the already excessive delay, thereby denying Union the opportunity to adapt its program delivery strategy within any future DSM program year to changes in targets and EM&V-related findings. Adopting past CPSV results to the 2017 program year, as recommended by Union, would ensure a more expeditious conclusion to the 2017 EM&V process and more effective execution of DSM programs.

A significant, coordinated effort must be made to advance the EM&V process timeline in 2018/2019 so that final 2018 audit results are completed and available by mid-2019. A sustainable long-term timeline must be established to maintain efficiencies gained moving forward. This will ensure that 2019 targets are in place within the 2019 DSM program year and will make an additional year of results available to inform development of the next DSM framework. Union also recommends that improvement opportunities be prioritized for the EAC to support committee efficacy, such as the regular creation of meeting agendas with specific time-allotments, capturing high-level meeting minutes and agreement items, and systematically documenting and following up on Action Items.

3. CONCLUSIONS

Fairness and predictability in setting targets and determining results can be achieved by updating targets in the manner Union has outlined. Union's proposed 2016 Audit-Adjusted targets are reasonable and appropriate as they:

i) are consistent with the Board's prior guidance that next year's targets should be based on the previous year's EM&V results; in this case the December 2015 updated prescriptive input assumptions and NTG Factors that are the result of the 2015 annual EM&V process;
ii) maintain a 10% escalation factor to make gas savings targets more aggressive, consistent with the Board's 2015-2020 DSM Decision;
iii) are consistent with target setting as set out in the current DSM framework and ensure that updated results flow into later years' formulaic target setting mechanisms; and,
iv) produce more accurate reporting on gas savings and cost-effectiveness.

Fairness in establishing future NTG Factors can be achieved by aligning future NTG studies with the jurisdictional best practice review conducted by Navigant and included in Union's 2015 Disposition of DSM Deferral and Variance Accounts proceeding.[24] As detailed in Section 1.2 this includes:

i) use of best available methodologies to determine free-riders;
ii) a sensitivity analysis; and,

[24] EB-2017-0323 Exhibit A, Tab 2, Appendix E.

iii) a more complete measurement of the effects that Union's DSM activities have had on customer participation.

Union also does not believe it is appropriate to consider NTG for self-direct self-access programs like its Large Volume program.

Union requests the OEB provide direction on a more complete assessment of NTG and the appropriateness of a NTG Factor for the Large Volume program either through its Decision in this proceeding or as part of the next DSM framework.

It is imperative that the annual EM&V process correct persistent and accumulative delays. As detailed in Section 2, the consequences of persistent EM&V-related delays include:

i) inhibiting optimal DSM program delivery;
ii) inappropriate financial impacts on current customers that did not fund or benefit from Union's 2016 DSM programs (including the accumulation of carrying charges);
iii) uncertainty regarding 2019 and 2020 DSM program year targets;
iv) increased recall bias (undermining the quality of information underpinning EM&V);
v) persistent delay in applying improvements to DSM programs stemming from EM&V; and,
vi) the absence of the most recent and best-available information during the planning of the next DSM framework.

Union urges the OEB to provide direction, through this proceeding, that the 2017 CPSV component of the EM&V process adopt average 2015/2016 CPSV results. This would facilitate clearance of deferral and variance accounts for the 2017 DSM program year in short order, and allow upcoming EM&V activities for the 2018 DSM program year to commence, returning the EM&V process to a more timely schedule.

July 30, 2018

Ms. Kirsten Walli
OEB Secretary
Ontario Energy Board
2300 Yonge Street, 27th Floor
Toronto, ON M4P 1E4

Dear Ms. Walli:

Re: EB-2015-0245 – Union Gas Limited – UPDATED 2016 Scorecards, Demand Side Management Draft Annual Report

The Ontario Energy Board's ("OEB") Filing Guidelines to the Demand Side Management ("DSM") Framework (2015-2020) indicate that the gas utilities should annually prepare a Draft Evaluation Report. On November 16, 2017, in compliance with this direction, Union Gas Limited ("Union") submitted its 2016 DSM Draft Annual Report to the OEB.

Union has updated the targets and results contained within its 2016 DSM Draft Annual Report consistent with the OEB's Decision and Order on Union's application for disposition of its 2015 DSM deferral balances (EB-2017-0323) and the 2015 input assumptions filing (EB-2015-0344),[1] to reflect the findings of the Evaluation Contractor's (DNV GL) 2015 Net to Gross Study report.[2] Specifically, Union has attached updated summary scorecards for each of: (i) Resource Acquisition; (ii) Low-Income; (iii) Large Volume; (iv) Market Transformation; and, (v) Performance Based.

This update is consistent with the OEB's confirmation that input assumptions and Net-to-Gross adjustment factors are finalized for a given year based on the previous year's final DSM audit, thereby ensuring that targets and achievements are based on the same set of input assumptions and Net-to-Gross adjustment factors.[3]

This submission has been made directly to the Board Secretary consistent with past practice. Union assumes that the OEB will distribute this information to the appropriate parties. However, Union will comply with any direction from the OEB to distribute this information to other parties.

If you have any questions on the above or would like to discuss in more detail, please contact me at 519-436-4558.

[1] EB-2015-0344 New and Updated DSM Measures – Joint Submission from Union Gas Ltd. and Enbridge Gas Distribution (dated December 16, 2015).
[2] Subject to the Evaluation Contractor's application of the findings of the Net to Gross Study to Union's 2016 DSM results.
[3] EB-2017-0323 OEB Decision and Order (dated July 12, 2018), pp. 6-7; EB-2015-0029 Union Gas Limited 2015-2020 DSM Plan – Written Comments, p. 3; EB-2015-0029 Revised OEB Decision and Order, p. 3.

Yours truly,

[Original signed by]

Adam Stiers
Specialist, Regulatory Initiatives

c.c.: Myriam Seers, Torys *(by email)*
Valerie Bennett, OEB *(by email)*
Josh Wasylyk, OEB *(by email)*

Updated 2016
Demand Side Management
Draft Annual Report

July 30, 2018

Table 5.0 Updated 2016 Resource Acquisition Scorecard Results[1]

Metrics	Metric Target Levels			Weight	Achievement	% of Metric Achieved	Weighted % of Scorecard Achieved
	Lower Band	Target	Upper Band				
Cumulative Natural Gas Savings (m3)	840,194,699[2]	1,120,259,599[2]	1,680,389,398[2]	75%	909,034,480[3]	81%	61%
Home Reno Rebate Participants (Homes)	2,475	3,300	4,950	25%	6,595	200%	50%
					Total Scorecard Target Achieved		***111%***
					Scorecard Utility Incentive Achieved		***$3,392,124***

Table 6.0 Updated 2016 Low-Income Scorecard Results[4]

Metrics	Metric Target Levels			Weight	Achievement	% of Metric Achieved	Weighted % of Scorecard Achieved
	Lower Band	Target	Upper Band				
Single Family Cumulative Natural Gas Savings (m^3)	28,339,761	37,786,348	56,679,521	60%	46,378,958[3]	123%	74%
Social and Assisted Multi-Family Cumulative Natural Gas Savings (m^3)	13,836,358	18,448,477	27,672,716	35%	10,187,613[3]	55%	19%
Market Rate Multi-Family Cumulative Natural Gas Savings (m^3)	2,252,430	3,003,240	4,504,860	5%	8,142,189[3]	200%	10%
					Total Scorecard Target Achieved		***103%***
					Scorecard Utility Incentive Achieved		***$1,139,248***

[1] Draft table can be found in Union's 2016 DSM Draft Annual Report (dated November 16, 2017), p. 28.
[2] Targets updated to reflect the findings of the Evaluation Contractor's (DNV GL) 2015 Net To Gross Study report and the New and Updated DSM Measures (EB-2015-0344) – Joint Submission from Union Gas Ltd. and Enbridge Gas Distribution (dated December 16, 2015).
[3] Results updated to reflect the findings of the Evaluation Contractor's (DNV GL) 2015 Net To Gross Study report and the New and Updated DSM Measures (EB-2015-0344) – Joint Submission from Union Gas Ltd. and Enbridge Gas Distribution (dated December 16, 2015).
[4] Draft table can be found in Union's 2016 DSM Draft Annual Report (dated November 16, 2017), p. 55.

Table 7.0 2016 Large Volume Rate T2/Rate 100 Scorecard Results[5]

Metrics	Metric Target Levels			Weight	Achievement	% of Metric Achieved	Weighted % of Scorecard Achieved
	Lower Band	Target	Upper Band				
Cumulative Natural Gas Savings (m^3)	667,536,465[2]	890,048,620[2]	1,335,072,930[2]	100%	64,662,363[3]	7%	7%
					Total Scorecard Target Achieved		***7%***
					Scorecard Utility Incentive Achieved		***$0***

Table 8.0 2016 Market Transformation Scorecard Results[6]

Metrics	Metric Target Levels			Weight	Achievement	% of Metric Achieved	Weighted % of Scorecard Achieved
	Lower Band	Target	Upper Band				
Optimum Home: Homes Built (>20% above OBC 2012) by Participating Builders	53%	70%	100%	50%	70.09%	100%	50%
Commercial New Construction: New Developments Enrolled by Participating Builders	6	8	12	50%	0	0%	0%
					Total Scorecard Target Achieved		***50%***
					Scorecard Utility Incentive Achieved		***$0***

Table 9.0 2016 Performance-Based Scorecard Results[7]

Metrics	Metric Target Levels			Weight	Achievement	% of Metric Achieved	Weighted % of Scorecard Achieved
	Lower Band	Target	Upper Band				
RunSmart Participants	21	28	41	50%	32	115%	58%
Strategic Energy Management Participants	2	3	5	50%	3	100%	50%
					Total Scorecard Target Achieved		***108%***
					Scorecard Utility Incentive Achieved		***$61,844***

[5] Draft table can be found in Union's 2016 DSM Draft Annual Report (dated November 16, 2017), p. 70.
[6] Draft table can be found in Union's 2016 DSM Draft Annual Report (dated November 16, 2017), p. 76.
[7] Draft table can be found in Union's 2016 DSM Draft Annual Report (dated November 16, 2017), p. 87.

UNION GAS LIMITED

Resource Acquisition Scorecard - Original and Audit-Adjusted Residential Home Reno Rebate 2016 Target Calculation

	Forecasted Units	Total Gross Cumulative Gas Savings (m^3)	Total Net Cumulative Gas Savings (m^3)	Input Assumptions (1)			
Measure/Offering	**2016**	**2016**	**2016**	**Equipment Life**	**Free Rider Rate**	**Adjustment Factor**	**Natural Gas Savings (m^3) per unit**
Home Reno Rebate	3,000	82,053,158	77,950,500	25	5%	100%	1,094
Total		**82,053,158**	**77,950,500**				

Notes:

(1) Residential inputs into the 2016 Resource Acquisition scorecard gas savings target are the same for both Union's Original 2016 scorecard and its proposed Audit-Adjusted scorecard

UNION GAS LIMITED
Resource Acquisition Scorecard - Original Commercial/Industrial 2016 Target Calculation

Measure/Offering	Forecasted Units	Total Gross Cumulative Gas Savings (m^3)	Total Net Cumulative Gas Savings (m^3)	Input Assumptions					
	2016	2016	2016	Equipment Life	Free Rider Rate	Adjustment Factor	Natural Gas Savings (m^3) per unit	Average Capacity per unit	Natural Gas Savings (m^3) per capacity
Energy Star Fryer -Energy Star- New/Existing	100	1,689,600	1,351,680	12	20%	100%	1,408	NA	NA
Energy Star Convection Ovens - Full Size-Energy Star- New/Existing	15	154,080	123,264	12	20%	100%	856	NA	NA
Energy Star Steam Cookers-Energy Star- New/Existing	5	533,340	426,672	12	20%	100%	8,889	NA	NA
Air Curtains-Double door-Existing	8	183,480	174,306	15	5%	100%	1,529	NA	NA
Air Curtains-Shipping and Receiving Doors (10 x 10)-New/Existing	13	4,017,975	3,817,076	15	5%	100%	20,605	NA	NA
Air Curtains-Shipping and Receiving Doors (8 x 10)-New/Existing	1	141,855	134,762	15	5%	100%	9,457	NA	NA
Air Curtains-Shipping and Receiving Doors (8 x 8)-New/Existing	3	340,425	323,404	15	5%	100%	7,565	NA	NA
Air Curtains-Single door-Existing	30	300,150	285,143	15	5%	100%	667	NA	NA
Condensing Boiler - Space Heating (200 to 299 Mbtu/h)-90% AFUE-New	32	2,157,370	2,049,501	25	5%	100%	2,697	264,643	0.0102
Condensing Boiler - Space Heating (200 to 299 Mbtu/h)-90% AFUE-Existing	100	6,587,759	6,258,371	25	5%	100%	2,635	258,597	0.0102
Condensing Boilers - Space Heating, 300 to 999 MBTUH-88% seasonal efficiency-New/Existing	245	32,115,629	30,509,848	25	5%	100%	5,243	504,170	0.0104
Condensing Boilers - Space Heating, 1,000 and above MBTUH-88% seasonal efficiency-New/Existing	135	62,886,529	59,742,202	25	5%	100%	18,633	1,791,639	0.0104
Condensing Rooftop Units (MUA) All other Commercial Efficiency + 2 speed 1000 -4999 cfm--New/Existing	3	270,000	256,500	15	5%	100%	6,000	4,800	1.2500
Condensing Rooftop Units (MUA) All other Commercial Efficiency + 2 speed≥ 5000 cfm --New/Existing	1	112,463	106,839	15	5%	100%	7,498	5,998	1.2500
Condensing Rooftop Units (MUA) All other Commercial Efficiency + VFDs >1000 -4999 cfm--New/Existing	13	1,022,042	970,940	15	5%	100%	5,241	2,532	2.0700
Condensing Rooftop Units (MUA) All other Commercial Efficiency + VFDs≥ 5000 cfm [15]--New/Existing	7	2,347,597	2,230,217	15	5%	100%	22,358	10,801	2.0700
Condensing Rooftop Units (MUA) All other Commercial Efficiency Improved efficiency 1000 -4999 cfm --New/Existing	8	147,157	139,799	15	5%	100%	1,226	2,991	0.4100
Condensing Rooftop Units (MUA) All other Commercial Efficiency Improved efficiency≥5000 cfm --New/Existing	3	231,234	219,672	15	5%	100%	5,139	12,533	0.4100
Condensing Rooftop Units (MUA) Multifamily & Healthcare Efficiency + 2 speed 1000 -4999 cfm--New/Existing	5	523,800	497,610	15	5%	100%	6,984	3,600	1.9400
Condensing Rooftop Units (MUA) Multifamily & Healthcare Efficiency + 2 speed≥ 5000 cfm --New/Existing	1	232,800	221,160	15	5%	100%	15,520	8,000	1.9400
Condensing Rooftop Units (MUA) Multifamily & Healthcare Efficiency + VFDs 1000 -4999 cfm--New/Existing	12	1,892,160	1,797,552	15	5%	100%	10,512	3,600	2.9200

Condensing Rooftop Units (MUA) Multifamily & Healthcare Efficiency + VFD≥ 5000 cfm -- New/Existing	4	1,752,000	1,664,400	15	5%	100%	29,200	10,000	2.9200
Condensing Rooftop Units (MUA) Multifamily & Healthcare Improved efficiency 1000 -4999 cfm--New/Existing	10	439,236	417,274	15	5%	100%	2,928	3,486	0.8400
Condensing Rooftop Units (MUA) Multifamily & Healthcare Improved efficiency≥ 5000 cfm -- New/Existing	3	265,243	251,980	15	5%	100%	5,894	7,017	0.8400
DCV Office – RTU/MUA < 2,500 sq ft ventilated with CO2 Sensor -Demand Controlled Ventilation (DCV) controls with CO2 sensors -New w/o maintenance plan	4	4,480	3,584	10	20%	100%	112	1,000	0.1120
DCV Retail - RTU/MUA < 5,000 sq ft ventilated with CO2 Sensor-Demand Controlled Ventilation (DCV) controls with CO2 sensors -New w/o maintenance plan	30	205,212	164,170	10	20%	100%	684	1,745	0.3920
DCV Retail – RTU/MUA ≥ 5,000 sq ft ventilated with CO2 Sensor-Demand Controlled Ventilation (DCV) controls with CO2 sensors -New w/o maintenance plan	40	1,410,259	1,128,207	10	20%	100%	3,526	8,994	0.3920
DCV Office – RTU/MUA < 2,500 sq ft ventilated with CO2 Sensor -Demand Controlled Ventilation (DCV) controls with CO2 sensors -Retrofit w/o maintenance plan	26	59,347	56,379	10	5%	100%	228	2,038	0.1120
DCV Office – RTU/MUA ≥ 2,500 sq ft with CO2 Sensor -Demand Controlled Ventilation (DCV) controls with CO2 sensors -Retrofit w/o maintenance plan	20	87,114	82,758	10	5%	100%	436	3,889	0.1120
DCV Retail - RTU/MUA < 5,000 sq ft ventilated with CO2 Sensor-Demand Controlled Ventilation (DCV) controls with CO2 sensors -Retrofit w/o maintenance plan	7	98,784	93,845	10	5%	100%	1,411	3,600	0.3920
DCV Retail – RTU/MUA ≥ 5,000 sq ft ventilated with CO2 Sensor-Demand Controlled Ventilation (DCV) controls with CO2 sensors -Retrofit w/o maintenance plan	53	1,895,187	1,800,427	10	5%	100%	3,576	9,122	0.3920
Demand Control Kitchen Ventilation -0 - 4,999 CFM-New/Existing	12	864,180	820,971	15	5%	100%	4,801	NA	NA
Demand Control Kitchen Ventilation -10,000 - 15,000 CFM-New/Existing	7	1,987,020	1,887,669	15	5%	100%	18,924	NA	NA
Demand Control Kitchen Ventilation -5,000 - 9,999 CFM-New/Existing	21	3,618,090	3,437,186	15	5%	100%	11,486	NA	NA
Destratification Fans - -New/Existing	120	21,765,200	19,588,680	15	10%	100%	12,092	24,184	0.5000
ERV 1- up to 1999 cfm MURB,Healthcare,Nursing- Ventilation with ERV -New Construction	155	2,116,032	2,010,230	14	5%	100%	975	169	5.7700
ERV 1- up to 1999 cfm MURB,Healthcare,Nursing- Ventilation with ERV -Retrofit	12	1,200,891	1,140,846	14	5%	100%	7,148	1,168	6.1200
ERV 2- => 2000 cfm MURB,Healthcare,Nursing- Ventilation with ERV -New Construction	33	9,370,076	8,901,572	14	5%	100%	20,282	3,515	5.7700
ERV 2- => 2000 cfm MURB,Healthcare,Nursing- Ventilation with ERV -Retrofit	12	4,843,662	4,601,479	14	5%	100%	28,831	4,711	6.1200
ERV 3- up to 1999 cfm Hotel,Restaurant,Retail- Ventilation with ERV -New Construction	40	1,303,260	1,238,097	14	5%	100%	2,327	725	3.2100
ERV 3- up to 1999 cfm Hotel,Restaurant,Retail- Ventilation with ERV -Retrofit	20	675,920	642,124	14	5%	100%	2,414	710	3.4000
ERV 4- => 2000 cfm Hotel,Restaurant,Retail- Ventilation with ERV -New Construction	16	2,986,892	2,837,548	14	5%	100%	13,334	4,154	3.2100
ERV 4- => 2000 cfm Hotel,Restaurant,Retail- Ventilation with ERV -Retrofit	11	4,061,565	3,858,487	14	5%	100%	26,374	7,757	3.4000
ERV 5- up to 1999 cfm All Other Commercial-New Construction	70	1,639,344	1,557,377	14	5%	100%	1,673	816	2.0500
ERV 5- up to 1999 cfm All Other Commercial -Retrofit	195	3,868,437	3,675,015	14	5%	100%	1,417	653	2.1700
ERV 6- => 2000 cfm All Other Commercial -New Construction	41	4,789,169	4,549,711	14	5%	100%	8,344	4,070	2.0500
ERV 6- => 2000 cfm All Other Commercial -Retrofit	45	6,233,976	5,922,277	14	5%	100%	9,895	4,560	2.1700

HRV >2,000cfm-Hotel, Restaurant, Retail, Rec - Ventilation with HRV -New Construction	1	106,624	101,293	14	5%	100%	7,616	3,200	2.3800
HRV >2,000cfm-Hotel, Restaurant, Retail, Rec - Ventilation with HRV -Retrofit	1	146,160	138,852	14	5%	100%	10,440	4,000	2.6100
HRV 500 to 2,000cfm-Hotel, Restaurant, Retail, Rec - Ventilation with HRV -New Construction	2	35,253	33,490	14	5%	100%	1,259	529	2.3800
HRV 500 to 2,000cfm-Hotel, Restaurant, Retail, Rec - Ventilation with HRV -Retrofit	6	212,224	201,613	14	5%	100%	2,526	968	2.6100
HRV ≥2,000cfm- All Other Commercial -New Construction	17	2,163,325	2,055,159	14	5%	100%	9,090	5,980	1.5200
HRV ≥2,000cfm-All Other Commercial -Retrofit	21	4,766,434	4,528,112	14	5%	100%	16,212	9,708	1.6700
HRV 500 to 2,000cfm - All Other Commercial -New Construction	25	245,252	232,989	14	5%	100%	701	461	1.5200
HRV 500 to 2,000cfm - All Other Commercial -Retrofit	33	745,308	708,042	14	5%	100%	1,613	966	1.6700
HRV ≥2,000cfm Multi Family, Health Care, Nursing - Ventilation with HRV -New Construction	17	3,819,900	3,628,905	14	5%	100%	16,050	3,750	4.2800
HRV ≥2,000cfm Multi Family, Health Care, Nursing - Ventilation with HRV - Retrofit	5	658,000	625,100	14	5%	100%	9,400	2,000	4.7000
HRV 500 to 2,000cfm Multi Family, Health Care, Nursing - Ventilation with HRV -New Construction	1	24,867	23,623	14	5%	100%	1,776	415	4.2800
HRV 500 to 2,000cfm Multi Family, Health Care, Nursing - Ventilation with HRV -Retrofit	1	27,044	25,692	14	5%	100%	1,932	411	4.7000
Single Stage & High Intensity Infrared Heaters-20,000 - 99,999 BTU/hr-New/Existing	400	6,321,139	4,235,163	20	33%	100%	790	54,871	0.0144
2-Stage Infrared Heaters-20,000 - 99,999 BTU/hr-New/Existing	200	6,394,221	4,284,128	20	33%	100%	1,599	66,056	0.0242
Single Stage & High Intensity Infrared Heaters-100,000 - 300,000 BTU/hr-New/Existing	800	31,507,430	21,109,978	20	33%	100%	1,969	136,751	0.0144
2-Stage Infrared Heaters-100,000 - 300,000 BTU/hr-New/Existing	400	25,788,875	17,278,546	20	33%	100%	3,224	133,207	0.0242
Ozone WE =< 60 lbs cap & 100,000 to 199,999lbs/yr. Used 2014 avg of 111,600 lbs/yr. - New/Retrofit	35	2,150,253	1,978,233	15	8%	100%	4,096	111,600	0.0367
Ozone WE =< 60 lbs cap & => 200,000 lbs/yr. Used 2014 avg of 251,300 lbs/yr. - New/Retrofit	40	5,533,604	5,090,916	15	8%	100%	9,223	251,299	0.0367
Ozone WE >60 lbs & =< 120lbs & => 200,000 lbs/yr. Used 2014 avg of 328,500 lbs/yr. - New/Retrofit	8	1,446,714	1,330,977	15	8%	100%	12,056	328,500	0.0367
Ozone WE > 120lbs & <500lbs & => 260,000 lbs/yr. Used 2014 avg of 463,283 lbs/yr. - New/Retrofit	8	2,040,298	1,877,074	15	8%	100%	17,002	463,283	0.0367
Condensing Boiler - DHW (200 to 299 Mbtu/h)-90% or greater AFUE- Existing	12	797,198	757,338	25	5%	100%	2,657	266,800	0.0100
Condensing Boiler - DHW (100 to 199 Mbtu/h)-90% or greater AFUE-New	4	199,800	189,810	25	5%	100%	1,998	150,000	0.0133
Condensing Boiler - DHW (300 to 599 Mbtu/h)-90% or greater AFUE-New/Existing	25	2,005,498	1,905,223	25	5%	100%	3,209	436,571	0.0074
Condensing Boiler - DHW (1000 to 1499 Mbtu/h)-90% or greater AFUE-New/Existing	7	1,408,750	1,338,313	25	5%	100%	8,050	1,250,000	0.0064
Condensing Gas Water Heater (1,000gal/day)- 95% thermal efficiency - New/Existing	105	2,117,115	2,011,259	13	5%	100%	1,551	NA	NA
Condensing Gas Water Heater (100gal/day)- 95% thermal efficiency - New/Existing	25	107,900	102,505	13	5%	100%	332	NA	NA

Condensing Gas Water Heater (500gal/day)- 95% thermal efficiency - New/Existing	50	567,450	539,078	13	5%	100%	873	NA	NA
Energy Star Dishwasher - Rack Conveyor - Multi Tank - High Temperature - Purchase	2	84,960	62,021	20	27%	100%	2,124	NA	NA
Energy Star Dishwasher - Rack Conveyor - Single Tank - High Temperature - Purchase	15	168,000	122,640	20	27%	100%	560	NA	NA
Energy Star Dishwasher - Stationary Rack - Door Type - High Temperature - Purchase	35	484,050	387,240	15	20%	100%	922	NA	NA
Energy Star Dishwasher - Stationary Rack - Door Type - Low Temperature - Purchase	140	4,452,000	3,561,600	15	20%	100%	2,120	NA	NA
Energy Star Dishwasher - Stationary Rack - Single Rack - High Temperature - Purchase	4	55,320	44,256	15	20%	100%	922	NA	NA
Energy Star Dishwasher - Stationary Rack - Single Rack - Low Temperature - Purchase	4	127,200	101,760	15	20%	100%	2,120	NA	NA
Energy Star Dishwasher - Undercounter - High Temperature - Purchase	21	29,820	17,892	10	40%	100%	142	NA	NA
Energy Star Dishwasher - Undercounter - Low Temperature - Purchase	4	13,320	7,992	10	40%	100%	333	NA	NA
High Efficiency Under-Fired Broiler - Three Foot - New/Replace	8	241,056	192,845	12	20%	100%	2,511	NA	NA
High Efficiency Under-Fired Broiler - Four Foot - New/Replace	8	321,312	257,050	12	20%	100%	3,347	NA	NA
High Efficiency Under-Fired Broiler - Five Foot - New/Replace	7	351,456	281,165	12	20%	100%	4,184	NA	NA
High Efficiency Under-Fired Broiler - Six Foot - New/Replace	7	421,764	337,411	12	20%	100%	5,021	NA	NA
Condensing Unit Heaters - New/Replace	60	1,022,220	1,022,220	18	0%	100%	947	150,000	0.0063
High Efficiency Condensing Furnace - Replacement	60	138,240	114,048	18	17.5%	100%	128	75,294	0.0017
Commercial Condensing Tankless Gas Water Heater - Low <200 kBtu/hr - Elementary schools, office, retail, churches - New/Replacement	15	81,000	79,380	20	2%	100%	270	150,285	0.0007
Commercial Condensing Tankless Gas Water Heater - Low >200 kBtu/hr - Elementary schools, office, retail, churches - New/Replacement	15	122,400	119,952	20	2%	100%	408	249,714	0.0007
Commercial Condensing Tankless Gas Water Heater - Medium <200 kBtu/hr - Secondary schools, fast food restaurant, dormitories, other - New/Replacement	20	138,000	135,240	20	2%	100%	345	150,166	0.0012
Commercial Condensing Tankless Gas Water Heater - Medium >200 kBtu/hr - Secondary schools, fast food restaurant, dormitories, other - New/Replacement	20	213,200	208,936	20	2%	100%	533	249,833	0.0012
Commercial Condensing Tankless Gas Water Heater - High <200 kBtu/hr - Fitness center, full service restaurant, hotels, in patient health care - New/Replacement	25	210,000	205,800	20	2%	100%	420	150,118	0.0017
Commercial Condensing Tankless Gas Water Heater - High >200 kBtu/hr - Fitness center, full service restaurant, hotels, in patient health care - New/Replacement	25	291,500	285,670	20	2%	100%	583	205,765	0.0017
CEE Tier 2 Front-Loading Clothes Washer. Multi-Family - New/Replacement	600	772,200	694,980	11	10%	100%	117	NA	NA
Energy Star Front-Loading Clothes Washer. Multi-Family - New/Replacement	15	12,540	6,521	11	48%	100%	76	NA	NA
Boiler Load Controls - Basic - CI (Purchase)	10	531,300	478,170	15	10%	100%	3,542	NA	NA
Boiler Load Controls - Basic - MURBs (Purchase)	10	357,000	321,300	15	10%	100%	2,380	NA	NA
Boiler Load Controls - Temp Sensor - MURBs (Existing Buildings)	8	1,025,160	922,644	15	10%	100%	8,543	NA	NA

Boiler Load Controls - Temp Sensor - MURBs (New Buildings)	2	187,200	168,480	15	10%	100%	6,240	NA	NA
DCV Office – RTU/MUA < 2,500 sq ft ventilated with CO2 Sensor -Demand Controlled Ventilation (DCV) controls with CO2 sensors -New w/o maintenance plan	5	5,600	4,480	10	20%	100%	112	1,000	0.1120
DCV Office – RTU/MUA ≥ 2,500 sq ft with CO2 Sensor -Demand Controlled Ventilation (DCV) controls with CO2 sensors -New w/o maintenance plan	5	14,000	11,200	10	20%	100%	280	2,500	0.1120
DCV Retail - RTU/MUA < 5,000 sq ft ventilated with CO2 Sensor-Demand Controlled Ventilation (DCV) controls with CO2 sensors -New w/o maintenance plan	20	136,808	109,446	10	20%	100%	684	1,745	0.3920
DCV Retail – RTU/MUA ≥ 5,000 sq ft ventilated with CO2 Sensor-Demand Controlled Ventilation (DCV) controls with CO2 sensors -New w/o maintenance plan	20	705,130	564,104	10	20%	100%	3,526	8,994	0.3920
DCV Office – RTU/MUA < 2,500 sq ft ventilated with CO2 Sensor -Demand Controlled Ventilation (DCV) controls with CO2 sensors -Retrofit w/o maintenance plan	20	45,651	43,369	10	5%	100%	228	2,038	0.1120
DCV Office – RTU/MUA ≥ 2,500 sq ft with CO2 Sensor -Demand Controlled Ventilation (DCV) controls with CO2 sensors -Retrofit w/o maintenance plan	15	65,335	62,068	10	5%	100%	436	3,889	0.1120
DCV Retail - RTU/MUA < 5,000 sq ft ventilated with CO2 Sensor-Demand Controlled Ventilation (DCV) controls with CO2 sensors -Retrofit w/o maintenance plan	5	70,560	67,032	10	5%	100%	1,411	3,600	0.3920
DCV Retail – RTU/MUA ≥ 5,000 sq ft ventilated with CO2 Sensor-Demand Controlled Ventilation (DCV) controls with CO2 sensors -Retrofit w/o maintenance plan	30	1,072,747	1,019,110	10	5%	100%	3,576	9,122	0.3920
Combination Boiler - Multi Family Residential	10	2,397,840	2,277,948	24	5%	100%	9,991	NA	NA
General Services Custom	178	165,932,317	76,328,865.65	17	54%	100%	54,901	NA	NA
Contract Custom	318	1,453,838,072	668,765,513	16	54%	100%	279,839	NA	NA
Total CI		**1,932,900,933**	**1,019,690,572**						

UNION GAS LIMITED
Resource Acquisition Scorecard - Audit-Adjusted Commercial/Industrial 2016 Target Calculation

	Units	Total Gross Cumulative Gas Savings (m^3)	Total Net Cumulative Gas Savings (m^3)	Input Assumptions (1)						
Measure/Offering	2016	2016	2016	Equipment Life	Free Rider Rate	Spillover	Adjustment Factor	Natural Gas Savings (m^3) per unit	Average Capacity per unit	Natural Gas Savings (m^3) per capacity
Energy Star Fryer -Energy Star- New/Existing	100	1,689,600	1,351,680	12	20%		100%	1,408	NA	NA
Energy Star Convection Ovens - Full Size-Energy Star- New/Existing	15	154,080	123,264	12	20%		100%	856	NA	NA
Energy Star Steam Cookers-Energy Star- New/Existing	5	533,340	426,672	12	20%		100%	8,889	NA	NA
Air Curtains-Double door-Existing	8	183,480	174,306	15	5%		100%	1,529	NA	NA
Air Curtains-Shipping and Receiving Doors (10 x 10)-New/Existing	13	4,055,220	3,852,459	15	5%		100%	20,796	NA	NA
Air Curtains-Shipping and Receiving Doors (8 x 10)-New/Existing	1	227,025	215,674	15	5%		100%	15,135	NA	NA
Air Curtains-Shipping and Receiving Doors (8 x 8)-New/Existing	3	544,860	517,617	15	5%		100%	12,108	NA	NA
Air Curtains-Single door-Existing	30	729,900	693,405	15	5%		100%	1,622	NA	NA
Condensing Boiler - Space Heating (200 to 299 Mbtu/h)-90% AFUE-New	32	2,157,370	2,049,501	25	5%		100%	2,697	264,643	0.0102
Condensing Boiler - Space Heating (200 to 299 Mbtu/h)-90% AFUE-Existing	100	6,587,759	6,258,371	25	5%		100%	2,635	258,597	0.0102
Condensing Boilers - Space Heating, 300 to 999 MBTUH-88% seasonal efficiency-New/Existing	245	32,115,629	30,509,848	25	5%		100%	5,243	504,170	0.0104
Condensing Boilers - Space Heating, 1,000 and above MBTUH-88% seasonal efficiency-New/Existing	135	62,886,529	59,742,202	25	5%		100%	18,633	1,791,639	0.0104
Condensing Rooftop Units (MUA) All other Commercial Efficiency + 2 speed 1000 -4999 cfm--New/Existing	3	351,360	333,792	20	5%		100%	5,856	4,800	1.2200
Condensing Rooftop Units (MUA) All other Commercial Efficiency + 2 speed ≥ 5000 cfm --New/Existing	1	146,351	139,034	20	5%		100%	7,318	5,998	1.2200
Condensing Rooftop Units (MUA) All other Commercial Efficiency + VFDs >1000 -4999 cfm--New/Existing	13	1,336,390	1,269,570	20	5%		100%	5,140	2,532	2.0300
Condensing Rooftop Units (MUA) All other Commercial Efficiency + VFDs ≥ 5000 cfm [15]--New/Existing	7	3,069,644	2,916,162	20	5%		100%	21,926	10,801	2.0300
Condensing Rooftop Units (MUA) All other Commercial Efficiency Improved efficiency 1000 -4999 cfm --New/Existing	8	194,774	185,035	20	5%		100%	1,217	2,991	0.4070
Condensing Rooftop Units (MUA) All other Commercial Efficiency Improved efficiency ≥ 5000 cfm --New/Existing	3	306,056	290,753	20	5%		100%	5,101	12,533	0.4070
Condensing Rooftop Units (MUA) Multifamily & Healthcare Efficiency + 2 speed 1000 -4999 cfm--New/Existing	5	882,000	837,900	20	5%		100%	8,820	3,600	2.4500
Condensing Rooftop Units (MUA) Multifamily & Healthcare Efficiency + 2 speed ≥ 5000 cfm --New/Existing	1	392,000	372,400	20	5%		100%	19,600	8,000	2.4500
Condensing Rooftop Units (MUA) Multifamily & Healthcare Efficiency + VFDs 1000 -4999 cfm--New/Existing	12	2,592,000	2,462,400	20	5%		100%	10,800	3,600	3.0000
Condensing Rooftop Units (MUA) Multifamily & Healthcare Efficiency + VFDs ≥ 5000 cfm --New/Existing	4	2,400,000	2,280,000	20	5%		100%	30,000	10,000	3.0000
Condensing Rooftop Units (MUA) Multifamily & Healthcare Improved efficiency 1000 -4999 cfm--New/Existing	10	640,727	608,690	20	5%		100%	3,204	3,486	0.9190

Condensing Rooftop Units (MUA) Multifamily & Healthcare Improved efficiency≥ 5000 cfm --New/Existing	3	386,917	367,572	20	5%		100%	6,449	7,017	0.9190
DCV Office – RTU/MUA < 2,500 sq ft ventilated with CO2 Sensor -Demand Controlled Ventilation (DCV) controls with CO2 sensors -New w/o maintenance plan	4	4,480	3,584	10	20%		100%	112	1,000	0.1120
DCV Retail - RTU/MUA < 5,000 sq ft ventilated with CO2 Sensor-Demand Controlled Ventilation (DCV) controls with CO2 sensors -New w/o maintenance plan	30	205,212	164,170	10	20%		100%	684	1,745	0.3920
DCV Retail – RTU/MUA ≥ 5,000 sq ft ventilated with CO2 Sensor-Demand Controlled Ventilation (DCV) controls with CO2 sensors -New w/o maintenance plan	40	1,410,259	1,128,207	10	20%		100%	3,526	8,994	0.3920
DCV Office – RTU/MUA < 2,500 sq ft ventilated with CO2 Sensor -Demand Controlled Ventilation (DCV) controls with CO2 sensors -Retrofit w/o maintenance plan	26	59,347	56,379	10	5%		100%	228	2,038	0.1120
DCV Office – RTU/MUA ≥ 2,500 sq ft with CO2 Sensor -Demand Controlled Ventilation (DCV) controls with CO2 sensors -Retrofit w/o maintenance plan	20	87,114	82,758	10	5%		100%	436	3,889	0.1120
DCV Retail - RTU/MUA < 5,000 sq ft ventilated with CO2 Sensor-Demand Controlled Ventilation (DCV) controls with CO2 sensors -Retrofit w/o maintenance plan	7	98,784	93,845	10	5%		100%	1,411	3,600	0.3920
DCV Retail – RTU/MUA ≥ 5,000 sq ft ventilated with CO2 Sensor-Demand Controlled Ventilation (DCV) controls with CO2 sensors -Retrofit w/o maintenance plan	53	1,895,187	1,800,427	10	5%		100%	3,576	9,122	0.3920
Demand Control Kitchen Ventilation -0 - 4,999 CFM-New/Existing	12	757,260	719,397	15	5%		100%	4,207	NA	NA
Demand Control Kitchen Ventilation -10,000 - 15,000 CFM-New/Existing	7	1,840,545	1,748,518	15	5%		100%	17,529	NA	NA
Demand Control Kitchen Ventilation -5,000 - 9,999 CFM-New/Existing	21	3,312,855	3,147,212	15	5%		100%	10,517	NA	NA
Destratification Fans - -New/Existing	120	21,765,200	19,588,680	15	10%		100%	12,092	24,184	0.5000
ERV 1- up to 1999 cfm MURB,Healthcare,Nursing- Ventilation with ERV -New Construction	155	2,435,087	2,313,333	14	5%		100%	1,122	169	6.6400
ERV 1- up to 1999 cfm MURB,Healthcare,Nursing- Ventilation with ERV -Retrofit	12	1,302,927	1,237,781	14	5%		100%	7,756	1,168	6.6400
ERV 2- => 2000 cfm MURB,Healthcare,Nursing- Ventilation with ERV -New Construction	33	10,782,895	10,243,750	14	5%		100%	23,340	3,515	6.6400
ERV 2- => 2000 cfm MURB,Healthcare,Nursing- Ventilation with ERV -Retrofit	12	5,255,215	4,992,454	14	5%		100%	31,281	4,711	6.6400
ERV 3- up to 1999 cfm Hotel,Restaurant,Retail- Ventilation with ERV -New Construction	40	1,494,080	1,419,376	14	5%		100%	2,668	725	3.6800
ERV 3- up to 1999 cfm Hotel,Restaurant,Retail- Ventilation with ERV -Retrofit	20	731,584	695,005	14	5%		100%	2,613	710	3.6800
ERV 4- => 2000 cfm Hotel,Restaurant,Retail- Ventilation with ERV -New Construction	16	3,424,225	3,253,014	14	5%		100%	15,287	4,154	3.6800
ERV 4- => 2000 cfm Hotel,Restaurant,Retail- Ventilation with ERV -Retrofit	11	4,396,047	4,176,245	14	5%		100%	28,546	7,757	3.6800
ERV 5- up to 1999 cfm All Other Commercial-New Construction	70	1,887,245	1,792,883	14	5%		100%	1,926	816	2.3600
ERV 5- up to 1999 cfm All Other Commercial -Retrofit	195	4,207,148	3,996,791	14	5%		100%	1,541	653	2.3600
ERV 6- => 2000 cfm All Other Commercial -New Construction	41	5,513,385	5,237,716	14	5%		100%	9,605	4,070	2.3600
ERV 6- => 2000 cfm All Other Commercial -Retrofit	45	6,779,808	6,440,818	14	5%		100%	10,762	4,560	2.3600
HRV >2,000cfm-Hotel, Restaurant, Retail, Rec - Ventilation with HRV -New Construction	1	124,544	118,317	14	5%		100%	8,896	3,200	2.7800
HRV >2,000cfm-Hotel, Restaurant, Retail, Rec - Ventilation with HRV -Retrofit	1	155,680	147,896	14	5%		100%	11,120	4,000	2.7800
HRV 500 to 2,000cfm-Hotel, Restaurant, Retail, Rec - Ventilation with HRV -New Construction	2	41,177	39,118	14	5%		100%	1,471	529	2.7800

HRV 500 to 2,000cfm-Hotel, Restaurant, Retail, Rec - Ventilation with HRV -Retrofit	6	226,047	214,745	14	5%		100%	2,691	968	2.7800
HRV ≥2,000cfm- All Other Commercial -New Construction	17	2,533,367	2,406,699	14	5%		100%	10,644	5,980	1.7800
HRV ≥2,000cfm-All Other Commercial -Retrofit	21	5,080,391	4,826,371	14	5%		100%	17,280	9,708	1.7800
HRV 500 to 2,000cfm - All Other Commercial -New Construction	25	287,203	272,843	14	5%		100%	821	461	1.7800
HRV 500 to 2,000cfm - All Other Commercial -Retrofit	33	794,400	754,680	14	5%		100%	1,719	966	1.7800
HRV ≥2,000cfm Multi Family, Health Care, Nursing - Ventilation with HRV -New Construction	17	4,462,500	4,239,375	14	5%		100%	18,750	3,750	5.0000
HRV ≥2,000cfm Multi Family, Health Care, Nursing - Ventilation with HRV - Retrofit	5	700,000	665,000	14	5%		100%	10,000	2,000	5.0000
HRV 500 to 2,000cfm Multi Family, Health Care, Nursing - Ventilation with HRV -New Construction	1	29,050	27,598	14	5%		100%	2,075	415	5.0000
HRV 500 to 2,000cfm Multi Family, Health Care, Nursing - Ventilation with HRV -Retrofit	1	28,770	27,332	14	5%		100%	2,055	411	5.0000
Single Stage & High Intensity Infrared Heaters-20,000 - 99,999 BTU/hr-New/Existing	400	4,290,912	2,874,911	17	33%		100%	631	54,871	0.0115
2-Stage Infrared Heaters-20,000 - 99,999 BTU/hr-New/Existing	200	2,942,134	1,971,230	17	33%		100%	865	66,056	0.0131
Single Stage & High Intensity Infrared Heaters-100,000 - 300,000 BTU/hr-New/Existing	800	21,387,856	14,329,864	17	33%		100%	1,573	136,751	0.0115
2-Stage Infrared Heaters-100,000 - 300,000 BTU/hr-New/Existing	400	11,866,080	7,950,273	17	33%		100%	1,745	133,207	0.0131
Ozone WE =< 60 lbs cap & 100,000 to 199,999lbs/yr. Used 2014 avg of 111,600 lbs/yr. - New/Retrofit	35	2,150,253	1,978,233	15	8%		100%	4,096	111,600	0.0367
Ozone WE =< 60 lbs cap & => 200,000 lbs/yr. Used 2014 avg of 251,300 lbs/yr. - New/Retrofit	40	5,533,604	5,090,916	15	8%		100%	9,223	251,299	0.0367
Ozone WE >60 lbs & =< 120lbs & => 200,000 lbs/yr. Used 2014 avg of 328,500 lbs/yr. - New/Retrofit	8	1,446,714	1,330,977	15	8%		100%	12,056	328,500	0.0367
Ozone WE > 120lbs & <500lbs & => 260,000 lbs/yr. Used 2014 avg of 463,283 lbs/yr. - New/Retrofit	8	2,040,298	1,877,074	15	8%		100%	17,002	463,283	0.0367
Condensing Boiler - DHW (200 to 299 Mbtu/h)-90% or greater AFUE- Existing	12	797,198	757,338	25	5%		100%	2,657	266,800	0.0100
Condensing Boiler - DHW (100 to 199 Mbtu/h)-90% or greater AFUE-New	4	199,800	189,810	25	5%		100%	1,998	150,000	0.0133
Condensing Boiler - DHW (300 to 599 Mbtu/h)-90% or greater AFUE-New/Existing	25	2,005,498	1,905,223	25	5%		100%	3,209	436,571	0.0074
Condensing Boiler - DHW (1000 to 1499 Mbtu/h)-90% or greater AFUE-New/Existing	7	1,408,750	1,338,313	25	5%		100%	8,050	1,250,000	0.0064
Condensing Gas Water Heater (1,000gal/day)- 95% thermal efficiency - New/Existing	105	1,102,445	1,047,322	15	5%		100%	700	226,526	0.0031
Condensing Gas Water Heater (100gal/day)- 95% thermal efficiency - New/Existing	25	78,190	74,280	15	5%		100%	209	153,313	0.0014
Condensing Gas Water Heater (500gal/day)- 95% thermal efficiency - New/Existing	50	359,602	341,622	15	5%		100%	479	215,977	0.0022
Energy Star Dishwasher - Rack Conveyor - Multi Tank - High Temperature - Purchase	2	84,960	62,021	20	27%		100%	2,124	NA	NA
Energy Star Dishwasher - Rack Conveyor - Single Tank - High Temperature - Purchase	15	168,000	122,640	20	27%		100%	560	NA	NA
Energy Star Dishwasher - Stationary Rack - Door Type - High Temperature - Purchase	35	484,050	387,240	15	20%		100%	922	NA	NA

Energy Star Dishwasher - Stationary Rack - Door Type - Low Temperature - Purchase	140	4,452,000	3,561,600	15	20%		100%	2,120	NA	NA
Energy Star Dishwasher - Stationary Rack - Single Rack - High Temperature - Purchase	4	55,320	44,256	15	20%		100%	922	NA	NA
Energy Star Dishwasher - Stationary Rack - Single Rack - Low Temperature - Purchase	4	127,200	101,760	15	20%		100%	2,120	NA	NA
Energy Star Dishwasher - Undercounter - High Temperature - Purchase	21	29,820	17,892	10	40%		100%	142	NA	NA
Energy Star Dishwasher - Undercounter - Low Temperature - Purchase	4	13,320	7,992	10	40%		100%	333	NA	NA
High Efficiency Under-Fired Broiler - Three Foot - New/Replace	8	241,056	192,845	12	20%		100%	2,511	NA	NA
High Efficiency Under-Fired Broiler - Four Foot - New/Replace	8	321,312	257,050	12	20%		100%	3,347	NA	NA
High Efficiency Under-Fired Broiler - Five Foot - New/Replace	7	351,456	281,165	12	20%		100%	4,184	NA	NA
High Efficiency Under-Fired Broiler - Six Foot - New/Replace	7	421,764	337,411	12	20%		100%	5,021	NA	NA
Condensing Unit Heaters - New/Replace	60	1,278,180	1,278,180	18	0%		100%	1,184	150,000	0.0079
High Efficiency Condensing Furnace - Replacement	60	252,898	208,641	18	17.5%		100%	234	75,294	0.0031
Commercial Condensing Tankless Gas Water Heater - Low <200 kBtu/hr - Elementary schools, office, retail, churches - New/Replacement	15	81,000	79,380	20	2%		100%	270	150,285	0.0007
Commercial Condensing Tankless Gas Water Heater - Low >200 kBtu/hr - Elementary schools, office, retail, churches - New/Replacement	15	122,400	119,952	20	2%		100%	408	249,714	0.0007
Commercial Condensing Tankless Gas Water Heater - Medium <200 kBtu/hr - Secondary schools, fast food restaurant, dormitories, other - New/Replacement	20	138,000	135,240	20	2%		100%	345	150,166	0.0012
Commercial Condensing Tankless Gas Water Heater - Medium >200 kBtu/hr - Secondary schools, fast food restaurant, dormitories, other - New/Replacement	20	213,200	208,936	20	2%		100%	533	249,833	0.0012
Commercial Condensing Tankless Gas Water Heater - High <200 kBtu/hr - Fitness center, full service restaurant, hotels, in patient health care - New/Replacement	25	210,000	205,800	20	2%		100%	420	150,118	0.0017
Commercial Condensing Tankless Gas Water Heater - High >200 kBtu/hr - Fitness center, full service restaurant, hotels, in patient health care - New/Replacement	25	291,500	285,670	20	2%		100%	583	205,765	0.0017
CEE Tier 2 Front-Loading Clothes Washer. Multi-Family - New/Replacement	600	772,200	694,980	11	10%		100%	117	NA	NA
Energy Star Front-Loading Clothes Washer. Multi-Family - New/Replacement	15	12,540	6,521	11	48%		100%	76	NA	NA
Boiler Load Controls - Basic - CI (Purchase)	10	531,300	478,170	15	10%		100%	3,542	NA	NA
Boiler Load Controls - Basic - MURBs (Purchase)	10	357,000	321,300	15	10%		100%	2,380	NA	NA
Boiler Load Controls - Temp Sensor - MURBs (Existing Buildings)	8	1,025,160	922,644	15	10%		100%	8,543	NA	NA
Boiler Load Controls - Temp Sensor - MURBs (New Buildings)	2	187,200	168,480	15	10%		100%	6,240	NA	NA
DCV Office – RTU/MUA < 2,500 sq ft ventilated with CO2 Sensor -Demand Controlled Ventilation (DCV) controls with CO2 sensors -New w/o maintenance plan	5	5,600	4,480	10	20%		100%	112	1,000	0.1120
DCV Office – RTU/MUA ≥ 2,500 sq ft with CO2 Sensor -Demand Controlled Ventilation (DCV) controls with CO2 sensors -New w/o maintenance plan	5	14,000	11,200	10	20%		100%	280	2,500	0.1120
DCV Retail - RTU/MUA < 5,000 sq ft ventilated with CO2 Sensor-Demand Controlled Ventilation (DCV) controls with CO2 sensors -New w/o maintenance plan	20	136,808	109,446	10	20%		100%	684	1,745	0.3920
DCV Retail – RTU/MUA ≥ 5,000 sq ft ventilated with CO2 Sensor-Demand Controlled Ventilation (DCV) controls with CO2 sensors -New w/o maintenance plan	20	705,130	564,104	10	20%		100%	3,526	8,994	0.3920

DCV Office – RTU/MUA < 2,500 sq ft ventilated with CO2 Sensor -Demand Controlled Ventilation (DCV) controls with CO2 sensors -Retrofit w/o maintenance plan	20	45,651	43,369	10	5%		100%	228	2,038	0.1120
DCV Office – RTU/MUA ≥ 2,500 sq ft with CO2 Sensor -Demand Controlled Ventilation (DCV) controls with CO2 sensors -Retrofit w/o maintenance plan	15	65,335	62,068	10	5%		100%	436	3,889	0.1120
DCV Retail - RTU/MUA < 5,000 sq ft ventilated with CO2 Sensor-Demand Controlled Ventilation (DCV) controls with CO2 sensors -Retrofit w/o maintenance plan	5	70,560	67,032	10	5%		100%	1,411	3,600	0.3920
DCV Retail – RTU/MUA ≥ 5,000 sq ft ventilated with CO2 Sensor-Demand Controlled Ventilation (DCV) controls with CO2 sensors -Retrofit w/o maintenance plan	30	1,072,747	1,019,110	10	5%		100%	3,576	9,122	0.3920
Combination Boiler - Multi Family Residential	10	2,397,840	2,277,948	24	5%		100%	9,991	NA	NA
General Services Custom	178	165,932,317	68,699,839	17	59%	0.768%	100%	54,901	NA	NA
Contract Custom	318	1,453,838,072	601,922,784	16	59%	0.768%	100%	279,839	NA	NA
Total CI		**1,912,788,259**	**934,377,153**							

Notes:
(1) Cells shaded grey within the Equipment Life, Natural Gas Savings (m3) per unit, Average Capacity per unit and Natural Gas Savings (m3) per capacity columns were updated to match the December 2015 Input Assumption Filing. Cells shaded grey within the Free Rider and Spillover columns were updated to match the findings of the custom CI/LV 2015 NTG Study.

UNION GAS LIMITED

Low-Income Scorecard - Original Single Family and Multi-family 2016 Target Calculation

Measure/Offering	Forecasted Units	Total Gross Cumulative Gas Savings (m^3)	Total Net Cumulative Gas Savings (m^3)	Input Assumptions					
	2016	2016	2016	Equipment Life	Free Rider Rate	Adjustment Factor	Natural Gas Savings (m^3) per unit	Average Capacity per unit	Natural Gas Savings (m^3) per capacity
Single Family									
Home Weatherization - Municipal	280	4,095,840	4,095,840	25	0%	100%	585	NA	NA
Home Weatherization - Independent	80	1,170,240	1,170,240	25	0%	100%	585	NA	NA
Home Weatherization - Private	900	26,982,450	26,982,450	25	0%	100%	1,199	NA	NA
Home Weatherization - Aboriginal	-	-	-	25	0%	100%	585	NA	NA
Furnace Replacement in Weatherized Homes	37	84,985	84,985	18	0%	100%	129	NA	NA
Furnace Replacement in Non-Weatherized Homes	680	1,578,960	1,578,960	18	0%	100%	129	NA	NA
Attic Weatherization	90	438,750	438,750	25	0%	100%	195	NA	NA
Multi-Family									
Condensing Gas Water Heater (1,000gal/day)- 95% thermal efficiency - New/Existing	1	20,163	19,155	13	5%	100%	1,551	NA	NA
HRV - Multi Family, Health Care, Nursing - Ventilation with HRV - Retrofit	25	2,559,550	2,431,573	14	5%	100%	7,313	1,556	4.7000
Condensing Rooftop Units (MUA) All other Commercial Efficiency + VFDs >1000 -4999 cfm--New/Existing	55	2,550,900	2,423,355	15	5%	100%	3,092	1,059	2.9200
Condensing Rooftop Units (MUA) All other Commercial Efficiency + VFDs ≥ 5000 cfm [15]--New/Existing	14	3,749,760	3,562,272	15	5%	100%	17,856	6,115	2.9200
Condensing Boiler - DHW (300 to 599 Mbtu/h)-90% or greater AFUE-New/Existing	3	232,500	220,875	25	5%	100%	3,100	421,769	0.00735
Condensing Boiler - DHW (> 1000 Mbtu/h)-90% or greater AFUE-New/Existing	1	243,200	231,040	25	5%	100%	9,728	1,510,559	0.00644
Condensing Boiler - Space Heating (200 to 299 Mbtu/h)-90% AFUE-Existing	12	694,800	660,060	25	5%	100%	2,316	227,282	0.01019
Condensing Boilers - Space Heating, 300 to 599 MBTUH-88% seasonal efficiency-New/Existing	20	2,032,000	1,930,400	25	5%	100%	4,064	390,769	0.0104
Condensing Boilers - Space Heating, 600 to 999 MBTUH-88% seasonal efficiency-New/Existing	3	765,000	726,750	25	5%	100%	10,200	980,769	0.0104
Condensing Boilers - Space Heating, 1,000 and above MBTUH-88% seasonal efficiency-New/Existing	2	616,000	585,200	25	5%	100%	12,320	1,184,615	0.0104
Custom	42	4,579,993	4,350,993	17	5%	100%	6,487	NA	NA
Total		**52,395,091**	**51,492,898**						

UNION GAS LIMITED

Low-Income Scorecard - Audit-Adjusted Single Family and Multi-family 2016 Target Calculation

Measure/Offering	Forecasted Units	Total Gross Cumulative Gas Savings (m3)	Total Net Cumulative Gas Savings (m3)	Input Assumptions (1)					
	2016	2016	2016	Equipment Life	Free Rider Rate	Adjustment Factor	Natural Gas Savings (m^3) per unit	Average Capacity per unit	Natural Gas Savings (m^3) per capacity
Single Family									
Home Weatherization - Municipal	280	4,095,840	4,095,840	25	0%	100%	585	NA	NA
Home Weatherization - Independent	80	1,170,240	1,170,240	25	0%	100%	585	NA	NA
Home Weatherization - Private	900	26,982,450	26,982,450	25	0%	100%	1,199	NA	NA
Home Weatherization - Aboriginal	-	-	-	25	0%	100%	585	NA	NA
Furnace Replacement in Weatherized Homes	37	84,985	84,985	18	0%	100%	129	NA	NA
Furnace Replacement in Non-Weatherized Homes	680	1,578,960	1,578,960	18	0%	100%	129	NA	NA
Attic Weatherization	90	438,750	438,750	25	0%	100%	195	NA	NA
Multi-Family									
Condensing Gas Water Heater (1,000gal/day)- 95% thermal efficiency - New/Existing	1	10,499	9,974	15	5%	100%	700	226,526	0.0031
HRV - Multi Family, Health Care, Nursing - Ventilation with HRV - Retrofit	25	2,722,926	2,586,779	14	5%	100%	7,780	1,556	5.0000
Condensing Rooftop Units (MUA) All other Commercial Efficiency + VFDs >1000 -4999 cfm--New/Existing	55	3,494,384	3,319,664	20	5%	100%	3,177	1,059	3.0000
Condensing Rooftop Units (MUA) All other Commercial Efficiency + VFDs ≥ 5000 cfm [15]--New/Existing	14	5,136,658	4,879,825	20	5%	100%	18,345	6,115	3.0000
Condensing Boiler - DHW (300 to 599 Mbtu/h)-90% or greater AFUE-New/Existing	3	232,500	220,875	25	5%	100%	3,100	421,769	0.00735
Condensing Boiler - DHW (> 1000 Mbtu/h)-90% or greater AFUE-New/Existing	1	243,200	231,040	25	5%	100%	9,728	1,510,559	0.00644
Condensing Boiler - Space Heating (200 to 299 Mbtu/h)-90% AFUE-Existing	12	694,800	660,060	25	5%	100%	2,316	227,282	0.01019
Condensing Boilers - Space Heating, 300 to 599 MBTUH-88% seasonal efficiency-New/Existing	20	2,032,000	1,930,400	25	5%	100%	4,064	390,769	0.0104
Condensing Boilers - Space Heating, 600 to 999 MBTUH-88% seasonal efficiency-New/Existing	3	765,000	726,750	25	5%	100%	10,200	980,769	0.0104
Condensing Boilers - Space Heating, 1,000 and above MBTUH-88% seasonal efficiency-New/Existing	2	616,000	585,200	25	5%	100%	12,320	1,184,615	0.0104
Custom	42	4,579,993	4,350,993	17	5%	100%	6,487	NA	NA
Total		**54,879,184**	**53,852,786**						

Notes:

(1) Cells shaded grey within the Equipment Life, Natural Gas Savings (m3) per unit, Average Capacity per unit and Natural Gas Savings (m^3) per capacity columns were updated to match the December 2015 Input Assumption Filing.

2016 DSM DEFERRAL AND VARIANCE ACCOUNT DISPOSITION:

2016 DSM DEFERRAL AND VARIANCE ACCOUNT BALANCES

The purpose of this evidence is to describe the three OEB-approved DSM deferral and variance accounts and to explain their respective 2016 balances. As explained in Exhibit A, Tab 1 and Exhibit A, Tab 2, Union is proposing to dispose of Audit-Adjusted balances (aligning Union's 2016 scorecard targets with updated prescriptive input assumptions and NTG Factors). Union's proposed Audit-Adjusted balances and supporting schedules are provided at Exhibit A, Tab 3, Appendix A, Schedules 1-4. For comparative purposes, and in accordance with Section 11.0 of the Guidelines, Union has also provided the audited balances and supporting schedules at Exhibit A, Tab 3, Appendix B, Schedules 1-4.[1]

This evidence is organized as follows:

1. Lost Revenue Adjustment Mechanism Variance Account
    1.1. Future Recovery of 2015 & 2016 LRAM Volume Savings
2. Demand Side Management Variance Account
    2.1. DSM Tracking & Reporting System Upgrades
    2.2. DSMVA 15% Overspend

[1] EB-2014-0134, Filing Guidelines to the Demand Side Management Framework for Natural Gas Distributors (2015-2020), Section 11.0, p.37, states that, "*The natural gas utilities should apply annually for the disposition of any balances in their LRAMVA and DSMVA and, if applicable, apply for a shareholder incentive amount associated with the previous DSM program year and disposition of any resulting DSMIDA balance. This application should include the final results as outlined in the Final Evaluation and Audit Reports, and information setting out the allocation across rate classes of the balances in the LRAMVA, DSMVA and DSMIDA.*"

1. LOST REVENUE ADJUSTMENT MECHANISM VARIANCE ACCOUNT

The LRAMVA (Account No. 179-75) is used to track, at the rate class level, the variance between the actual contract market impact of DSM activities (volume savings) undertaken by the natural gas utility and the forecasted impact included in distribution rates.[2] There is an inherent time lag between the date that Union receives the audit of volume savings from the EC and the date that these audited volume savings are reflected in Union's distribution rates. Depending on the timing of audited volume savings and Union's annual rate filings, the impacts captured in the LRAM variance account can span multiple DSM program years, and can include:

- **Full-Year Impacts** - for prior program years if no pre-audit volume savings were reflected in rates;

[2] EB-2014-0134, Filing Guidelines to the Demand Side Management Framework for Natural Gas Distributors (2015-2020), p. 39.

- **Partial-Year Impacts** - for the monthly impact of volume savings resulting from the current DSM program year, if no pre-audit volume savings were reflected in rates; and,
- **True-Ups** - to true-up pre-audit volume savings reflected in rates with audited actual volume savings. True-Ups result from the persistent delays in the annual EM&V process that began with the transition to the OEB Staff-coordinated EM&V process for the 2015 DSM program year.

LRAM amounts are only recorded in the variance account until such time as the OEB sets new distribution rates for the utility based on a revised load forecast that includes the actual audited impact of DSM activities (volume savings). Please see Tables 1 and 2 for a summary of LRAM volume savings adjustments for each of the 2013-2018 DSM program years included or expected in each of Union's annual rates applications (2015-2018) and DSM deferrals applications (2015-2018).

Table 1

DSM Program Year LRAM Volume Adjustment Included in Rates

		(a)	(b)	(c)	(d)	(e)	(f)
Line No.	Rates Application	DSM Program Year LRAM Volume Adjustment					
		2013	2014	2015	2016	2017	2018
1	**2015** *(EB-2014-0271)*	Audited	Not Included	Not Included	N/A	N/A	N/A
2	**2016** *(EB-2015-0116)*	Audited	Audited	Not Included	Not Included	N/A	N/A
3	**2017** *(EB-2016-0245)*	Audited	Audited	Pre-Audit	Not Included	Not Included	N/A
4	**2018** *(EB-2017-0087)*	Audited	Audited	Pre-Audit	Pre-Audit	Not Included	Not Included

Table 2

DSM Program Year LRAM Volume Adjustment Included in LRAM Variance Account

		(a)	(b)	(c)	(d)	(e)	(f)
Line No.	DSM Deferral Application	DSM Program Year LRAM Volume Adjustment					
		2013	2014	2015	2016	2017	2018
1	**2015** *(EB-2017-0323)*	None	Full-Year	Partial-Year	N/A	N/A	N/A
2	**2016** *(EB-2018-0300)*	None	None	Full-Year	Partial-Year	N/A	N/A
3	**2017** *(Expected)*	None	None	True-up	Full-Year	Partial-Year	N/A
4	**2018** *(Expected)*	None	None	True-up	True-up	Full-Year	Partial-Year

As actual OEB-approved 2015 and 2016 contract rate class LRAM volume savings were not reflected in Union's 2016 OEB-approved distribution rates ("2016 Rates") (as the 2015 and 2016 EM&V processes were not complete), Union's 2016 LRAMVA balance is composed of:

i) Full-year audited volume savings for contract rate classes related to the 2015 DSM program year ("2015 Annual Volumes") calculated using Union's 2016 Rates (see Table 2, line 2, column (c)); and,

ii) Partial-year monthly volume savings for contract rate classes related to the 2016 DSM program year, beginning the month that audited volume savings were realized and for the remaining months of the 2016 DSM program year, per the Guidelines, calculated using Union's 2016 Rates (see Table 2, line 2, column (d)).[3]

[3] EB-2014-0134, Filing Guidelines to the Demand Side Management Framework for Natural Gas Distributors (2015-2020), p. 39.

Thus, the 2016 LRAMVA balance reflects the full-year impact of 2015 audited LRAM volumes, and the partial-year (depending upon the month the DSM measure was installed) impact of 2016 audited LRAM volumes. Accordingly, Union's 2016 LRAM variance account debit balance of $0.488 million includes:

i) $0.306 million (see Exhibit A, Tab 3, Appendix A, Schedule 2, p. 2, line 10, column (e)) related to 2015 Annual Volumes of 50,910 10^3m^3 calculated using Union's 2016 Rates; and,

ii) $0.182 million (see Exhibit A, Tab 3, Appendix A, Schedule 2, p. 3, line 10, column (e)) related to 2016 Monthly Volumes of 16,797 10^3m^3 calculated using Union's 2016 Rates.

Union's 2015 Annual Volumes were audited as part of the 2015 Natural Gas Demand Side Management Annual Verification Report and are therefore not included in the 2016 Natural Gas Demand Side Management Annual Verification Report.

Exhibit A, Tab 3, Appendix A, Schedule 2, p. 1 provides detail of the LRAMVA balance by rate class.

The LRAMVA does not include volume variances for general service rate classes as these are captured in the Normalized Average Consumption ("NAC") deferral account. The 2016 balance in the NAC deferral account was disposed of in Union's 2016 Disposition of Deferral Account Balances (EB-2017-0091) proceeding.[4]

1.1 FUTURE RECOVERY OF 2015 & 2016 LRAM VOLUME SAVINGS

2015 LRAM Volume Savings

As the 2015 DSM audit process was not complete when Union filed its 2017 Rates Application (EB-2016-0245) ("2017 Rates") or its 2018 Rates Application (EB-2017-0087) ("2018 Rates"), Union's 2015 pre-audit LRAM volume savings were reflected in both which will drive a variance when compared to actual audited results (see Table 1, line 3, column (c); and, Table 1, line 4, column (c)). As per Union's 2017 and 2018 Rates evidence, the variance related to the difference between the 2015 pre-audit LRAM volume savings and OEB-approved final 2015 LRAM volume savings will be captured in the LRAMVA for these respective years.[5]

2016 LRAM Volume Savings

As the 2016 DSM program year was not complete when Union filed its 2017 Rates Application (EB-2016-0245), no amounts for the 2016 DSM program year were included in 2017 Rates (see Table 1, line 3, column (d)). Union will record the full-year impact of the lost revenues related to 2016 volume savings using Union's 2017 Rates and expects to bring this balance forward in Union's 2017 Disposition of DSM Deferral and Variance Account Balances proceeding (see Table 2, line 3, column (d)), the timing of which is dependent upon completion of the 2017 EM&V process.

[4] This treatment is consistent with the Settlement Agreement approved by the OEB in Union's 2014-2018 Incentive Regulation Mechanism ("IRM") Agreement (EB-2013-0202).
[5] EB-2016-0245, Exhibit A, Tab 1, p. 6; EB-2017-0087, Exhibit A, Tab 1, p. 7.

As the 2016 DSM audit process was not complete when Union filed its 2018 Rates Application (EB-2017-0087), Union adjusted 2018 volumes by 2016 pre-audit LRAM volume savings (see Table 1, line 4, column (d)). As per Union's 2018 Rates evidence, the variance related to the difference between the 2016 pre-audit LRAM volume savings and OEB-approved final 2016 LRAM volume savings will be captured in the LRAMVA and Union expects to bring this balance forward in Union's 2018 Disposition of DSM Deferral and Variance Account Balances proceeding (see Table 2, line 4, column (d)).[6]

2. DEMAND SIDE MANAGEMENT VARIANCE ACCOUNT

The DSMVA (Account No. 179-111) records the difference between the OEB-approved DSM budget included in rates by rate class and actual DSM spending by rate class. The credit balance of $6.156 million (see Exhibit A, Tab 3, Appendix A, Schedule 3, line 14, column (e)) represents the difference between actual 2016 DSM expenditures of $47.844 million and the $56.821 million budget included in 2016 rates, less $2.822 million relating to a spending variance on OEB-approved DSM tracking and reporting system upgrades.

During 2016, Union incurred costs related to two studies which were initiated by the OEB and are included in Union's DSMVA balance for 2016:[7]

i) $0.267 million for the Achievable Potential Study; and,

[6] EB-2017-0087, Exhibit A, Tab 1, p. 7.
[7] Exhibit B, Tab 1, Table 11.0.

ii) $0.047 million for the DSM and Infrastructure Planning Study, also known as the Integrated Resource Planning ("IRP") Study.

As no costs were included Union's OEB-approved 2016 DSM budget related to these studies, Union is seeking recovery of related costs through the DSMVA in this proceeding. As spending continued on the IRP Study in 2017 Union expects to seek further recovery through the DSMVA as part of its 2017 Disposition of DSM Deferral and Variance Account Balances proceeding.

Union followed the OEB-approved methodology to calculate the 2016 DSMVA balance.[8] Union used the DSMVA to track the variance between actual DSM spending by rate class, relative to the OEB-approved DSM budget included in rates by rate class. The customer incentive was allocated based on the amount spent within each rate class. All other program costs were allocated by customer class (e.g. Residential, Commercial/Industrial) and assigned by rate class based on the percentage allocation of the customer incentive costs. All portfolio-level costs that cannot be attributed to an individual program were allocated to a rate class based on the percentage allocation of the program costs by rate class. The variance between the Low-Income DSM budget included in rates and the actual amount spent on Low-Income DSM programs is recovered in proportion to the OEB-approved 2016 distribution revenue by rate class. The

[8] EB-2015-0029, Union Gas Limited 2015-2020 DSM Plan, Exhibit A, Tab 2, pp. 22-23.

overall 2016 Low-Income budget spend of $11.776 million, which includes the allocated portfolio costs, is allocated in proportion to the 2016 distribution revenue.[9]

2.1 DSM TRACKING & REPORTING SYSTEM UPGRADES

As part of Union's 2015-2020 DSM Plan (EB-2015-0029) Union requested, and the OEB subsequently approved, a total of $6.0 million of incremental budget for DSM tracking and reporting system upgrades.[10] Union's preliminary estimates included costs of $1.0 million in 2015 and $5.0 million in 2016 to complete these system upgrades. Following the establishment of Union's final project scope and schedule, Union determined that development of the upgraded DSM tracking and reporting system would continue through 2017 and be implemented in January 2018. The total cost of Union's DSM tracking and reporting system upgrades was $5.077 million, which is $0.923 million under the OEB-approved budget. As discussed in Union's 2015 Disposition of DSM Deferral and Variance Accounts Application,[11] Union requested OEB-approval to collect $0.214 million spent in 2015 through the DSMVA (as the budgeted amount of $1.0 million was not included in 2015 rates). The OEB subsequently approved Union's 2015 DSMVA balance.[12] Union continued to incur costs of $2.041 million in 2016 and $2.822 million in 2017/2018.

[9] Per Union's 2016 Rates application (EB-2015-0116).
[10] EB-2015-0029, Decision and Order (dated January 20, 2016), p. 57; EB-2015-0029, Decision and Order (dated January 20, 2016), Schedule A.
[11] EB-2017-0323, Exhibit A, Tab 3, pp. 5-6.
[12] EB-2017-0323, Decision and Order (dated July 12, 2018), pp. 8-9.

As a result of the system development time horizon, Union spent $2.041 million on DSM tracking and reporting system upgrades in 2016 compared to the $5.0 million it included in 2016 Rates, resulting in a 2016 underspend and corresponding credit of $2.959 million. As development of the DSM tracking and reporting system continued into 2017 and 2018, rather than return the entire 2016 underspend to ratepayers through the 2016 DSMVA, Union proposes that the 2016 DSMVA balance be adjusted by $2.822 million (see Exhibit A, Tab 3, Appendix A, Schedule 3, column (d)) to account for that fact that these funds were spent in 2017/2018. In effect, Union proposes to roll-forward $2.822 million of the 2016 budget into 2017/2018 to correspond with the actual spending that has occurred in those years. Otherwise, these funds would be returned to ratepayers through the mechanical application of the 2016 DSMVA, and then subsequently incur carrying charges and be sought for recovery from ratepayers again in 2017/2018; despite the fact that these funds have already been spent for their intended purpose and that overall, Union was nearly $1 million below the total $6.0 million OEB-approved budget for the project. A summary of project spending and DSMVA impact is provided in Table 3.

Table 3

DSM Tracking and Reporting System Budget and Spending by Year ($ million)

Year (a)	**Actual Spend** (b)	**Approved Budget** (c)	**Budget Rolled-Forward from Prior Year** (d)	**Budget Rolled-Forward to Future Year** (e)	**Amount Included in DSMVA** (b) – [(c) + (d) + (e)] = (f)
2015	$0.214	$1.0	-	-	$0.214 [(1)]
2016	$2.041	$5.0	-	$(2.822)	$(0.137)
2017	$2.614	-	$2.822	$(0.208)	-
2018	$0.208	-	$0.208	-	-
Total	$5.077	$6.0			

Notes:
[(1)] As the budgeted amount of $1.0 million was not included in 2015 rates, the 2015 DSMVA balance represented the Actual Spend in 2015.

2.2 DSMVA 15% OVERSPEND

As per Union's OEB-approved 2015-2020 DSM Plan and consistent with past DSM frameworks, Union is eligible to recover up to an additional 15% overspend above its annual OEB-approved DSM budget through the DSMVA as long as its overall weighted scorecard target on a pre-audited basis for one or more of its scorecards has been achieved, provided the overspend was on program expenses.[13] While Union's DSMVA has an overall credit balance of $6.156 million, it utilized the DSMVA mechanism to overspend on the Residential Program contained within the Resource Acquisition scorecard. The Resource Acquisition scorecard achieved pre-audit results above the weighted scorecard targets required for the 15% overspend to be accessed. The pre-audit scorecard results are summarized in Table 4.

Table 4

2016 DSM Scorecard Results (Pre-Audit)

Scorecard	**Total Scorecard Target Achieved**
Resource Acquisition	111%

As outlined in Table 11.0 of Union's Final 2016 Demand Side Management Annual report dated November 30, 2018 (see Exhibit B, Tab 1), the overspend on the Residential Program portion of the Resource Acquisition scorecard was largely offset by underspend across all other program and portfolio level costs.

[13] EB-2015-0029, Union Gas Limited 2015-2020 DSM Plan, Exhibit A, Tab 2, pp. 22-23.

2.3 BUDGET TRANSFERS BETWEEN PROGRAMS

Section 6.6 of the Guidelines states that the utilities should inform the OEB and stakeholders in the event that cumulative fund transfers among OEB-approved DSM programs exceed 30% of the approved annual DSM budget for an individual DSM program. Union did not transfer more than 30% between programs.

2.4 EVALUATION BUDGET

The evaluation budget was used solely for evaluation expenditures of $1.498 million (see Exhibit B, Tab 1, Table 11.0).

2.5 LARGE VOLUME PROGRAM BUDGET TRANSFERS – RATE T2 & RATE 100 CUSTOMERS

In accordance with the OEB's Decision on Union's 2015-2020 DSM Plan, Union continued to offer its Large Volume direct access program and adhered to the OEB-approved maximum program budget transfer rules between Rate T2 and Rate 100 in 2016.[14] The overall underspend of $0.986 million for the Large Volume Program is credited in the DSMVA. Union did not transfer budget dollars from any other part of the overall DSM budget into Rate T2 or Rate 100 rate classes.

[14] EB-2015-0029, Decision and Order (dated January 20, 2016), pp. 50–52; EB-2012-0337, 2013-2014 DSM Plan for Large Volume Customers, Exhibit A, Tab 1, p. 14.

3. DEMAND SIDE MANAGEMENT INCENTIVE DEFERRAL ACCOUNT

The purpose of the DSMIDA (Account No. 179-126) is to record the DSM incentive amount earned by Union as a result of its DSM programs.[15] This account has a debit balance of $4.121 million to be recovered from ratepayers related to 2016 Audit-Adjusted DSM activity. Exhibit A, Tab 3, Appendix A, Schedule 4 provides the breakdown of the DSMIDA by rate class. The 2016 DSM incentive Union achieved for each scorecard is presented in Table 5.

Table 5

Summary of 2016 Incentive Results by Scorecard

DSM Incentive			
Scorecard	**Plan (100% Target)**	**Actual Audit-Adjusted Results**	**Max Payout**
Resource Acquisition	$2,560,817	$2,907,230	$6,402,042
Large Volume T2/R100	$366,776	$0	$916,941
Low-Income	$1,045,997	$1,151,656	$2,614,993
Market Transformation	$156,161	$0	$390,404
Performance Based	$50,248	$61,844	$125,621
Total	**$ 4,180,000**	**$ 4,120,731**	**$ 10,450,000**

The process to finalize DSMIDA related balances includes a third-party EM&V by an EC hired by the OEB. This process is discussed in further detail in Exhibit A, Tab 2.

3.1 RESOURCE ACQUISITION SCORECARD

Resource Acquisition programs seek to achieve direct, measurable savings via installation of energy efficient equipment. Union's 2016 Resource Acquisition scorecard included three performance metrics that support and incentivize technologies that drive deeper and longer

[15] EB-2014-0134, Filing Guidelines to the Demand Side Management Framework for Natural Gas Distributors (2015-2020), p. 39.

savings for all customers. The overall 2016 Resource Acquisition program achieved 105% and Union is claiming a $2.907 million DSM incentive based on Audit-Adjusted 2016 scorecard targets and corresponding incentives. Union's Audit-Adjusted 2016 Resource Acquisition scorecard results are presented in Table 6.

Table 6

2016 Resource Acquisition Scorecard

Metrics	Metric Target Levels			Weight	Achievement	% of Metric Achieved	Weighted % of Metric Achieved
	Lower Band	Target	Upper Band				
Cumulative Natural Gas Savings (m^3)	840,194,699	1,120,259,599	1,680,389,398	75%	814,757,886	73%	*55%*
Deep Savings – Residential (m^3)	2,475	3,300	4,950	25%	6,595	200%	*50%*
					Total Scorecard Target Achieved		***105%***
					Scorecard Incentive Achieved		***$ 2,907,230***
					% of Maximum Incentive Achieved		***45%***

3.2 LARGE VOLUME SCORECARD

Union's Large Volume program is a self-direct program that seeks to achieve direct, measurable savings. Union's 2016 Large Volume scorecard measures the cumulative m^3 savings of participants within the Rate T2 and Rate 100 rate classes. The 2016 Large Volume program did not achieve a DSM incentive based on its performance compared to scorecard targets. Union's 2016 Large Volume scorecard results are provided in Table 7.

Table 7

2016 Large Volume Scorecard

Metrics	Metric Target Levels			Weight	Achievement	% of Metric Achieved	Weighted % of Metric Achieved
	Lower Band	Target	Upper Band				
Rate T2/Rate 100 Cumulative Natural Gas Savings (m^3)	668,168,041	890,890,721	1,336,336,082	100%	79,848,302	9%	*9%*
					Total Scorecard Target Achieved		***9%***
					Scorecard Incentive Achieved		***$ 0***
					% of Maximum Incentive Achieved		***0%***

3.3 LOW-INCOME SCORECARD

The Low-Income program seeks to achieve direct measurable savings by the installation of energy efficient equipment focusing on the needs of the Low-Income market segment. Union's 2016 Low-Income program achieved 103% overall and Union is claiming a $1.152 million DSM incentive based on the Audit-Adjusted 2016 scorecard targets and corresponding incentives. The overall Audit-Adjusted 2016 Low-Income scorecard results are provided in Table 8.

Table 8

2016 Low-Income Scorecard

Metrics	Metric Target Levels			Weight	Achievement	% of Metric Achieved	Weighted % of Metric Achieved
	Lower Band	Target	Upper Band				
Single Family Cumulative Natural Gas Savings (m^3)	28,339,761	37,786,348	56,679,522	60%	45,783,307	121%	*73%*
Multi Family – Social & Assisted Cumulative Natural Gas Savings (m^3)	13,836,358	18,448,477	27,672,716	35%	10,894,573	59%	*21%*
Multi Family – Market Rate Cumulative Natural Gas Savings (m^3)	2,252,430	3,003,240	4,504,860	5%	8,151,190	200%	*10%*
					Total Scorecard Target Achieved		***103%***
					Scorecard Incentive Achieved		***$1,151,656***
					% of Maximum Incentive Achieved		***44%***

3.4 MARKET TRANSFORMATION SCORECARD

In 2016, Union continued to focus its Market Transformation activity on the New Home Efficiency offering (Optimum Home). Union also began work on a new Commercial New Construction offering (Commercial Savings by Design). The overall 2016 Market Transformation scorecard did not achieve a DSM incentive based on the 2016 scorecard targets. The 2016 Market Transformation scorecard results are provided below in Table 9.

Table 9

2016 Market Transformation Scorecard

Metrics	Metric Target Levels			Weight	Achievement	% of Metric Achieved	Weighted % of Metric Achieved
	Lower Band	Target	Upper Band				
Homes Built (>20% above OBC 2012) by Participating Builders	52.50%	70.00%	100.00%	50%	70.09%	100%	*50%*
Commercial New Construction *New Developments Enrolled by Participating Builders*	6	8	12	50%	0	0%	*0%*
				Total Scorecard Target Achieved			***50%***
				Scorecard Incentive Achieved			***$0***
				% of Maximum Incentive Achieved			***0%***

3.5 PERFORMANCE BASED SCORECARD

In 2016, Union began work on two offerings in its new Performance Based Scorecard, RunSmart and Strategic Energy Management. In 2016, Union: successfully enrolled the target participants in both offerings; achieved 108% based on 2016 scorecard targets; and is claiming a DSM incentive of $0.062 million. The 2016 Performance Based scorecard results are provided below in Table 10.

Table 10

2016 Performance Based Scorecard

Metrics	Metric Target Levels			Weight	Achievement	% of Metric Achieved	Weighted % of Metric Achieved
	Lower Band	Target	Upper Band				
RunSmart Participants	21	28	41	50%	32	115%	*58%*
Strategic Energy Management Participants	2	3	5	50%	3	100%	*50%*
				Total Scorecard Target Achieved			***108%***
				Scorecard Incentive Achieved			***$61,844***
				% of Maximum Incentive Achieved			***49%***

UNION GAS LIMITED
Audit-Adjusted Deferral and Variance Account Balances (1)
Year Ending December 31, 2016

Line No.	Account Number	Account Name	Balance ($000's)
	DSM Accounts (2):		
1	179-75	Lost Revenue Adjustment Mechanism	488
2	179-111	Demand Side Management Variance Account	(6,156)
3	179-126	Demand Side Management Incentive	4,121
4	**Total DSM Accounts (Lines 1 through 3)**		**(1,547)**

Notes:

(1) The Audit-Adjusted balances reflect the final audited DSM amounts, with targets adjusted to include the application of revised prescriptive input assumptions that were updated in December 2015 and CI/LV custom NTG factors that were updated as part of the 2015 NTG Study.

(2) There is no interest calculated on the above noted DSM deferral and variance account balances as of December 31, 2016.

UNION GAS LIMITED
Lost Revenue Adjustment Mechanism
Audit-Adjusted 2016 LRAM Variance Account Balance

Line No.	Particulars ($)	Amounts by DSM Plan Year 2015 [1] (a)	2016 [2] (b)	Total (c)
	South			
1	M4	134,719	44,781	179,499
2	M5	96,015	118,225	214,241
3	M7	52,410	13,830	66,240
4	T1	2,275	736	3,011
5	T2	1,076	219	1,295
6		286,495	177,791	464,286
	North			
7	Rate 20	15,489	3,691	19,180
8	Rate 100	3,894	199	4,093
9		19,383	3,890	23,273
10	Total	305,878	181,681	487,559

Notes:

[1] EB-2018-0300, Exhibit A, Tab 3, Appendix A, Schedule 2, p. 2, column (e).

[2] EB-2018-0300, Exhibit A, Tab 3, Appendix A, Schedule 2, p. 3, column (e).

UNION GAS LIMITED
Lost Revenue Adjustment Mechanism
2015 - Audit-Adjusted

Line No.	Particulars ($)	2015 Audited Volumes [(1)] 10^3 m^3	2015 LRAM Volumes in 2016 Rates 10^3 m^3	2015 Net LRAM Volumes 10^3 m^3	2016 Delivery Rates $/$10^3$ m^3	Revenue Impact ($)
		(a)	(b)	(c) = (a) - (b)	(d)	(e) = (c) x (d)
	South					
1	M4	11,643	-	11,643	11.571	134,719
2	M5	3,745	-	3,745	25.638	96,015
3	M7	14,868	-	14,868	3.525	52,410
4	T1	2,993	-	2,993	0.760	2,275
5	T2	13,126	-	13,126	0.082	1,076
6		46,375	-	46,375		286,495
	North					
7	Rate 20	2,792	-	2,792	5.548	15,489
8	Rate 100	1,742	-	1,742	2.235	3,894
9		4,534	-	4,534		19,383
10	Total	50,910	-	50,910		305,878

Notes:

[(1)] Volumes reflect 2015 audited volumes, not adjusted for month of install.

UNION GAS LIMITED
Lost Revenue Adjustment Mechanism
2016 - Audit-Adjusted

Line No.	Particulars	2016 Audited Volumes [1] 10^3 m^3	2016 LRAM Volumes in 2016 Rates 10^3 m^3	2016 Net LRAM Volumes 10^3 m^3	2016 Delivery Rates \$/10^3 m^3	Revenue Impact (\$)
		(a)	(b)	(c) = (a) - (b)	(d)	(e) = (c) x (d)
	South					
1	M4	3,870	-	3,870	11.571	44,781
2	M5	4,611	-	4,611	25.638	118,225
3	M7	3,923	-	3,923	3.525	13,830
4	T1	968	-	968	0.760	736
5	T2	2,669	-	2,669	0.082	219
6		16,043	-	16,043		177,791
	North					
7	Rate 20	665	-	665	5.548	3,691
8	Rate 100	89	-	89	2.235	199
9		754	-	754		3,890
10	Total	16,797	-	16,797		181,681

Notes:

[1] Volumes reflect 2016 audited volumes, adjusted for month of install.

UNION GAS LIMITED
Audit-Adjusted Demand Side Management Variance Account

Line No.	Particulars ($000's)	2016 DSM Costs in 2016 Rates[1] (a)	2016 Actual DSM Costs [2] (b)	2016 Variance (c) = (b) - (a)	2016 System Upgrades Spending Variance Adjustment [3] (d)	2016 Account Balance (e) = (c) + (d)	2016 Variance
	South						
1	M1	19,979,231	21,316,933	1,337,702	1,257,261	2,594,963	13.0%
2	M2	9,016,533	5,798,746	(3,217,787)	342,007	(2,875,780)	(31.9%)
3	M4	3,322,171	3,456,443	134,272	203,859	338,131	10.2%
4	M5	2,374,234	2,147,689	(226,545)	126,669	(99,876)	(4.2%)
5	M7	2,230,133	3,433,249	1,203,116	202,491	1,405,607	63.0%
6	T1	1,663,904	1,302,803	(361,101)	76,839	(284,262)	(17.1%)
7	T2	3,993,871	3,758,098	(235,773)	221,651	(14,123)	(0.4%)
		42,580,077	41,213,961	(1,366,116)	2,430,776	1,064,660	2.5%
	North						
9	Rate 01	7,575,805	4,110,239	(3,465,565)	242,420	(3,223,146)	(42.5%)
10	Rate 10	2,675,111	1,225,225	(1,449,886)	72,263	(1,377,623)	(51.5%)
11	Rate 20	1,894,689	753,854	(1,140,836)	44,462	(1,096,374)	(57.9%)
12	Rate 100	2,095,691	540,568	(1,555,123)	31,882	(1,523,240)	(72.7%)
13		14,241,296	6,629,886	(7,611,410)	391,027	(7,220,383)	(50.7%)
14	Total	56,821,373	47,843,847	(8,977,526)	2,821,803	(6,155,723)	(10.8%)

Notes:

(1) DSM Costs in 2016 rates as per EB-2015-0029, Decision and Rate Order, Appendix D, p. 1, column (b).

(2) Allocated consistent with OEB approved methodology, as described at Exhibit A, Tab 3, pp. 8-9.

(3) Allocated consistent with OEB approved methodology for portfolio costs, as described at Exhibit A, Tab 3, pp. 8-9.

UNION GAS LIMITED
DSM Incentive Deferrral Account
Based on 2016 Audit-Adjusted Results [1]

Line No.	Particulars ($)	Amount [2] (a)
	South	
1	M1	2,020,574
2	M2	706,006
3	M4	306,562
4	M5	187,060
5	M7	313,361
6	T1	105,541
7	T2	-
		3,639,104
	North	
8	Rate 01	336,435
9	Rate 10	96,305
10	Rate 20	48,887
11	Rate 100	-
12		481,627
13	Total	4,120,731

Notes:

[1] The Audit-Adjusted balances reflect the final audited DSM amounts, with targets adjusted to include the application of revised prescriptive input assumptions that were updated in December 2015 and CI/LV custom NTG factors that were updated as part of the 2015 NTG Study.

[2] The DSM Incentive for 2016 is calculated and allocated to rate classes using the mechanism approved by the Board in EB-2015-0029, Exhibit A, Tab 3, p. 40.

UNION GAS LIMITED
Audited Deferral and Variance Account Balances
Year Ending December 31, 2016

Line No.	Account Number	Account Name	Balance ($000's)
	DSM Accounts (1):		
1	179-75	Lost Revenue Adjustment Mechanism	488
2	179-111	Demand Side Management Variance Account	(6,156)
3	179-126	Demand Side Management Incentive	3,886
4	**Total DSM Accounts (Lines 1 through 3)**		**(1,782)**

Notes:

(1) There is no interest calculated on the above noted DSM deferral and variance account balances as of December 31, 2016.

UNION GAS LIMITED
Lost Revenue Adjustment Mechanism
Audited 2016 LRAM Variance Account Balance

Line No.	Particulars ($)	Amounts by DSM Plan Year 2015 [1] (a)	2016 [2] (b)	Total (c)
	South			
1	M4	134,719	44,781	179,499
2	M5	96,015	118,225	214,241
3	M7	52,410	13,830	66,240
4	T1	2,275	736	3,011
5	T2	1,076	219	1,295
6		286,495	177,791	464,286
	North			
7	Rate 20	15,489	3,691	19,180
8	Rate 100	3,894	199	4,093
9		19,383	3,890	23,273
10	Total	305,878	181,681	487,559

Notes:

[1] EB-2018-0300, Exhibit A, Tab 3, Appendix B, Schedule 2, p. 2, column (e).

[2] EB-2018-0300, Exhibit A, Tab 3, Appendix B, Schedule 2, p. 3, column (e).

UNION GAS LIMITED
Lost Revenue Adjustment Mechanism
2015 - Audited

Line No.	Particulars ($)	2015 Audited Volumes [(1)] 10^3 m^3	2015 LRAM Volumes in 2016 Rates 10^3 m^3	2015 Net LRAM Volumes 10^3 m^3	2016 Delivery Rates $/$10^3$ m^3	Revenue Impact ($)
		(a)	(b)	(c) = (a) - (b)	(d)	(e) = (c) x (d)
	South					
1	M4	11,643	-	11,643	11.571	134,719
2	M5	3,745	-	3,745	25.638	96,015
3	M7	14,868	-	14,868	3.525	52,410
4	T1	2,993	-	2,993	0.760	2,275
5	T2	13,126	-	13,126	0.082	1,076
6		46,375	-	46,375		286,495
	North					
7	Rate 20	2,792	-	2,792	5.548	15,489
8	Rate 100	1,742	-	1,742	2.235	3,894
9		4,534	-	4,534		19,383
10	Total	50,910	-	50,910		305,878

Notes:

(1) Volumes reflect 2015 audited volumes, not adjusted for month of install.

UNION GAS LIMITED
Lost Revenue Adjustment Mechanism
2016 - Audited

Line No.	Particulars	2016 Audited Volumes [1] 10^3 m^3	2016 LRAM Volumes in 2016 Rates 10^3 m^3	2016 Net LRAM Volumes 10^3 m^3	2016 Delivery Rates \$/10^3 m^3	Revenue Impact (\$)
		(a)	(b)	(c) = (a) - (b)	(d)	(e) = (c) x (d)
	South					
1	M4	3,870	-	3,870	11.571	44,781
2	M5	4,611	-	4,611	25.638	118,225
3	M7	3,923	-	3,923	3.525	13,830
4	T1	968	-	968	0.760	736
5	T2	2,669	-	2,669	0.082	219
6		16,043	-	16,043		177,791
	North					
7	Rate 20	665	-	665	5.548	3,691
8	Rate 100	89	-	89	2.235	199
9		754	-	754		3,890
10	Total	16,797	-	16,797		181,681

Notes:

[1] Volumes reflect 2016 audited volumes, adjusted for month of install.

UNION GAS LIMITED
Audited Demand Side Management Variance Account

Line No.	Particulars ($000's)	2016 DSM Costs in 2016 Rates[1] (a)	2016 Actual DSM Costs [2] (b)	2016 Variance (c) = (b) - (a)	2016 System Upgrades Spending Variance Adjustment [3] (d)	2016 Account Balance (e) = (c) + (d)	2016 Variance
	South						
1	M1	19,979,231	21,316,933	1,337,702	1,257,261	2,594,963	13.0%
2	M2	9,016,533	5,798,746	(3,217,787)	342,007	(2,875,780)	(31.9%)
3	M4	3,322,171	3,456,443	134,272	203,859	338,131	10.2%
4	M5	2,374,234	2,147,689	(226,545)	126,669	(99,876)	(4.2%)
5	M7	2,230,133	3,433,249	1,203,116	202,491	1,405,607	63.0%
6	T1	1,663,904	1,302,803	(361,101)	76,839	(284,262)	(17.1%)
7	T2	3,993,871	3,758,098	(235,773)	221,651	(14,123)	(0.4%)
		42,580,077	41,213,961	(1,366,116)	2,430,776	1,064,660	2.5%
	North						
9	Rate 01	7,575,805	4,110,239	(3,465,565)	242,420	(3,223,146)	(42.5%)
10	Rate 10	2,675,111	1,225,225	(1,449,886)	72,263	(1,377,623)	(51.5%)
11	Rate 20	1,894,689	753,854	(1,140,836)	44,462	(1,096,374)	(57.9%)
12	Rate 100	2,095,691	540,568	(1,555,123)	31,882	(1,523,240)	(72.7%)
13		14,241,296	6,629,886	(7,611,410)	391,027	(7,220,383)	(50.7%)
14	Total	56,821,373	47,843,847	(8,977,526)	2,821,803	(6,155,723)	(10.8%)

Notes:

(1) DSM Costs in 2016 rates as per EB-2015-0029, Decision and Rate Order, Appendix D, p. 1, column (b).

(2) Allocated consistent with OEB approved methodology, as described at Exhibit A, Tab 3, pp. 8-9.

(3) Allocated consistent with OEB approved methodology for portfolio costs, as described at Exhibit A, Tab 3, pp. 8-9.

UNION GAS LIMITED
DSM Incentive Deferrral Account
Based on 2016 Audited Results

Line No.	Particulars ($)	Amount [1]
		(a)
	South	
1	M1	1,924,000
2	M2	673,775
3	M4	273,097
4	M5	167,601
5	M7	278,448
6	T1	93,782
7	T2	-
		3,410,704
	North	
8	Rate 01	342,887
9	Rate 10	89,081
10	Rate 20	43,440
11	Rate 100	-
12		475,408
13	Total	3,886,112

Notes:

[1] The DSM Incentive for 2016 is calculated and allocated to rate classes using the mechanism approved by the Board in EB-2015-0029, Exhibit A, Tab 3, p. 40.

2016 DSM DEFERRAL AND VARIANCE ACCOUNT DISPOSITION:

ALLOCATION AND DISPOSITION OF 2016 DSM DEFERRAL AND VARIANCE ACCOUNT BALANCES

The purpose of this evidence is to address the allocation and disposition of the 2016 DSM deferral and variance account balances identified at Exhibit A, Tab 3, Appendix A, Schedule 1. As discussed throughout Exhibit A, Tabs 1-3, the balances Union is proposing to dispose of are Audit-Adjusted balances, reflecting updated targets that include the application of revised prescriptive input assumptions that were updated in December 2015 and CI/LV custom NTG Factors that were updated as part of the 2015 NTG Study. The allocation and disposition of the Audit-Adjusted 2016 DSM deferral and variance account balances is provided at Exhibit A, Tab 4, Appendix A. For comparative purposes, and in accordance with Section 11.0 of the Guidelines,[1] Union has also provided the allocation and disposition of Audited 2016 DSM deferral and variance account balances at Exhibit A, Tab 4, Appendix B.

This evidence is organized as follows:

1. DSM Deferral and Variance Accounts
    1.1. Disposition of 2016 DSM Deferral and Variance Account Balances
    1.2. General Service Bill Impacts

[1] EB-2014-0134, Filing Guidelines to the Demand Side Management Framework for Natural Gas Distributors (2015-2020), Section 11.0, p. 37.

The allocation of 2016 Audit-Adjusted DSM deferral and variance account balances to rate classes appears at Exhibit A, Tab 4, Appendix A, Schedule 1. Exhibit A, Tab 4, Appendix A, Schedule 2 provides the unit rates for disposition to Union's in-franchise rate classes. Exhibit A, Tab 4, Appendix A, Schedule 3 provides the bill impact of the proposed disposition for general service customers in Union South and Union North.

The allocation of 2016 DSM deferral and variance account balances to rate classes is consistent with the allocation methodologies approved by the OEB in Union's 2015 Disposition of DSM Deferral and Variance Accounts proceeding (EB-2017-0323).

1. DSM DEFERRAL AND VARIANCE ACCOUNTS

Union proposes to allocate the balance in the LRAM Variance Account (Account No. 179-75) to contract rate classes in proportion to the margin reduction attributable to DSM activities appearing at Exhibit A, Tab 3, Appendix A, Schedule 2, p. 1.

Consistent with prior years, Union proposes to allocate the balance in the DSMVA (Account No. 179-111) to rate classes in proportion to the variance between budgeted and actual DSM spending by rate class in 2016, adjusted to reflect the System Upgrade Spending Variance Adjustment at Exhibit A, Tab 3, Appendix A, Schedule 3 (see Exhibit A, Tab 3, Section 2.1 for additional detail). Consistent with the pooled DSM budget costs included in 2016 Rates, Union has pooled Rate M4, Rate M5 and Rate M7 DSMVA balances for the purposes of disposition. Any variance between the DSM budget included in rates and the actual DSM spending in these rate classes has been allocated

and disposed of based on actual 2016 annual volumes for all three rates classes. Accordingly, there is a single common unit rate calculated to determine the disposition of the DSMVA balance to individual customers in these rate classes. Union pooled the DSM budget costs for Rate M4, Rate M5 and Rate M7 to address the rate class eligibility changes approved in Union's 2013 Cost of Service proceeding. The OEB approved Union's proposal to pool DSM costs for Rate M4, Rate M5 and Rate M7 for both ratemaking purposes and DSMVA disposition treatment for 2016 – 2018 as part of its Decision on Union's 2015-2020 DSM Plan.[2]

Union proposes to allocate the balance in the DSMIDA (Account No. 179-126) to rate classes in proportion to the actual DSM spending by rate class in 2016 for scorecards where Union has achieved a DSM incentive.

1.1. DISPOSITION OF 2016 DSM DEFERRAL AND VARIANCE ACCOUNT BALANCES

For general service Rate M1, Rate M2, Rate 01 and Rate 10 customers, Union proposes to dispose of the net 2016 DSM deferral and variance account balances prospectively over a six-month period beginning the first available QRAM after receiving OEB approval. For purposes of calculating bill impacts, Union assumes implementation with the April 1, 2019 QRAM.

For in-franchise contract rate classes, Union is proposing to dispose of the net 2016 DSM deferral and variance account balances as a one-time adjustment with the first available QRAM after

[2] EB-2015-0029, Decision and Order (dated January 20, 2016), p. 91.

receiving OEB approval.

The disposition approach for general service and contract customers is consistent with how Union disposed of 2015 DSM deferral and variance account balances in the 2015 Disposition of DSM Deferral and Variance Accounts proceeding (EB-2017-0323).

1.2. General Service Bill Impacts

General service customer impacts are presented at Exhibit A, Tab 4, Appendix A, Schedule 3. For a residential customer in Union South with annual consumption of 2,200 m^3, the charge for the period April 1, 2019 to September 30, 2019 is estimated to be $3.58. For a residential customer in Union North with annual consumption of 2,200 m^3, the credit for the period April 1, 2019 to September 30, 2019 is estimated to be $7.39.

UNION GAS LIMITED
Allocation of 2016 DSM Deferral Account Balances
2016 - Audit-Adjusted

Line No.	Particulars ($000's)	Acct No.	Union North					Union South										Total (1)
			Rate 01	Rate 10	Rate 20	Rate 100	Rate 25	M1	M2	M4	M5A	M7	M9	M10	T1	T2	T3	
		(a)	(b)	(c)	(d)	(e)	(f)	(g)	(h)	(i)	(j)	(k)	(l)	(m)	(n)	(o)	(p)	(q)
	Delivery-Related Deferrals:																	
1	Lost Revenue Adjustment Mechanism	179-75	-	-	19	4	-	-	-	180	214	66	-	-	3	1	-	488
2	Demand Side Management Variance Account (2)	179-111	(3,223)	(1,378)	(1,096)	(1,523)	-	2,595	(2,876)	680	280	684	-	-	(284)	(14)	-	(6,156)
3	Demand Side Management Incentive	179-126	336	96	49	-	-	2,021	706	307	187	313	-	-	106	-	-	4,121
4	Total Delivery-Related Deferrals		(2,887)	(1,281)	(1,028)	(1,519)	-	4,616	(2,170)	1,166	681	1,064	-	-	(176)	(13)	-	(1,547)

Notes:
(1) Exhibit A, Tab 3, Appendix A, Schedule 1.
(2) Demand Side Management Variance Account balances for Rate M4, M5 and M7 are allocated based on 2016 actual volumes to derive a common unit rate for disposition for all three rate classes, as illustrated below.

Rate Class	Account Balances (i) ($000s)	2016 Actual Volume (10^3m^3)	Pooled Account Balances (ii) ($000s)	Unit Rate (cents/m^3)
	(a)	(b)	(c)	(d) =(c / b) * 100
M4	338	472,042	680	0.1440
M5	(100)	194,195	280	0.1440
M7	1,406	475,225	684	0.1440
Total	1,644	1,141,462	1,644	

(i) - Exhibit A, Tab 3, Appendix A, Schedule 3.
(ii) - Allocated in proportion to column (b).

UNION GAS LIMITED
General Service Unit Rates for Prospective Recovery/(Refund) - Delivery
2016 DSM Deferral Account Disposition
2016 - Audit-Adjusted

Line No.	Particulars	Rate Class	Deferral Balance for Disposition ($000's) (1) (a)	Forecast Volume (10^3m^3) (2) (b)	Unit Rate for Prospective Recovery/(Refund) (cents/m^3) (c) = (a / b) * 100
	Union North				
1	Small Volume General Service	01	(2,887)	203,731	(1.4169)
2	Large Volume General Service	10	(1,281)	98,050	(1.3068)
	Union South				
3	Small Volume General Service	M1	4,616	673,025	0.6858
4	Large Volume General Service	M2	(2,170)	329,950	(0.6576)
5	Total General Service		(1,722)		

Notes:
(1) Exhibit A, Tab 4, Appendix A, Schedule 1.
(2) Forecast volume for the period April 1, 2019 to September 30, 2019.

UNION GAS LIMITED
Contract Unit Rates for One-Time Adjustment - Delivery
2016 DSM Deferral Account Disposition
2016 - Audit-Adjusted

Line No.	Particulars	Rate Class	Deferral Balance for Disposition ($000's) (1) (a)	2016 Actual Volume (10^3m^3) (b)	Unit Rate (cents/m^3) (c) = (a / b) * 100
	Union North				
1	Medium Volume Firm Service	20	(1,028)	565,469	(0.1819)
2	Large Volume High Load Factor	100	(1,519)	1,365,541	(0.1112)
3	Large Volume Interruptible	25	-	116,365	-
	Union South				
4	Firm Com/Ind Contract	M4	1,166	472,042	0.2470
5	Interruptible Com/Ind Contract	M5A	681	194,195	0.3507
6	Special Large Volume Contract	M7	1,064	475,225	0.2239
7	Large Wholesale	M9	-	72,275	-
8	Small Wholesale	M10	-	247	-
9	Contract Carriage Service	T1	(176)	447,213	(0.0393)
10	Contract Carriage Service	T2	(13)	4,213,980	(0.0003)
11	Contract Carriage- Wholesale	T3	-	250,167	-
12	Total Contract Service		175		

Notes:
(1) Exhibit A, Tab 4, Appendix A, Schedule 1.

UNION GAS LIMITED
General Service Bill Impacts
2016 - Audit-Adjusted

Line No.	Particulars	Rate Component	Unit Rate for Prospective Recovery/(Refund) (cents/m^3) (1)	Volume (m^3) (2)	Bill Impact ($)
			(a)	(b)	(c) = (a x b) / 100
1	Rate 01	Delivery	(1.4169)	521	(7.39)
2		Commodity	-	521	-
3		Transportation	-	521	-
4			(1.4169)		(7.39)
5	Sales Service				(7.39)
6	Direct Purchase Bundled T				(7.39)
7	Rate 10	Delivery	(1.3068)	26,039	(340.28)
8		Commodity	-	26,039	-
9		Transportation	-	26,039	-
10			(1.3068)		(340.28)
11	Sales Service				(340.28)
12	Direct Purchase Bundled T				(340.28)
13	Rate M1	Delivery	0.6858	521	3.58
14		Commodity	-	521	-
15			0.6858		3.58
16	Sales Service				3.58
17	Direct Purchase				3.58
18	Rate M2	Delivery	(0.6576)	17,228	(113.29)
19		Commodity	-	17,228	-
20			(0.6576)		(113.29)
21	Sales Service				(113.29)
22	Direct Purchase				(113.29)

Notes:
(1) Exhibit A, Tab 4, Appendix A, Schedule 2, p. 1, column (c).
(2) Average consumption, per customer, for the period April 1, 2019 to September 30, 2019.
Rate 01 volume based on annual consumption of 2,200 m^3.
Rate 10 volume based on annual consumption of 93,000 m^3.
Rate M1 volume based on annual consumption of 2,200 m^3.
Rate M2 volume based on annual consumption of 73,000 m^3.

UNION GAS LIMITED
Allocation of 2016 DSM Deferral Account Balances
2016 - Audited

Line No.	Particulars ($000's)	Acct No.	Union North					Union South										Total (1)
			Rate 01	Rate 10	Rate 20	Rate 100	Rate 25	M1	M2	M4	M5A	M7	M9	M10	T1	T2	T3	
		(a)	(b)	(c)	(d)	(e)	(f)	(g)	(h)	(i)	(j)	(k)	(l)	(m)	(n)	(o)	(p)	(q)
	Delivery-Related Deferrals:																	
1	Lost Revenue Adjustment Mechanism	179-75	-	-	19	4	-	-	-	180	214	66	-	-	3	1	-	488
2	Demand Side Management Variance Account (2)	179-111	(3,223)	(1,378)	(1,096)	(1,523)	-	2,595	(2,876)	680	280	684	-	-	(284)	(14)	-	(6,156)
3	Demand Side Management Incentive	179-126	343	89	43	-	-	1,924	674	273	168	278	-	-	94	-	-	3,886
4	Total Delivery-Related Deferrals		(2,880)	(1,289)	(1,034)	(1,519)	-	4,519	(2,202)	1,132	662	1,029	-	-	(187)	(13)	-	(1,782)

Notes:
(1) Exhibit A, Tab 3, Appendix B, Schedule 1.
(2) Demand Side Management Variance Account balances for Rate M4, M5 and M7 are allocated based on 2016 actual volumes to derive a common unit rate for disposition for all three rate classes, as illustrated below.

Rate Class	Account Balances (i) ($000s)	2016 Actual Volume (10^3m^3)	Pooled Account Balances (ii) ($000s)	Unit Rate (cents/m^3)
	(a)	(b)	(c)	(d) =(c / b) * 100
M4	338	472,042	680	0.1440
M5	(100)	194,195	280	0.1440
M7	1,406	475,225	684	0.1440
Total	1,644	1,141,462	1,644	

(i) - Exhibit A, Tab 3, Appendix B, Schedule 3.
(ii) - Allocated in proportion to column (b).

UNION GAS LIMITED
General Service Unit Rates for Prospective Recovery/(Refund) - Delivery
2016 DSM Deferral Account Disposition
2016 - Audited

Line No.	Particulars	Rate Class	Deferral Balance for Disposition ($000's) (1) (a)	Forecast Volume (10^3m^3) (2) (b)	Unit Rate for Prospective Recovery/(Refund) (cents/m^3) (c) = (a / b) * 100
	Union North				
1	Small Volume General Service	01	(2,880)	203,731	(1.4138)
2	Large Volume General Service	10	(1,289)	98,050	(1.3142)
	Union South				
3	Small Volume General Service	M1	4,519	673,025	0.6714
4	Large Volume General Service	M2	(2,202)	329,950	(0.6674)
5	Total General Service		(1,852)		

Notes:
(1) Exhibit A, Tab 4, Appendix B, Schedule 1.
(2) Forecast volume for the period April 1, 2019 to September 30, 2019.

UNION GAS LIMITED
Contract Unit Rates for One-Time Adjustment - Delivery
2016 DSM Deferral Account Disposition
2016 - Audited

Line No.	Particulars	Rate Class	Deferral Balance for Disposition ($000's) (1) (a)	2016 Actual Volume (10^3m^3) (b)	Unit Rate (cents/m^3) (c) = (a / b) * 100
	Union North				
1	Medium Volume Firm Service	20	(1,034)	565,469	(0.1828)
2	Large Volume High Load Factor	100	(1,519)	1,365,541	(0.1112)
3	Large Volume Interruptible	25	-	116,365	-
	Union South				
4	Firm Com/Ind Contract	M4	1,132	472,042	0.2399
5	Interruptible Com/Ind Contract	M5A	662	194,195	0.3406
6	Special Large Volume Contract	M7	1,029	475,225	0.2165
7	Large Wholesale	M9	-	72,275	-
8	Small Wholesale	M10	-	247	-
9	Contract Carriage Service	T1	(187)	447,213	(0.0419)
10	Contract Carriage Service	T2	(13)	4,213,980	(0.0003)
11	Contract Carriage- Wholesale	T3	-	250,167	-
12	Total Contract Service		70		

Notes:
(1) Exhibit A, Tab 4, Appendix B, Schedule 1.

UNION GAS LIMITED
General Service Bill Impacts
2016 - Audited

Line No.	Particulars	Rate Component	Unit Rate for Prospective Recovery/(Refund) (cents/m^3) (1)	Volume (m^3) (2)	Bill Impact ($)
			(a)	(b)	(c) = (a x b) / 100
1	Rate 01	Delivery	(1.4138)	521	(7.37)
2		Commodity	-	521	-
3		Transportation	-	521	-
4			(1.4138)		(7.37)
5	Sales Service				(7.37)
6	Direct Purchase Bundled T				(7.37)
7	Rate 10	Delivery	(1.3142)	26,039	(342.21)
8		Commodity	-	26,039	-
9		Transportation	-	26,039	-
10			(1.3142)		(342.21)
11	Sales Service				(342.21)
12	Direct Purchase Bundled T				(342.21)
13	Rate M1	Delivery	0.6714	521	3.50
14		Commodity	-	521	-
15			0.6714		3.50
16	Sales Service				3.50
17	Direct Purchase				3.50
18	Rate M2	Delivery	(0.6674)	17,228	(114.98)
19		Commodity	-	17,228	-
20			(0.6674)		(114.98)
21	Sales Service				(114.98)
22	Direct Purchase				(114.98)

Notes:
(1) Exhibit A, Tab 4, Appendix B, Schedule 2, p. 1, column (c).
(2) Average consumption, per customer, for the period April 1, 2019 to September 30, 2019.
Rate 01 volume based on annual consumption of 2,200 m^3.
Rate 10 volume based on annual consumption of 93,000 m^3.
Rate M1 volume based on annual consumption of 2,200 m^3.
Rate M2 volume based on annual consumption of 73,000 m^3.

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Glossary of Terms

Audit

The Audit is an annual Evaluation, Measurement and Verification ("EM&V") process to assess Union's reported DSM results. Ontario Energy Board ("OEB") Staff is responsible for retaining the auditor, also known as the Evaluation Contractor, whom ultimately serves to protect the interests of ratepayers with respect to Union's DSM claims.

Avoided Costs

Avoided costs are a measurement of the reduction in the delivered costs of supplying all resources (natural gas, electricity and water) to customers as a consequence of a program.

Base Case

The base case is a projection of the future without the effects of the utility's DSM program. The difference between the base case and the energy efficient case represents the saving attributable to the energy efficient measure.

Building Envelope

The building envelope refers to the exterior surfaces (such as walls, windows, roof and floor) of a building that separate the conditioned space from the outdoors.

Channel Partner

A Channel Partner is a company that, in the course of its business, can influence consumers to choose gas over competing fuels, or one method of increasing energy efficiency over another. Examples of Channel Partners include appliance retailers, HVAC contractors, engineers and architects.

Cost Effectiveness

Cost effectiveness refers to the analysis that determines whether or not the benefits of a project/measure are greater than the costs. It is based on the net present value of savings over the equipment life of the measures.

Demand Side Management ("DSM")

DSM is the modification in end-use customer demand for natural gas through conservation programs. While the focus of Union's DSM is natural gas savings and the reduction in greenhouse gas emissions, it may also result in the saving of a number of other resources such as electricity, water, propane, and heating fuel oil.

Demand Side Management Incentive Deferral Account ("DSMIDA")

The account used to record the DSM Shareholder Incentive amount earned by Union as a result of its DSM programs.

Demand Side Management Variance Account ("DSMVA")

The account used to track the variance between actual DSM spending by rate class versus the budgeted amount included in rates by rate class. Union may record in the DSMVA, in any one year, a variance amount of no more than 15% above its DSM budget for that year.

Direct Access ("DA") Budget Mechanism

The DA budget mechanism is offered to Union's largest industrial customers (Rate T2 and Rate 100). It provides each customer dedicated access to the customer incentive budget they pay in their rates to support energy efficiency projects and studies on an annual basis.

Discount Rate

The interest rate used to calculate the net present value of expected yearly benefits and costs.

DSM Shareholder Incentive

The incentive available to Union for achieving Board approved performance targets.

Effective Useful Life ("EUL")

EUL is the length of time that a piece of equipment or measure is anticipated to last and perform as expected.

Evaluation Contractor ("EC")

As part of the new 2015-2020 evaluation governance structure, the EC is a third party who carries out the evaluation and audit processes of Union's DSM programs. The EC, also know as the auditor, is retained by OEB Staff.

Evaluation and Audit Committee ("EAC")

As part of the new 2015-2020 evaluation governance structure, the EAC provides input and advice to OEB Staff on the evaluation and audit of DSM results. The EAC consists of representatives from Union, Enbridge, non-utility stakeholders, independent experts and observers, all working with OEB Staff. The EAC replaces the Audit Committees and Technical Evaluation Committee form the previous DSM framework.

Evaluation, Measurement & Verification ("EM&V")

EM&V is the collection of methods and processes used to assess the implementation and performance of energy efficiency activities. The main objective of EM&V is to assess the performance of a program and to measure (through data collection, analysis, and reporting of data) and verify program impacts to ensure the expected level of savings are being achieved. EM&V data, in addition to various evaluation studies, such as Net-to-Gross ("NTG") or persistence studies, inform recommendations for improvements in program performance.

Free Ridership

Free Riders are program participants who would have installed an energy efficient measure without the influence of Union's DSM programs. Free Ridership is not a binary concept and consequently, different levels of Free Ridership exist. Free Rider rates are estimated based on research, market penetration studies, through negotiations in prior evaluation processes or by surveying participants. The Free Rider rates are applied to the gross program savings results to derive savings generated by the program.

Incentive

An incentive is a payment from Union to DSM participants to encourage participation in a DSM program.

Incremental Cost

The incremental cost is the difference in price between the high efficiency case and the base case.

Input Assumptions

Assumptions such as operating characteristics and associated units of resource savings for DSM technologies and measures. These cover a range of typical DSM activities, measures and technologies with residential, low-income, commercial and industrial applications.

Lifetime Cumulative cubic meters ("cumulative m^3")

Total natural gas savings over the effective useful life of a DSM measure. Frequently used at the measure or program level and can also summarize the benefits of an entire portfolio.

Lost Revenue Adjustment Mechanism Variance Account ("LRAMVA")

The LRMVA captures the differences between the actual contract market margin reductions (distribution revenues) related to Union's DSM plans and the contract market margin reduction included in gas delivery rates as approved by the Board.

Measure

A measure is any particular energy efficient technology (e.g. an energy recovery ventilator, condensing boiler, etc.)

National Account

National Account customers are those customers that have multiple property locations and are similar in design and use. National Account customers include retail chains, property management firms and foodservice chains.

Net Present Value ("NPV")

The NPV is the sum of the discounted yearly benefits arising from an investment over the lifetime of that investment.

Net-to-Gross Ratio

Gross impacts are the program impacts prior to accounting for program attribution effects. These effects include Free Ridership and Spillover. Net impacts are the program impacts once program attribution effects have been accounted for. The NTG Ratio is defined as 1 – Free Rider Rate + Spillover Rate.

Offering

A DSM offering exists where there are either bundles of energy efficiency measures or performance/maintenance based enhancements to existing measures marketed together (e.g. home retrofit measures or custom equipment/process improvements) or where support is delivered through a suite of services (e.g. customer engagement, site energy assessments, etc.).

Participants

The units used by Union to measure participation in its DSM programs. Participant units of measurement may include customers, projects and measures or technologies installed. Not all participants result in energy savings.

Persistence

Persistence is the extent to which a DSM measure remains installed and performing as originally predicted. Persistence of DSM savings takes into account how long a DSM measure is kept in place relative to its useful life, the net impact of the measure relative to the base case scenario, and the impact of technical degradation.

Prescriptive Offering

A prescriptive DSM offering includes natural gas savings from various measures or technologies that are based on previously substantiated and pre-approved inputs. Prescriptive DSM measures apply to all of Union's customer market segments including residential, low-income, commercial and industrial.

Program

A program is the utility specific approach to providing one or more DSM offerings to customers.

Program Costs

DSM program costs include the following components:

- Development and Start-up
- Promotion
- Delivery
- Evaluation, Measurement and Verification ("EM&V") and Monitoring
- Administration

Of the above costs, only start-up, promotion, delivery, and a portion of the evaluation and verification costs are applicable to individual programs. Other costs related to the design and deliveries of DSM programs are appropriately considered at the DSM portfolio level. These include development, a portion of the evaluation costs, monitoring, tracking and administration costs.

Program Evaluation

Program evaluation refers to activities related to the collection, analysis, and reporting of data for purposes of measuring program impacts from past, existing or potential program impacts.

Resource Acquisition

Programs that seek to achieve direct, measurable savings customer-by-customer through the incenting or promotion of specific energy efficiency upgrades.

Social and Assisted Housing

Residential social housing includes all non-profit housing developed, acquired or operated under a federal, provincial or municipally funded program including shelters and hostels.

Spillover

Spillover effects refer to customers that adopt energy efficiency measures because they are influenced by a utility's program-related information and marketing efforts, but do not actually participate in the program.

Technical Evaluation Committee ("TEC")

In the 2012-2014 framework, the TEC established DSM technical and evaluation standards for natural gas utilities. The TEC consisted of seven individuals: three intervenor members, a representative from Union, a representative from Enbridge, and two independent members with technical and other relevant expertise. The TEC was replaced by the EAC as part of the 2015-2020 evaluation governance structure.

Total Resource Cost Test ("TRC")

The TRC Test provides a measure of the benefits and costs that accrue as a result of the installation of a DSM measure.

Trade Allies

Trade allies include organizations (e.g. architectural and engineering firms, building contractors, appliance manufacturers and dealers, and banks) that influence the energy-related decisions of customers who might participate in DSM programs.

Units

Units provided within report tables can represent different items, such as the number of measures installed or homes retrofitted, depending on the program being reported on. Units are not equivalent to the number of participants since a single participant can install several units.

Acronyms

	Acronym	Full Name
A	AFUE	Annual fuel utilization efficiency
C	CBS	Canadian Boiler Society
	CEA	Certified Energy Auditor
	CEE	Consortium for Energy Efficiency
	CFM	Cubic feet per minute
	CI	Commercial/Industrial
	CSBD	Commercial savings by design
D	DA	Direct access
	DCKV	Demand control kitchen ventilation
	DCV	Demand control ventilation
	DSM	Demand side management
	DSMVA	Demand side management variance account
E	EAC	Evaluation advisory committee
	EC	Evaluation contractor
	EEP	Energy efficiency plan
	EM&V	Evaluation, measurement, and verification
	ERV	Energy recovery ventilation
G	GIF	Green Investment Fund
H	HRR	Home Reno rebate
	HRV	Heat recovery ventilation
	HSC	Housing Services Corporation
	HVAC	Heating, ventilation and air conditioning
	HWP	Home Weatherization Program
I	IDP	Integrated design process
	IESO	Independent Electricity System Operator
L	LICO	Low-income cut-offs
	LRAMVA	Lost revenue adjustment mechanism variance account
N	NRCan	Natural Resource Canada
	NTG	Net-to-gross study
O	OBC	Ontario building code
	OEB	Ontario Energy Board a.k.a. Board
	OH	Optimum home
	OHBA	Ontario Home Builders Association
	ONPHA	Ontario Non-Profit Housing Association
Q	QA/QC	Quality assurance/quality control
S	SEM	Strategic energy management
	SO	Service organization
T	TEC	Technical Evaluation Committee
	TRC-Plus	Total resource cost plus
	TRM	Technical reference manual

Executive Summary

In its twentieth year of offering Ontarian's Demand Side Management ("DSM") programming, Union Gas Limited ("Union") is pleased to report that we continue to drive incremental year-over-year natural gas savings for many of our DSM programs. In Union's large volume program, however, savings achieved in 2016 were less than previous years. There was some delay in modifying and relaunching the large volume program following the Ontario Energy Board's ("Board") direction to continue the program for the term of the new framework. These customers were also contending with operational changes and economic constraints in 2016 causing projects to be smaller in size than they were historically. Union's utility incentive specific to the resource acquisition and low-income scorecards is also lower in 2016 compared to previous years. Although natural gas savings on these scorecards were higher than 2015, scorecard target increases presented a significant challenge. A summary of 2016 results is tabulated below (Table ES.1).

Table ES. 1- 2016 DSM Results Summary

2016 DSM Results Summary*	
Net Cumulative Natural Gas Savings (m^3)	959,435,258 m^3
DSM Shareholder Incentive amount	$ 4,120,731
DSM Variance amount**	$ (6,155,723)
Lost Revenue Adjustment Mechanism amount	$ 181,681

*Post-audit, post-verification
**The DSMVA represents the difference between the 2016 budget already built into rates and the 2016 overspend

Delivering DSM to commercial, industrial and large volume customers presented a number of new obstacles for Union in 2016. In 2016 DSM was in direct competition with several government policies and mandates as well as electric utility programs. As a result of this changing energy efficiency landscape, customers were left to triage limited resources, both financial capital and human capacity, to adhere to carbon policies while still achieving business performance and profit goals. This, combined with relatively low natural gas commodity pricing (compared with rising electricity prices), impacted customer investments in natural gas conservation.

In addition to the changing energy efficiency landscape in Ontario, the Board staff now plays a more active role as evaluation coordinators for DSM activities. The Board staff coordinated process took significantly longer than the annual audit process had previously. As a result, the release of this 2016 DSM Report is delayed by seven months; eleven months after the program year was completed. Union relies on the feedback provided by stakeholders through the audit and evaluation process to enhance program design and implementation practices and ensure knowledge and expertise from other jurisdictions are incorporated in the DSM portfolio. The delayed determination of evaluation and audit results impacts Union's ability to adapt to any continuous improvement recommendations in a timely manner, finalize targets for the following year, as well as clear accounts at regular intervals with rate-payers.

1. Introduction

The Board's first DSM policy was introduced more than 20 years ago. In response to this original regulatory framework,[1] Union has been pursuing and promoting opportunities to help customers reduce their natural gas energy consumption since 1997.

DSM has evolved and continued to grow through several subsequent regulatory frameworks. The 2006 Generic Proceeding[2] Decision guided DSM from 2007 to 2011. Recognizing that DSM is a voluntary business function for natural gas utilities, the Shared Savings Mechanism, which was later renamed the DSM Shareholder Incentive, was established to motivate the utilities to actively and effectively pursue DSM savings by providing financial incentives.

As part of the 2012 DSM guidelines[3] period (2012 to 2014), measurement of DSM performance transitioned from a Total Resource Cost ("TRC")-based incentive mechanism (providing an incentive based on the economic benefits produced by DSM programs) to a weighted scorecard approach with multiple performance metrics. It also shifted emphasis to lifetime (cumulative) cubic metre natural gas savings (m^3) to encourage delivery of long-life energy efficiency measures and sustained benefits from DSM efforts.

The current framework[4] governs DSM activities from 2015 to 2020 and reflects the changing environment and commitment to energy conservation in the province. It is informed by the March 31, 2014 Directive to the Board from the Minister of Energy (the "Conservation Directive") and incorporates the government's policy of putting "conservation first"[5] into distributor planning processes for both electricity and natural gas utilities. The framework sets out specific goals and guiding principles for DSM programs to achieve all cost-effective DSM, provide opportunities for all customers to better manage their energy consumption, promote a culture of energy conservation and potentially avoid building additional natural gas infrastructure.

[1] E.B.O. 169-III Report of the Board, July 23, 1993.

[2] DSM Generic Proceeding, EB-2006-0021.

[3] DSM Guidelines for Natural Gas Distributors, EB-2008-0346.

[4] Report of the Board: DSM Framework for Natural Gas Distributors (2015-2020), EB-2014-0134.

[5] Achieving Balance, Ontario's Long-Term Energy Plan, December 2013, Conservation First, pg. 21.

Union has demonstrated considerable success delivering energy efficiency programs and helping customers to realize energy savings and adopt lasting conservation behaviours. Union is pleased to continue offering DSM programming through its Board approved 2015-2020 DSM Plan (EB-2015-0029); to remain a trusted advisor to customers in helping them reduce their energy bills as well as supporting putting "conservation first" in the province.

This DSM Annual Report presents a summary of Union's performance in 2016 and the resulting balances in the Lost Revenue Adjustment Mechanism Variance Account, DSM Shareholder Incentive Deferral Account, and DSM Variance Account.

This report satisfies the following objectives:

- Provides an overview of key elements of the DSM framework and evaluation structure (section 2);
- Presents reporting requirements established in section 14.2 of the filing guidelines[6] (section 3);
- Summarizes savings achieved and budget spent (section 4);
- Describes in detail the scorecards, programs and offerings included in the DSM portfolio (section 5 to 9);
- Outlines the expected lost revenue (section 10) and shareholder incentive amounts (section 11) that will be sought for approval, as well as the balance of the DSMVA (section 12) that will be requested for disposition; and,
- Discusses how DSM will continue in 2017.

This report also benchmarks the results of this second year under the 2015-2020 DSM Plan and highlights successes and lessons learned in delivering the DSM portfolio.

The DSM portfolio is shown in Table 1.0. Each scorecard contains one or more programs and each program provides one or more DSM offerings to customers. Offerings are bundles of energy efficiency measures, enhancements or support. Sections five through nine of this report describe the scorecards and programs as well as provide a detailed view of the offerings, including the target market, market incentive, market delivery and education and awareness initiatives.

[6]Filing Guidelines to the DSM Framework for Natural Gas Distributors (2015-2020), EB-2014-0134, pp.44-45.

Table 1.0 - Union's 2016 DSM Portfolio by Scorecard, Program and Offering

Scorecards	Programs	Offerings
Resource Acquisition Scorecard	Residential Program	Home Reno Rebate Offering
	Commercial/Industrial Program	• Commercial/Industrial Prescriptive Offering • Commercial/Industrial Direct Install Offering • Commercial/Industrial Custom Offering
Low-Income Scorecard	Low-Income Program	• Home Weatherization Offering • Furnace End-of-Life Upgrade Offering • Indigenous Offering • Multi-Family Offering
Large Volume Scorecard	Large Volume Program	Large Volume Direct Access Offering
Market Transformation Scorecard	Market Transformation Program	• Optimum Home Offering • Commercial Savings By Design Offering
Performance-Based Scorecard	Performance-Based Program	• RunSmart Offering • Strategic Energy Management Offering

2. Demand Side Management Framework

The purpose of this section is to outline the Board-approved plan that sets the parameters for 2016 DSM programming, lay out the portfolio at the scorecard level, and discuss the related evaluation work.

2.1 2016 DSM Plan

In 2016, Union entered the second year of the EB 2015-0029 multi-year 2015-2020 DSM Plan filed on April 1, 2015,[7] in accordance with the Board's Demand Side Management Guidelines for Natural Gas Utilities (EB-2014-0134).

Although 2016 is the second year of Union's 2015-2020 DSM Plan, it is the first year the new framework came into full effect for DSM programs in Ontario, as 2015 was considered a "roll-over" year. Included in the changes of the new framework is a significant increase in budgets which enable the introduction of a number of new and expanded program offerings.

On January 20, 2016, the Board released its EB-2015-0029/49 Decision on Union and Enbridge Gas Distribution Inc. ("Enbridge") 2015-2020 DSM Plans ("2015-2020 DSM Plan Decision"). As part of this Decision, the Board approved many of Union's 2016 programs, scorecards, metrics, targets, incentives and budgets but also directed certain changes to be made.

The following amendments to Union's 2016 DSM Plan were made as a result of the Decision:

- The residential energy savings kit offering was not approved and concluded at the end of 2015;
- The new residential behavioural offering was not approved and, therefore, not launched as planned in 2016;
- The proposed direct install pilot in the commercial/industrial program was modified to be a full program offering on the resource acquisition scorecard;
- The Board directed Union to continue its large volume self-direct program offering with cumulative m3 savings targets rather than adopt a program focused solely on technical support and training; and,

[7] The plan was amended July 3, 2015 to capture minor corrections.

- The Board directed Union to establish a new market transformation offering targeting commercial and industrial new construction.

2.2 Portfolio Design

Union's DSM activities are continuing to drive market change through focused efforts on delivering natural gas savings and related customer benefits. This annual report highlights Union's achievements in 2016 within five scorecards:

- Resource Acquisition
- Low-Income
- Large Volume
- Market Transformation
- Performance-Based

The resource acquisition scorecard contains a residential and a commercial/industrial program. Resource acquisition programs are designed to achieve direct, measureable savings for an individual customer and involve the installation of energy efficient equipment.

The low-income scorecard has one program – the low-income program, which includes various single family and multi-family offerings. While the low-income program is essentially a resource acquisition program, it is treated independently to recognize the unique needs of this customer base and a different cost-effectiveness screening threshold.

The large volume program, on the large volume scorecard, is comprised of the direct access program offering. This offering has been re-launched based on the 2015-2020 DSM Plan Decision. The offering uses a self-direct funding model that grants Rate T2 and Rate100 customers direct access to the incentive budget they pay in rates. This motivates customers to better plan expenditures on projects that will reduce energy usage in their facility.

Market transformation programs focus on facilitating fundamental changes that lead to greater market adoption of emerging and/or leading edge energy efficient products and services. Unlike resource acquisition programs, market transformation programs approach adoption barriers and energy savings related to a technology or service within an entire market or industry, including non-participants of the program. Resource acquisition programs

target adoption barriers specific to the individual customer and energy savings resulting directly from customers who participate. Union's market transformation program, captured on the market transformation scorecard, includes an offering for residential new construction (Optimum Home) as well as commercial new construction (Commercial Savings By Design).

Performance-based conservation uses energy monitoring as an educational tool to enable commercial and industrial customers to identify and implement system-wide operational energy efficiency enhancements. Savings are measured by comparing energy usage before and after improvements are made.

2.3 Cost Effectiveness Screening

The Board mandates cost effectiveness screening as the means for determining the economic value of a DSM program. Cost effectiveness screening for the new framework has adopted an enhanced TRC test, called the "TRC-Plus" test, which includes a 15 percent adder to account for positive corollary effects of DSM, such as improvements to the environment, economy and society.

The TRC-Plus test is used to screen for cost effectiveness at the program and portfolio level.

TRC benefits include the avoided costs associated with natural gas, electricity, and water savings over the life of the energy efficient equipment. TRC costs include the incremental equipment costs[8] associated with the energy efficient equipment in relation to its less-efficient equivalent, as well as any program, administrative, and evaluation costs attributed directly to the program.[9] For programs measured by cumulative m^3 natural gas savings, excluding the low-income program, the program is considered cost effective if the ratio of the present value of the TRC benefits to the present value of the TRC costs exceeds 1.0. To recognize that the low-income program may result in significant benefits not captured by the

[8] Incremental costs include capital, cost of removal less salvage value, installation, operating and maintenance and/or fuel costs.

[9] By definition of the TRC test, incentive costs provided to program participants are benefits to participants and are not included as TRC costs.

TRC test, this program is screened using a TRC threshold of 0.7. The market transformation program is assessed based on the objectives of the program.

2.4 Program Evaluation

There are two broad categories of evaluations: impact evaluation and process evaluation. Impact evaluations focus on participation and related savings resulting from DSM programs. Process evaluations focus on the effectiveness of program design and delivery, and assess why program outcomes occur.

As part of the 2015 – 2020 DSM framework, Board staff have taken over coordinating the impact evaluation of Union's DSM programs and have engaged DNV GL to be the Evaluation Contractor ("EC") to undertake that work.[10] Details specific to 2016 impact evaluation activities proposed by the EC are provided in its 2016-2018 Natural Gas DSM Evaluation, Measurement, and Verification ("EM&V") Plan provided to the utilities and available on the OEB's DSM Evaluation webpage.[11] Board staff is coordinating the implementation of elements in the plan, including preparing the scope of work and selecting vendors.

In a letter dated March 15, 2017,[12] the "deadline for gas utilities to file their respective 2016 Draft [Annual DSM] Evaluation Reports will be one month following the OEB's release of the 2015 results." As such, the 2016 Draft Annual DSM Report was filed November 16, 2017 and this triggered the initiation of the second impact evaluation of DSM portfolio results coordinated by Board staff. Initially engaged to audit the utilities' 2015 DSM activities, Board staff determined that DNV GL would continue to act as the EC, or independent third party auditor, in 2016 to assess DSM program results for both Union and Enbridge, known collectively as "the utilities."

Process evaluations are planned and managed by the utilities.

[10] Board letter, 2015-2020 DSM Evaluation Process of Program Results, EB-2015-0245, August 21, 2015.

[11] oeb.ca/industry/policy-initiatives-and-consultations/natural-gas-demand-side-management-dsm-evaluation

[12] Board letter dated March 15, 2017 Re: Union Gas Limited 2016 DSM Draft Evaluation Report.

2.5 Evaluation Advisory Committee

An Evaluation Advisory Committee ("EAC") was established per a memo from the Board dated August 21, 2015 to provide input and advice for DSM evaluation activities coordinated by Board staff. The EAC is comprised of:

- Experts representing non-utility stakeholders, with demonstrated experience and expertise in the evaluation of DSM technologies and programs, natural gas energy efficiency technologies, multi-year impact assessments, net-to-gross studies, free ridership analysis and natural gas energy efficiency persistence analysis
- Expert(s) retained by the Board
- Representatives from the Independent Electricity System Operator ("IESO");
- Representatives from each natural gas utility; and,
- Representatives from the Ministry of Energy and the Environmental Commissioner of Ontario, who will participate as observers.

The Board appointed the following non-utility stakeholders as members of the EAC:

- Chris Neme, Energy Futures Group
- Jay Shepherd, Shepherd Rubenstein Professional Corporation
- Marion Fraser, Fraser & Company

On May 5, 2016, two additional independent experts were added to the EAC:

- Ted Kesik, Knowledge Mapping Inc.
- Robert Wirtshafter, Wirtshafter Associates Inc.

Non-utility and independent stakeholders are expected to provide input and advice based on their experience and technical expertise and not to advocate for the position of parties they have represented before the Board in various proceedings.

2.6 Transition Plan of TEC Activities to the OEB

The Technical Evaluation Committee ("TEC") evaluation activities were transitioned to the Board under the new DSM evaluation governance structure.[13] Projects that were under management by the TEC were reviewed with Board staff and the remaining deliverables were to be managed as follows:

- **Technical Reference Manual ("TRM") Development.** Development of the TRM with updated measures and input assumptions was completed and filed jointly by the utilities with the Board on December 21, 2016 (EB-2016-0246) and approved in June 2017. The TRM maintenance and update process, including posting the final TRM online, has now been transitioned to the Board staff coordinated evaluation process.
- **Custom Project Net-to-Gross Study ("NTG").** Under direction from Board staff, the free-ridership and spillover study, also known as the NTG study, were combined with custom program savings verification completed by the EC.[14] The combined study is intended to produce free ridership and spillover ratios applicable to commercial, industrial and large volume projects through the use of end user self-reports and interviews. The study was initiated in March 2016 and is expected to be completed January 2018.
- **Boiler Baseline Study.** The TEC selected ICF Consulting Canada, Inc. for the boiler baseline study. The study is currently underway and is expected to be completed in 2018.
- **Persistence Study.** Board staff will be responsible for the procurement process and management of the persistence study, including management of project deliverables and contractual obligations through to completion of the study, with input from the EAC. This project has yet to be initiated.

[13] As outlined in the letter from the Board dated March 4, 2016 (EB-2015-0245).

[14] Custom Program Savings Verification is an integral part of the annual DSM audit.

2.7 Audit of the 2016 DSM Results

Union's DSM results are subject to an independent external audit. The intention of the audit is to have the EC provide an opinion on whether the claimed DSM Shareholder Incentive amount ("DSMIDA"), Lost Revenue Adjustment Mechanism Variance Account ("LRAMVA"), and Demand Side Management Variance Account ("DSMVA") have been correctly calculated using reasonable assumptions. The EAC, as described in Section 2.6, is intended to provide input and advice throughout the audit to facilitate the achievement of the audit objectives.

2.8 Input Assumptions for 2016 Scorecard Targets and Results

In setting the original 2016 DSM targets, as part of its OEB-approved 2015-2020 DSM Plan, Union applied the prescriptive input assumptions and NTG Factors that resulted from Union's 2014 EM&V process, which were the most recent OEB-approved adjustment factors available at the time. These included: (i) OEB-approved TRM prescriptive input assumptions established in the March 2015 joint utility filing (EB-2014-0354); and (ii) a 46% NTG Factor established in 2008.

Targets have now been updated to reflect the outcomes of the 2015 EM&V process including updated prescriptive input assumptions from the December 2015 joint utility filing (EB-2015-0344) and the NTG Factors that resulted from the 2015 NTG Study. These same assumptions and factors were used to calculate Union's 2015 LRAM during the 2015 EM&V process.

3. OEB Data Reporting Requirements

This Section of the Annual Report is dedicated to tabulating required elements outlined in section 14.2 of the DSM guidelines as follows:

Key element	Table number
Annual and long-term DSM budgets ($/year and $/6 years)	Table 3.0
Actual annual total DSM costs (including DSM budget[15], overheads, evaluation, DSM Shareholder Incentive, lost revenues) for each rate class dating back to 2007	Table 3.1
Historic actual annual DSM spending ($/year) dating back to 2007	Table 3.2
DSM spending as a percent (%) of distribution revenue	Table 3.3
Historic annual DSM Shareholder Incentive amounts available and earned ($/year) dating back to 2007	Table 3.4
DSM Shareholder Incentive earned as a percent (%) of DSM budget[16]	Table 3.5
Annual and long-term natural gas savings targets (m^3/year and m^3/6 years)	Table 3.6
Total annual and cumulative gross and net natural gas savings (m^3) for each year of the DSM framework (2015 to 2020)	Table 3.7
Total historic annual and cumulative gross and net natural gas savings (m^3) dating back to 2007	Table 3.8 – Table 3.9
Total annual and cumulative gross and net natural gas savings (m^3) from 2007 to the reporting year as a percent of total annual natural gas sales	Table 3.10 – Table 3.11
Actual annual gas operating revenue ($/year)	Table 3.12
Actual annual operating revenue less cost of natural gas commodity ($/year)	Table 3.12
Total cost of gas ($ million/year)	Table 3.12
Total natural gas sales (m^3/year)	Table 3.13
Number of customers, broken out by rate class and by customer type (i.e. residential, low-income, commercial and industrial, relative to the DSM programs offered by the gas utility) per year	Table 3.14 and Table 3.15

[15] As the request is for actual costs, Union interprets this request to be 'DSM Spending' rather than 'DSM budget'.

[16] Union interprets this request as requesting values as a percentage of 'DSM Spending' rather than 'DSM budget'.

Table 3. 0 - Annual and Long-Term DSM Budgets ($ millions)

Program	2015*	2016**	2017**	2018**	2019**	2020**	Total ($/6 years)
Residential	$ 3.163	$ 8.612	$ 11.369	$ 13.908	$ 13.908	$ 13.908	$ 64.867
Commercial / Industrial	$ 10.859	$ 19.316	$ 22.035	$ 22.726	$ 22.403	$ 22.403	$ 119.743
Low-Income	$ 6.839	$ 11.407	$ 12.343	$ 13.571	$ 14.145	$ 15.005	$ 73.310
Large Volume	$ 4.534	$ 4.000	$ 4.000	$ 4.000	$ 4.000	$ 4.000	$ 24.534
Market Transformation	$ 1.379	$ 1.703	$ 2.338	$ 2.338	$ 2.338	$ 2.338	$ 12.434
Performance-Based Conservation	NA	$ 0.548	$ 0.843	$ 1.088	$ 0.833	$ 1.053	$ 4.365
Portfolio Level Research, Evaluation and Administration[1,2]	$ 4.717	$ 11.235	$ 5.642	$ 5.642	$ 5.642	$ 5.642	$ 38.520
Inflation	$ 2.497						$ 2.497
Total	**$ 33.988**	**$ 56.821**	**$ 58.570**	**$ 63.272**	**$ 63.269**	**$ 64.350**	**$ 340.270**

* 2015 includes budget amounts for the Achievable Potential Study, Future Infrastructure Planning Study and DSM Tracking and Reporting System Upgrades
** 2016-2020 includes budget amounts for pilots and DSM Tracking and Reporting System Upgrades

Table 3. 1 - Actual Annual Total DSM Costs ($ millions)
(including DSM spending, overheads, evaluation, DSM Shareholder Incentive, lost revenues)

Rate Class	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016
M1	NA	$ 12.107	$ 12.743	$ 11.348	$ 11.498	$ 13.502	$ 13.657	$ 15.415	$ 16.752	$ 23.338
M2	$ 11.619	$ 2.487	$ 2.022	$ 2.118	$ 4.097	$ 4.968	$ 5.818	$ 6.728	$ 4.958	$ 6.505
M4	$ 1.488	$ 1.353	$ 0.828	$ 1.098	$ 1.817	$ 3.319	$ 3.244	$ 3.296	$ 3.645	$ 3.808
M5	$ 0.295	$ 1.044	$ 1.226	$ 1.086	$ 3.150	$ 2.660	$ 3.484	$ 2.394	$ 1.421	$ 2.453
M7	$ 0.886	$ 0.116	$ 0.256	$ 1.474	$ 1.304	$ 0.538	$ 0.571	$ 2.143	$ 3.370	$ 3.760
T1	$ 3.147	$ 3.988	$ 5.596	$ 3.964	$ 7.749	$ 6.111	$ 2.265	$ 1.078	$ 0.889	$ 1.409
T2	NA	NA	NA	NA	NA	NA	$ 3.365	$ 2.875	$ 2.673	$ 3.758
Rate 01	$ 2.229	$ 2.162	$ 2.093	$ 1.869	$ 3.050	$ 3.532	$ 3.560	$ 4.161	$ 3.555	$ 4.447
Rate 10	$ 1.612	$ 1.371	$ 2.293	$ 0.510	$ 1.109	$ 1.939	$ 1.637	$ 1.613	$ 0.953	$ 1.322
Rate 20	$ 0.323	$ 0.496	$ 0.771	$ 0.881	$ 1.030	$ 1.607	$ 1.573	$ 1.791	$ 1.005	$ 0.806
Rate 100	$ 1.535	$ 4.542	$ 3.950	$ 4.471	$ 1.614	$ 2.305	$ 1.828	$ 1.517	$ 0.799	$ 0.541
Total	**$ 23.134**	**$ 29.666**	**$ 31.778**	**$ 28.819**	**$ 36.418**	**$ 40.481**	**$ 41.002**	**$ 43.011**	**$ 40.019**	**$ 52.146**

Table 3. 2 - Historic Actual Annual DSM Spending

$ millions	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016
Total DSM Spending*	$ 16.13	$ 20.26	$ 22.04	$ 21.61	$ 27.97	$ 31.32	$ 32.84	$ 33.71	$ 32.39	$ 47.84

* Total DSM spending includes direct, indirect and DSMVA where applicable

Table 3. 3 - DSM Spending as a Percent (%) of Distribution Revenue

$ millions	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016
Total DSM Spending*	$ 16	$ 20	$ 22	$ 22	$ 28	$ 31	$ 33	$ 34	$ 32	$ 48
Total Distribution Revenue**	$ 655	$ 675	$ 658	$ 699	$ 713	$ 727	$ 772	$ 778	$ 800	$ 812
Total DSM Spending as a % of Distribution Revenue	**2%**	**3%**	**3%**	**3%**	**4%**	**4%**	**4%**	**4%**	**4%**	**6%**

* Total DSM spending includes direct, indirect and DSMVA where applicable
** Distribution revenue is equal to the gas distribution margin and is the gas sales and distribution revenue less the cost of gas; where gas sales and distribution revenue is the sum of the delivery revenue and gas supply revenue (and earning sharing, if applicable)

Table 3. 4 - Historic Annual DSM Shareholder Incentive Amounts Available and Earned

$ millions	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016
DSM Shareholder Incentive Earned	$ 6.23	$ 8.70	$ 8.75	$ 6.58	$ 7.63	$ 8.21	$ 7.78	$ 8.99	$ 7.47	$ 4.12
Shareholder Incentive Available	$ 8.50	$ 8.70	$ 8.92	$ 8.94	$ 9.24	$ 10.45	$ 10.68	$ 10.82	$ 11.00	$ 10.45

Table 3. 5 - DSM Shareholder Incentive Earned as a Percent (%) of DSM Spending

$ millions	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016
Shareholder Incentive Earned	$ 6.23	$ 8.70	$ 8.75	$ 6.58	$ 7.63	$ 8.21	$ 7.78	$ 8.99	$ 7.47	$ 4.12
Total DSM Spending*	$ 16.13	$ 20.26	$ 22.04	$ 21.61	$ 27.97	$ 31.32	$ 32.84	$ 33.71	$ 32.39	$ 47.84
Shareholder Incentive Earned as a % of DSM Spending	**38.64%**	**42.92%**	**39.71%**	**30.43%**	**27.29%**	**26.21%**	**23.70%**	**26.66%**	**23.07%**	**8.61%**

* Total DSM Spending includes direct, indirect and DSMVA where applicable

Table 3. 6 - Annual and Long-Term Natural Gas Savings Targets*

Scorecard	2015	2016	2017	2018**	2019	2020
Resource Acquisition	816,561,818	1,120,259,599	1,005,614,776	*Targets are formulaic based on past year's performance.*		
Low-Income	43,600,000	59,238,065	81,957,527			
Large Volume	1,236,097,404	890,890,721	463,549,872			

* Values are cumulative m^3 gas savings at the target (100%) band
** 2018 targets require OEB-approved 2017 DSM audited results

Table 3. 7 - Total Annual and Cumulative Natural Gas Savings for 2016 (Gross and Net)

	Annual Gas Savings		Cumulative Gas Savings	
10^3m^3	Gross	Net	Gross	Net
Resource Acquisition	110,284	46,527	1,839,468	814,758
Low-Income	2,715	2,671	65,831	64,829
Large Volume	75,742	6,772	853,596	79,848
Total	**188,741**	**55,970**	**2,758,895**	**959,435**

Table 3. 8 - Total Historic Annual Natural Gas Savings (Gross and Net)

	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016
Total Net Annual Natural Gas Savings (10^3m^3)	55,854	61,852	92,604	121,116	139,027	137,438	179,967	131,825	125,077	55,970
Total Gross Annual Natural Gas Savings (10^3m^3)	Not reported for 2007 – 2011					282,177	370,474	267,465	255,169	188,741

Table 3. 9 - Total Historic Cumulative Natural Gas Savings (Gross and Net)

	2007-2011	2012	2013	2014	2015	2016
Total Net Cumulative Natural Gas Savings (10^3m^3)	Not reported for 2007-2011	2,336,351	2,820,834	1,889,459	1,750,765	959,435
Total Gross Cumulative Natural Gas Savings (10^3m^3)	Not reported for 2007-2011	4,777,826	5,752,390	3,752,366	3,482,496	2,758,895

Table 3. 10 - Total Annual Natural Gas Savings as a Percent (%) of Total Annual Natural Gas Sales (Gross and Net)

	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016
Net Annual Natural Gas Savings (10^3m^3)	55,854	61,852	92,604	121,116	139,027	137,438	179,967	131,825	125,077	55,970
Net Annual Natural Gas Savings as a % of Natural Gas Sales	0.42%	0.47%	0.75%	0.95%	1.02%	1.03%	1.29%	0.93%	0.93%	0.43%
Gross Annual Natural Gas Savings (10^3m^3)	Not reported for 2007 – 2011					282,177	370,474	267,465	255,169	188,741
Gross Annual Natural Gas Savings as a % of Natural Gas Sales						2.11%	2.65%	1.88%	1.90%	1.46%
Total Natural Gas Sales*	13,158,018	13,231,158	12,327,846	12,778,870	13,654,990	13,396,120	13,992,688	14,204,104	13,404,980	12,935,767

* Total Natural Gas Sales only includes rate classes eligible for DSM and subject to DSM costs

Table 3. 11 - Total Cumulative Natural Gas Savings as a Percent (%) of Total Annual Natural Gas Sales (Gross and Net)

	2007-2011	2012	2013	2014	2015	2016
Net Cumulative Natural Gas Savings (10^3m^3)	Not reported for 2007-2011	2,336,351	2,820,834	1,889,459	1,750,765	959,435
Net Cumulative Natural Gas Savings as a % of Natural Gas Sales		17.44%	20.16%	13.30%	13.06%	7.42%
Gross Cumulative Natural Gas Savings (10^3m^3)	Not reported for 2007-2011	4,777,826	5,752,390	3,752,366	3,482,496	2,758,895
Gross Cumulative Natural Gas Savings as a % of Natural Gas Sales		35.67%	41.11%	26.42%	25.98%	21.33%
Total Natural Gas Sales*		13,396,120	13,992,688	14,204,104	13,404,980	12,935,767

* Total Natural Gas Sales only includes rate classes eligible for DSM and subject to DSM costs

Table 3. 12 - Actual Annual Gas Operating Revenues

$ millions	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016
Gas Sales and Distribution Operating Revenue	$ 1,811	$ 1,852	$ 1,684	$ 1,493	$ 1,468	$ 1,365	$ 1,621	$ 1,755	$ 1,675	$ 1,529
Less Total Cost of Gas	$ 1,156	$ 1,177	$ 1,026	$ 794	$ 755	$ 638	$ 849	$ 977	$ 875	$ 717
Total Distribution Revenue*	$ 655	$ 675	$ 658	$ 699	$ 713	$ 727	$ 772	$ 778	$ 800	$ 812

* Distribution revenue is equal to the gas distribution margin and is the gas sales and distribution revenue less the cost of gas; where gas sales and distribution revenue is the sum of the delivery revenue and gas supply revenue (and earning sharing, if applicable)

Table 3. 13 - Total Natural Gas Sales (Volumes)*

10^3m^3	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016
Total Natural Gas Sales	13,158,018	13,213,158	12,327,846	12,778,870	13,654,990	13,396,120	13,992,688	14,204,104	13,404,980	12,935,767

* Only includes rate classes eligible for DSM and subject to DSM costs

Table 3. 14 - Number of Customers by Customer Type

Customer Type	# of Customers in 2016
Residential	1,042,748
Low-Income*	294,108
Commercial	121,385
Industrial	473
Wholesale	6
Total	**1,458,720**

* Low-income customers are estimated to be 22% of all Residential customers

Table 3. 15 - Number of Customers by Rate Class

Rate Class	# of Customers in 2016
General Service	
M1	1,105,497
M2	7,608
02	342,946
10	2,190
Total	**1,458,241**
Contract	
M4	178
M5	63
M7	30
T1	37
T2	23
20	47
100	11
Total	**389**
Non-DSM Rate Classes	
M9	3
M10	2
T3	1
25	84
30	0
77	0
Total	**1,458,720**

4. 2016 DSM Program Results Summary

To illustrate and compare the impact that Union's DSM programs had in 2016, this section provides a summary of results that reflect 959,435,258 cumulative m³ in natural gas savings for customers. As illustrated in Figure 4.0, the commercial/industrial program delivered the largest proportion of savings, followed by the large volume, residential and low-income programs respectively.

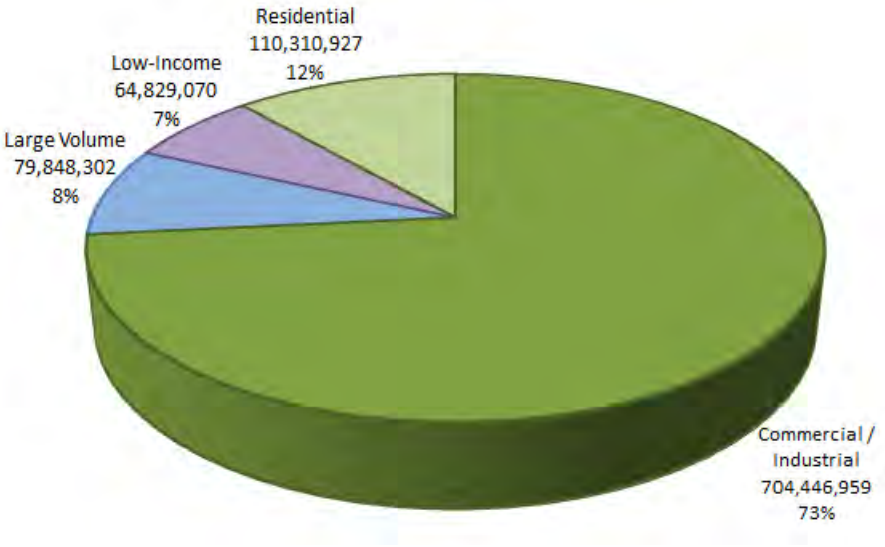

Figure 4.0 - Major Drivers in 2016 Natural Gas Savings (Cumulative m^3 and Percentage)

Table 4.0 summarizes Union's DSM results by program for 2016 including annual and cumulative natural gas savings, number of units, expenditures, and the associated net TRC-Plus and TRC-Plus ratio.

DSM expenditures are detailed on a program level in Table 4.1. Gross and net annual and cumulative savings are provided in Table 4.2 and have been expanded to provide offering level detail. Program scorecard accomplishments and specific program elements that contributed to those results are outlined in sections 5 through 9.

Table 4. 0 - 2016 Program Results

Program	Net Gas Savings (m^3)	Cumulative Net Gas Savings (m^3)	Units	Expenditures	Net TRC-Plus	TRC-Plus Ratio
Residential	4,412,437	110,310,927	6,595	$11,201,397	$ 9,401,169	1.56
Commercial/Industrial	42,114,316	704,446,959	4,018	$16,384,544	$115,655,388	3.57
Low- Income	2,670,900	64,829,070	2,010	$10,400,612	$ 4,899,408	1.50
Large Volume	6,772,053	79,848,302	71	$ 2,989,176	$ 13,142,160	5.20
Market Transformation	-	-	-	$ 1,004,693	NA	NA
Performance-Based	-	-	-	$ 274,604	NA	NA
Program Subtotal	**55,969,706**	**959,435,258**	**12,694**	**$42,255,026**	**$143,098,125**	**2.91**
Portfolio Costs				$3,050,268		
Portfolio Total				**$45,305,294**[1]	**$140,140,207**	**2.80**

[1] Does not include pilots, tracking and reporting system upgrades and incremental spend. See table 4.1 for further details.

Table 4. 1 - 2016 Direct DSM Program Costs

Program	Administration	Evaluation	Promotion	Incentives	Total
Residential	$510,346	$1,001,900	$1,294,961	$8,394,192	$11,201,397
Commercial / Industrial	$3,680,463	$120,578	$1,196,169	$11,387,335	$16,384,544
Low-Income	$861,489	$161,733	$2,712,933	$6,664,457	$10,400,612
Large Volume	$509,939	$37,682	$322	$2,441,233	$2,989,176
Market Transformation	$302,149	$7,933	$526,970	$167,641	$1,004,693
Performance-Based	$140,948	$401	$133,255	$ -	$274,604
Program Total	**$6,005,334**	**$1,330,225**	**$5,864,609**	**$29,054,857**	**$42,255,026**
Portfolio Costs					
Research					$517,567
Evaluation					$168,121
Administration					$2,364,580
Pilot Programs					$183,200
DSM Tracking System Upgrades					$2,041,209
Portfolio Total					**$5,274,676**
Incremental Spend[1]					$314,145
Total Spend	**$6,005,334**	**$1,330,225**	**$5,864,609**	**$29,054,857**	**$47,843,847**

[1] Incremental spend includes achievable potential study and future infrastructure planning study

Table 4. 2 - 2016 Gross and Net Natural Gas Savings

Program	Offering	Annual Gross Gas Savings (m^3)	Cumulative Gross Gas Savings (m^3)	Annual Net Gas Savings (m^3)	Cumulative Net Gas Savings (m^3)
Residential	Home Reno Rebate	4,644,671	116,116,589	4,412,437	110,310,927
Residential Program Total		**4,644,671**	**116,116,589**	**4,412,437**	**110,310,927**
Commercial/Industrial	Prescriptive	8,821,926	173,961,414	8,034,415	159,584,767
	Direct Install	-	-	-	-
	Custom	96,817,327	1,549,389,969	34,079,900	544,862,192
Commercial/Industrial Program Total		**105,639,253**	**1,723,351,383**	**42,114,316**	**704,446,959**
Low-Income	Home Weatherization	1,831,659	45,754,577	1,831,630	45,754,201
	Furnace End-of-Life Upgrade	1,617	29,106	1,617	29,106
	Indigenous	-	-	-	-
	Multi-Family	881,704	20,047,428	837,653	19,045,763
Low-Income Program Total		**2,714,980**	**65,831,111**	**2,670,900**	**64,829,070**
Large Volume	Large Volume Direct Access	75,741,890	853,595,991	6,772,053	79,848,302
Large Volume Program Total		**75,741,890**	**853,595,991**	**6,772,053**	**79,848,302**
Market Transformation	Optimum Home	-	-	-	-
	Commercial Savings By Design	-	-	-	-
Market Transformation Program Total		**NA**	**NA**	**NA**	**NA**
Performance-Based	RunSmart	-	-	-	-
	Strategic Energy Management	-	-	-	-
Performance-Based Program Total		**NA**	**NA**	**NA**	**NA**
Portfolio Total		**188,740,794**	**2,758,895,074**	**55,969,706**	**959,435,258**

5. Resource Acquisition Scorecard

Resource acquisition programs aim to achieve direct, measureable savings for customers through the installation of energy efficient equipment and/or operation and process improvements. These programs provide customers with rebates or financial incentives that reduce the overall cost of upgrading to more efficient technologies and equipment, motivate them to act, and promote a culture of energy conservation through education and awareness initiatives.

The resource acquisition scorecard contains both a residential and commercial/industrial program and is comprised of two performance metrics: Cumulative Natural Gas Savings (m^3) and Home Reno Rebate ("HRR") Participants (Homes).

The Cumulative Natural Gas Savings (m^3) metric measures the total lifetime natural gas saved for both the residential and commercial/industrial resource acquisition programs delivered by Union, net of free riders.

Homes that count towards the HRR Participants (Homes) metric must meet the following two requirements:

- A homeowner must complete at least two eligible renovations as listed in Table 5.7.
- The aggregate of all the homes counted towards the metric must achieve, on average, at least a 15 percent reduction in annual natural gas use as determined by comparing pre and post energy assessments modelled using Natural Resource Canada ("NRCan") HOT2000 software.

Table 5.0 presents the results of the resource acquisition scorecard, demonstrating an achievement of 105 percent of the overall scorecard target, resulting in a DSM Shareholder Incentive of $2.907 million.

Table 5. 0 - 2016 Resource Acquisition Scorecard Results

Metrics	Metric Target Levels			Weight	Achievement	% of Metric Achieved	Weighted % of Scorecard Achieved
	Lower Band	Target	Upper Band				
Cumulative Natural Gas Savings (m3)	840,194,699	1,120,259,599	1,680,389,398	75%	814,757,886	73%	55%
Home Reno Rebate Participants (Homes)	2,475	3,300	4,950	25%	6,595	200%	50%
					Total Scorecard Target Achieved		***105%***
					Scorecard Utility Incentive Achieved		***$2,907,230***

Table 5.1 presents the results of programs on the resource acquisition scorecard along with total program spend.

Table 5. 1 - 2016 Resource Acquisition Scorecard Results by Program and Offering

Program	Offering	Units	Annual Net Gas Savings (m^3)	Cumulative Net Gas Savings (m^3)	Total Spend	Net TRC-Plus	Net TRC-Plus Ratio
Residential	Home Reno Rebate	6,595	4,412,437	110,310,927	$11,201,397	$9,401,169	1.56
Commercial/ Industrial	Prescriptive	3,586	8,034,415	159,584,567	$5,584,228	$25,397,837	3.13
	Custom	432	34,079,900	544,862,192	$10,800,316	$90,257,550	3.73
Resource Acquisition Total		**10,613**	**46,526,753**	**814,757,886**	**$27,585,942**	**$125,056,556**	**3.02**

5.1 Residential Program

The residential program encourages a holistic approach to energy efficiency through education and financial incentives that help offset the cost of efficiency upgrades in residential homes.

Union's 2015-2020 DSM Plan (EB-2015-0029) proposed three offerings under the residential program: Home Reno Rebate ("HRR"), energy savings kits and a new behavioural offering. For 2016, only the Home Reno Rebate offering was approved by the Board in its 2015-2020 DSM

Plan Decision due to concerns with market saturation of energy savings kits and uncertainty of value for money in the behavioural offering. The Board directed the energy savings kit program offering to conclude at the end of 2015. The behavioural offering was never launched.

Table 5.2 shows the results of the residential DSM program and Table 5.3 breaks down the total spend into its components.

Table 5. 2 - 2016 Residential DSM Program Results

Program	Offering	Units	Annual Net Gas Savings (m^3)	Cumulative Net Gas Savings (m^3)	Total Spend	Net TRC-Plus	Net TRC-Plus Ratio
Residential	Home Reno Rebate	6,595	4,412,437	110,310,927	$11,201,397	$ 9,401,169	1.56
Residential Total		**6,595**	**4,412,437**	**110,310,927**	**$11,201,397**	**$ 9,401,169**	**1.56**

Table 5. 3 - 2016 Residential DSM Program Spend

Item	Total
Incentives	$ 8,394,192
Administration	$ 510,346
Evaluation	$ 1,001,900
Promotion	$ 1,294,961
Total Residential Program Spend	**$11,201,397**

Table 5.4 shows the calculation of the Residential Program's TRC-Plus ratio.

Table 5. 4 - 2016 Residential DSM Program Cost-Effectiveness

	TRC-Plus Benefits (a)	TRC Costs (b)	Net TRC-Plus (c)=(a-b)	TRC-Plus Ratio (d)=(a/b)
Measures	$ 26,331,257	$14,122,882	$12,208,375	1.86
Administration		$ 510,346		
Evaluation		$ 1,001,900		
Promotion		$ 1,294,961		
Residential Program Total	**$ 26,331,257**	**$ 16,930,088**	**$ 9,401,169**	**1.56**

The residential program consists of a single program offering, HRR. Union enhanced the HRR offering in 2016 to drive higher customer participation by implementing the improvements outlined in the 2015-2020 DSM Plan[17] as well as entering into a major partnership with the Government of Ontario that provided funds from the province's Climate Change Action Plan.

5.1.1 Home Reno Rebate Offering

Union introduced the HRR offering in 2012. The offering focuses on whole home energy savings by helping homeowners understand improvement opportunities throughout their home and encouraging them to install measures that generate long-lived energy savings. By participating in HRR, customers can increase the energy efficiency of their home and decrease their energy bills each year; enhance home comfort in the winter and summer months; avoid unsightly mould and condensation caused by poor insulation; and, improve health through better indoor air quality.

The "existing HRR offering" refers to the offering structure prior to the partnership with the Government of Ontario, as outlined in Union's 2015-2020 DSM Plan (EB-2015-0029). Modifications made to the existing HRR offering in 2016 included:

- Continued expansion of the HRR offering across the Union franchise area;
- Introduction of a multi-measure bonus incentive of $250 for each measure installed beyond the first two. This rebate was intended to encourage homeowners to pursue all energy savings opportunities available to them;
- Raising the maximum rebate allowance per home from $2,500 to $5,000 to encourage residential customers to pursue all identified natural gas savings opportunities in their home;
- Changing the approach for modeling the heating system efficiency to assume all heating systems were at Code, even where the existing system efficiency was below this level. This is a more conservative approach to measuring savings as it reduces the annual savings for measures compared to previous years of the program offering; and,
- Adjusting the aggregate savings threshold of all of the homes counted so that it must achieve, on average, at least a 15 percent reduction in annual natural gas use,

[17] Union's DSM Plan (EB-2015-0029), Exhibit A, Tab 3, Appendix A, p.2

comparing the results of the D Assessment to the results of the E Assessment produced by NRCan energy rating software HOT2000.

The existing HRR offering included four components and was the basis for the partnership with the Government of Ontario:

1. Participants work with a partner Service Organization ("SO") to complete an initial, pre-installation energy assessment to determine the home's current energy use and profile. A critical component of this assessment is a blower door test that measures the home's air tightness;
2. A Certified Energy Auditor ("CEA") with the SO models the home using HOT2000 in EnerGuide mode and delivers an energy efficiency report to the homeowner that outlines all energy saving opportunities, along with the home's EnerGuide rating and energy saving tips and information;
3. Using the report, participants can make informed energy decisions on the most effective improvements to carry out. Rebates are available for completing the assessments and at least two eligible measures recommended in the energy efficiency report;
4. After upgrades to the home are complete, participants complete a second, post-installation energy assessment with the CEA to learn the energy savings achieved by the retrofits, as determined by HOT2000.

5.1.2 Enhanced HRR Offering

The enhanced HRR offering leverages the design, promotion and delivery of the existing HRR offering while increasing homeowner participation (approximately 12,000 homes over a three-year period) and avoiding greenhouse gas emissions beyond what would have been realized through DSM funding alone.

In 2016, the Government of Ontario established a Green Investment Fund ("GIF"), with a $100M allocation, targeted at reducing greenhouse gas emissions while strengthening the economy. Union was provided $40M of this allocation to enhance the existing HRR offering as well as $2M to launch a behavioural offering.

The existing HRR offering with GIF enhancements was designed to operate as a single HRR offering in the market, known as the "enhanced HRR offering". Union launched the enhanced HRR offering in July 2016.

Funding from the GIF allocation was used to expand the target market for HRR to include homes in Union's program area that use oil, propane or wood as their primary heating fuel as well as natural gas heated homes outside of Union's franchise area. The funding also allowed measure rebates to be increased to drive higher participation levels and to provide incentives for additional energy efficiency measures. These additional measures include: high-efficiency oil and propane furnaces/boilers, wood burning systems and smart thermostats.

The behavioural offering will use customized energy reports to influence customers to change their energy use decisions and actions. Along with benchmarking to peers and past performance, the reports provide energy savings tips and other tools to motivate behavioural changes, and will be used to promote the benefits of participating in the enhanced HRR offering. This offering will launch in 2017 and be fully funded and results fully attributed to the GIF.

5.1.3 Attribution of the Enhanced HRR Offering Results

As informed by section 7.2.2 of the filing guidelines,[18] attribution between Union and the province was defined as part of a partnership agreement made prior to the program's launch.

While funding from the GIF drives incremental participation, the existing DSM offering continues to be the foundation of the offering. For this reason, attribution of the enhanced HRR offering's results is not determined simply based on the source of funding. Instead, attribution occurs based on the following rules:

1. 100% of the results from homes outside of Union's franchise area are attributed to the GIF.

[18] Filing Guidelines to the DSM Framework for Natural Gas Distributors (2015-2020), EB-2014-0134, pp.21-22.

2. 100% of the results from homes within Union's franchise that use a primary heating fuel other than natural gas (electrically heated homes are not included in the offering) are attributed to the GIF.
3. 100% of the results directly related to the smart thermostat are attributed to the GIF.
4. For all other results, there is a two-phased approach to attribution each year. During Phase 1, 80% of the results are attributed to Union and 20% are attributed to the GIF. If at any point in a given year DSM funding is exhausted or Union elects to stop using DSM funds for the enhanced HRR offering, Phase 2 of attribution begins. During Phase 2, 100% of the offering's results are attributed to the GIF.

Attributable results include the number of homes participating, the amount of energy saved, and the amount of greenhouse gas emissions avoided by the enhanced HRR offering. Savings are determined based on HOT2000, except for smart thermostats, which uses prescriptive savings assumptions from the Technical Reference Manual.

Table 5.5 shows the total number of homes that participated in the HRR offering, both existing and enhanced, in 2016 and the manner in which the homes were attributed.

Table 5. 5 - 2016 Total HRR Offering Participants

Offering	Attribution Details	Homes
Existing HRR Offering (Pre-GIF Agreement)	100% to DSM	3,126
Enhanced HRR Offering, Phase 1 (Post-GIF Agreement)	80% to DSM	3,469
	20% to GIF	868
Enhanced HRR Offering, Phase 2 (Post-GIF Agreement)	100% to GIF	562
Enhanced HRR Offering, homes not heated by Union Gas (Post-GIF Agreement)	100% to GIF	214
HRR Offering Total		**8,239**

Savings resulting from the offering attributed to DSM are shown in Table 5.6 below. GIF results are presented in Table 5.7 in the manner prescribed in the GIF agreement.

Table 5. 6 - 2016 HRR Offering Results Attributed to DSM

Offering	Homes	Annual Net Gas Savings (m^3)	Cumulative Net Gas Savings (m^3)	Total Spend	Net TRC-Plus	Net TRC-Plus Ratio
Existing HRR Offering (Pre-GIF Agreement)	3,126	2,162,974	54,074,391	$11,201,397	$9,401,169	1.56
Enhanced HRR Offering (Post-GIF Agreement)	3,469	2,249,463	56,236,682			
HRR Offering Total	**6,595**	**4,412,437**	**110,311,073**[1]	**$11,201,397**	**$9,401,169**	**1.56**

[1] Values shown do not match exactly to the 2016 DSM Annual Verification Report due to rounding.

Table 5. 7 - 2016 Enhanced HRR Offering Results Attributed to GIF

Fuel Type	Gross Cumulative Energy Savings (GJ)	Avoided Greenhouse Gas Emissions (t)
Natural Gas	1,309,904	67,230
Oil	108,598	7,771
Propane	-19,497	-1,179
Wood	39	5
Electricity	29,816	414
Total	**1,428,860**	**72,241**

The DSM budget spent on the HRR offering is shown in Table 5.8. In 2016, a total of $5.7M of GIF funding was used to deliver the enhanced HRR offering.

Table 5. 8 - 2016 HRR Offering DSM Program Spend

Item	Total
Incentives	$ 8,394,192
Administration	$ 510,346
Evaluation	$ 1,001,900
Promotion Costs	$ 1,294,961
DSM Program Spend	**$11,201,397**

Target Market

The existing HRR offering targeted Union's residential customers in detached, semi-detached, townhouses and individually metered row townhouses with a natural gas heating system.

Participants had to complete both the pre- and post-installation assessments and install at least two eligible energy efficiency upgrades to qualify for rebates.

The reach of the program was expanded in 2016 to the East and Northeast regions of Union's franchise, including communities such as: Bruce County, Kenora District, Sudbury District, and Thunder Bay District, to name a few.

The enhanced HRR offering further broadened the target market to include:

- Homes that use oil, propane, or wood as their primary heating fuel (electric customers are not eligible); and,
- Non-Union natural gas customers (i.e. Kitchener Utilities, NRG, Utilities Kingston, and Six Nations Natural Gas customers).

Market Incentive

Rebates are structured in a prescriptive manner to ensure simplicity for participants. The predictable nature of this type of rebate enables participants to make fully informed decisions and assists SOs and channel partners in communicating accurate information.

Table 5.9 outlines the measures, criteria and incentives of the existing and enhanced HRR offering.

Table 5. 9 - HRR Offering Measure Rebates

Measure	Criteria	Existing HRR Offering	Enhanced HRR Offering
Attic Insulation	Increase insulation from R12 or less to at least R50	$500	$500
	Increase insulation from R13 to R25 to at least R50	$250	$250
	Increase cathedral/flat roof insulation by at least R14	$500	$500
Air Sealing	Achieve 10% or more above base target	$150	$150
	Achieving base target	$100	$100
Basement Insulation	Add at least R23 insulation to 100% of basement	$1,000	$1,250
	Add at least R12 insulation to 100% of basement	$500	$750
	Add at least R23 insulation to 100% of crawl space wall	$800	$1,000
	Add at least R10 insulation to 100% of crawl space wall	$400	$500
	Add at least R24 insulation to 100% of floor above crawl space	$450	$500
Exterior Wall Insulation	Add at least R9 insulation to 100% of building to achieve a minimum of R12	$1,500	$1,750
	Add at least R3.8 to 100% of building to achieve a minimum of R12	$1,000	$1,250
Furnace/Boiler	Replace a 94% or less AFUE with a 95% or higher AFUE natural gas, propane, or oil furnace. OR Replace an 89% or less AFUE with a 90% or higher AFUE natural gas, propane, or oil boiler.	$500	$1,000
Wood Burning System	Replace a wood-burning system or appliance with a certified indoor wood-burning appliance, an indoor pellet-burning appliance, or an indoor masonry heater. OR Replace a solid fuel-fired outdoor boiler with a certified outdoor wood-burning appliance.	N/A	$375
Water Heater	Replace a water heater with an ENERGY STAR® natural gas water heater with an energy factor of 0.82 or higher.	$200	$500
Window/Door/Skylight	For each window, door or skylight replaced with an ENERGY STAR®-qualified model.	$40	$80
Smart Thermostat[2]	Purchase and install a Wi-Fi enabled thermostat with learning capabilities utilizing sensor technology.	N/A	$100

[2] Smart thermostats are not considered one of the eligible energy efficiency upgrades to qualify for the offering and will not contribute towards eligibility for the bonus rebate offer.

From the perspective of participants, there was a single HRR offering in the market in 2016. This was a key element of the GIF agreement. Prior to the GIF agreement, participants received the existing HRR rebates as outlined in Union's 2015 - 2020 DSM Plan (EB-2015-0029). Following the introduction of the enhanced HRR offering, participants were eligible for the enhanced HRR rebates.

The maximum rebate payment was $5,000 per home, which includes rebates for the home energy assessments, measure upgrades, and bonuses.

Assessment Rebate (existing and enhanced HRR offering)
Since pre and post assessments are participation requirements, customers were eligible for a rebate of up to $500, intended to cover the full cost of the assessments.

Bonus Rebate (existing and enhanced HRR offering)
Starting in 2016, a bonus rebate of $250 was available for each measure installed beyond the first two. This rebate was intended to encourage homeowners to pursue all energy savings opportunities available to them

Market Delivery

Union established a network of SOs and Contractors to deliver the HRR offering and also used traditional marketing tactics in 2016, such as mass-media and targeted promotion, to create awareness and encourage participation.

Service Organization and Contractor Network
Union continued to develop and rely on a strong network of energy professionals to generate participant leads and provide an effective and efficient customer experience from start-to-finish.

SOs employ CEAs to perform energy assessments, recommend eligible upgrades to the customer based on the pre-assessment and findings presented in the energy efficiency report, and submit all required paperwork to Union on behalf of the customer. Customers could select any one of the partner SOs serving their area and contact them directly. Two new SOs, EnerQuality and EnviroCentre, were added in 2016 to increase CEA capacity and offering coverage. The SOs delivering the HRR offering in 2016 were:

- Amerispec of Canada
- Barrier Sciences Group
- BuyWise Consulting
- Eco Advantage Energy Advisors
- EnerCare
- Energuy Canada
- EnerTest Corporation
- Green Communities Canada (REEP Green Solutions, Green Venture, ELORA Environment, Environment Network, GreenUP, Red Squirrel Conservation Services, Baerg's Home Performance Solutions, EcoSuperior)
- Ridge Energy Consultants
- Canada Energy Audit
- EnerQuality (added in 2016)
- EnviroCentre (added in 2016)

Contractors perform a variety of services including HVAC, insulation and window installations, as well as general renovations. The customer could select any contractor servicing their area or complete the installations themselves.

SOs, contractors, and other channel partners were provided with promotional materials, training and ongoing coaching to help them understand the logistics of the HRR offering, how to "sell" energy efficiency, and how to provide a positive customer experience.

Figure 5.0 is an example of promotional material provided to SOs. This customer brochure was used by CEAs during customer visits to explain the offering and given to customers for reference.

Figure 5.0 - HRR Customer Brochure

In 2016, Union launched an online and magazine campaign targeting contractors (HVAC, insulation, window installers and renovators) to create awareness of the offering and its benefits. Ads (as shown in Figure 5.1) were placed in several industry-specific publications, such as Canadian Contractor, Contracting Canada, Contractor Advantage, and Renovation Contractor. As a primary contact for customers, contractors can effectively promote the HRR offering directly to the target market.

Figure 5.1 - HRR Contractor Ad

Marketing Tactics

Mass-media promotion efforts in 2016 relied on radio and online marketing, bill inserts and Union's website to build widespread awareness of the benefits and cost savings of home renovations and advantages of Union's HRR offering.

- A 30-second radio campaign ran in all major cities within Union's program delivery area.
- Geo-coded online marketing campaigns were used on Kijiji (kijiji.ca), Style at Home (styleathome.com) and Rogers Home Channel (rogers.com). Banner ads were displayed on these websites for customers in Union's delivery areas that enticed them to learn more by clicking on the ad and being directed to Union's website.
- Union also used its own media channels to promote the offering and direct customers to participating SOs to schedule a pre-renovation energy assessment. This included bill inserts to all of Union's residential customers and use of the Union website (uniongas.com/homereno).
- Targeted promotion was used for homes identified as most likely to benefit from the offering, such as older homes (built prior to 1977) and neighbouring homes of HRR participants likely to be of the same vintage. Door hangers (shown in Figure 5.2) were used by CEAs and sales teams to promote the offering during their visits and were distributed to other homes on the same street post-visit.

Figure 5.2 - HRR Door Hangers

5.1.4 Education and Awareness

Education and awareness efforts in the residential sector are crucial in influencing customer decisions and ensuring the success of Union's DSM programs. In 2016, Union continued to distribute educational materials and promote DSM offerings through various channels:

- Residential Energy Efficiency Webpage - energy efficiency, environmental stewardship and conservation are a central focus of Union's website[19]. Under the residential section of the site, customers can find information on Union rebates and promotions, do-it-yourself projects and upgrades, energy saving resources, and various other tips to help them save money and energy.

- MyAccount - Union's online account management tool for residential and small business customers provides access to personalized tools to help them better understand their energy use, such as natural gas use and billing history, a "compare bills" feature to graph consumption or bill amounts for two or more months, and a download feature to export energy data into a spreadsheet or energy management software. MyAccount is also used as a promotional vehicle for Union's DSM programs.

- Residential HVAC Newsletter - in 2016, Union continued to target residential HVAC contractors through the GasFacts newsletter. The newsletter provides updates to the HVAC community related to Union's energy efficiency programs, Codes and Standards, recalls and manufacturers' notifications, as well as rebate offers from third party organizations.

- Dedicated HVAC Webpage – a section on Union's website[20] was designed to inform the HVAC industry of relevant information, updates, Codes and Standards, and provide links to Union's conservation programs. The website hosts past *GasFacts* editions as well as FAQs, rebate and incentive information, equipment and technical support and other useful information.

[19] uniongas.com/residential/save-money-energy

[20] uniongas.com/business/your-business/hvac

5.1.5 Lessons Learned

- ***Contractor media campaigns result in higher program awareness***
  Feedback has shown that a significant number of participants hear about the program through their contractors. Contractors present the first point of contact with potential participants. To leverage this relationship as an effective channel to reach potential participants, Union needs to continue focusing on education and awareness initiatives targeting these trade allies.

- ***Online tracking tool (Parachute Software) enhanced overall program efficiency***
  Since the launch of the HRR offering, a simple manual database was used by CEAs to document and submit customer information. Missing or incorrect information created delays in processing and issuing rebate cheques. Tracking errors could also occur due to limitations in document control. In 2016, Union developed and launched Parachute, an online tracking tool that has resulted in improvements in productivity and benefited all stakeholders.

  Real time tracking of files entered into the online tool significantly reduced the time required to process files and issue incentive payments to customers. This created a central repository for all activities impacting an application and a way to streamline communications amongst CEAs and Union. In addition, it has supported an even better customer experience by providing CEAs information on the status of applications and timing of when customers can expect cheques.

- **The enhanced HRR offering has demonstrated a successful approach to coordinating and integrating DSM efforts**

  Leveraging the design, promotion and delivery of existing DSM programs creates opportunities to increase overall efficiency, maximize program impacts, and make energy efficiency offerings accessible across Ontario. The partnership with the Government of Ontario has paved the way for continued collaboration and expansion of the HRR offering. Union began working with the Independent Electricity System Operator ("IESO") in 2016 to develop a program that extended the HRR offering to electrically heated homes through the IESO's whole home pilot program. The pilot will

also include incentives for electricity measures, like upgrading to ENERGY STAR® fridges and window AC units, for all homes. This program will be implemented in 2017.

The HRR offering continues to grow and deliver positive results. It has become an attractive platform for integration efforts with both government-sponsored programs as well as the IESO and offers residential customers across the province the opportunity to better manage their energy usage while maintaining home comfort.

5.2 Commercial/Industrial ("CI") Program

In addition to the residential program, performance from the CI program is also measured on the resource acquisition scorecard. The CI program aims to advance customer energy efficiency and productivity in the commercial, institutional, agricultural and industrial markets by providing a mix of prescriptive and custom incentive offerings to customers.

Goals for the CI program consist of the following:

- Increase customer's awareness and knowledge of energy efficient practices
- Deliver a comprehensive suite of cost effective DSM initiatives across all sectors and customer types
- Generate long term energy savings in commercial, institutional and industrial facilities and
- Attract participation from customers who have not yet embraced a culture of conservation in their facility.

The CI program is comprised of three offerings: prescriptive, direct install and custom. Financial incentives are offered for eligible technologies with deemed savings values through the prescriptive offering. The direct install offering provides customers with turnkey installation for certain prescriptive measures. The custom offering, in contrast, addresses energy savings opportunities unique to a particular customer and facility. Projects were developed based on customer-specific information and could include new capital equipment, retrofit (or replacement) equipment, and building/system optimization.

CI program offerings generated significant savings and benefits in 2016, as shown below in Table 5.10. Budget spend and program TRC-Plus is found in Tables 5.11 and 5.12.

Table 5. 10 - 2016 Commercial/Industrial Program Results

Program	Offering	Units	Annual Natural Gas Savings (m^3)	Cumulative Natural Gas Savings (m^3)	Total Spend	Net TRC-Plus	TRC-Plus Ratio
Commercial/ Industrial	Prescriptive	3,586	8,034,415	159,584,767	$5,584,228	$25,397,837	3.13
	Custom	432	34,079,900	544,862,192	$10,800,316	$90,257,550	3.73
Commercial/Industrial Total		**4,018**	**42,114,316**	**704,446,959**	**$16,384,545**	**$115,655,387**	**3.57**

Table 5. 11 - 2016 Commercial/Industrial Program Spend

Item		Total
Incentives	$	11,387,335
Administration	$	3,680,463
Evaluation	$	120,578
Promotion Costs	$	1,196,169
Program Spend	**$**	**16,384,544**

Table 5. 12 - 2016 Commercial/Industrial Program Cost-Effectiveness

	TRC Benefits (a)	TRC Costs (b)	Net TRC-Plus (c)=(a-b)	TRC-Plus Ratio (d)=(a/b)
Measures	$ 160,648,127	$ 39,995,530	$ 120,652,597	4.02
Administration		$ 3,680,463		
Evaluation		$ 120,578		
Promotion		$ 1,196,169		
Commercial/Industrial Program Total	**$ 160,648,127**	**$ 44,992,740**	**$ 115,655,388**	**3.57**

5.2.1 Prescriptive Offering

Union's prescriptive offering provides customers with a list of recommended efficient technologies and equipment, also known as measures, which have pre-determined incentive and natural gas savings amounts, defined by facility and equipment size. The application process for the prescriptive offering promotes ease of participation as customers know upfront the incentive available for each measure. This allows customers with multiple facilities to make informed decisions and roll out technologies to their entire building stock.

In 2016, new measures were added to the suite of eligible measures, incentive amounts were increased and the incentive structure was modified to reflect the size of the equipment (i.e. cubic feet per minute, annual pounds of laundry). These changes were intended to increase uptake in the marketplace, especially from customers who do not traditionally participate in DSM programs.

Target Market

All CI customers are eligible to participate in the prescriptive offering however Union continued to use a segmented approach to the market through various delivery channels and tailored initiatives. Eligible measures were grouped into initiatives that targeted water heating, space heating, and foodservice applications.

By using a segmented approach, Union targeted similar business types with customized communications on the measures most relevant to each segment while gaining valuable market insights on Union's CI customer base and barriers to DSM uptake.

CI market segments specifically targeted in 2016 included: Education, Entertainment, Foodservice, Healthcare, Hotel/Motel, Manufacturing, Multi-Unit Residential, Retail and Warehouses. CI segments beyond those specifically targeted are also eligible to participate, where the technology is appropriate, and were included in the outreach and marketing efforts.

Market Incentive

A range of incentives directed towards the end-use customer (also known as downstream incentives) encourage the adoption of energy efficient technologies. Incentive levels were

established based on a number of considerations including natural gas savings generated, effectiveness of the incentive to influence customers and reach non-participants in DSM, and the equipment useful life. The 2016 prescriptive incentives are outlined in Table 5.13.

The Water Heating initiative includes measures that are designed to reduce a customer's energy use and water consumption; the Space Heating Initiative urges customers to retire older inefficient space heating equipment and install new energy-efficient equipment; and, the Commercial Foodservice Initiative encourages food establishment owners and operators to install high efficiency technologies designed to reduce hot water consumption and natural gas use.

National Account Multi-Unit Incentive

National Account customers are those that have multiple property locations throughout Union's franchise with similar design and use, such as retail chains, property management firms and foodservice chains. National Account customers have the ability to install various energy efficient technologies within numerous locations across Union's franchise. Recognizing that this customer group has a greater number of savings opportunities, Union continued to offer a multi-unit installation bonus incentive in 2016:

- 25 percent incentive increase on 6-30 installations per National Account
- 50percent incentive increase on 30 or more installations per National Account

Service Provider Limited Time Bonus

A limited time bonus was offered on select measures between September and December 2016 to drive awareness of Union's program offerings amongst trade allies, attract new service providers and influence incremental participation. The bonus offer included a one-time $250 participation bonus and an additional bonus: $250 for installing three or more eligible measures and $500 for installing five or more select prescriptive measures. Eligible measures included: condensing boilers, ERVs, HRVs, infrared heaters, makeup air units and air curtains. The maximum incentive available was $750 per service provider.

Table 5. 13 - 2016 Commercial/Industrial Prescriptive Offering Measure Incentives

Initiative	Measure	Customer Incentive	Service Provider
Water Heating	Condensing Storage Water Heater – Low, Medium, and High utilization	$450	$100
	Condensing Tankless Water Heater – Low, Medium, and High utilization	$450	$100
	Front Loading Clothes Washer, CEE Tier 2	$200	$50
	Ozone Laundry Equipment – All incentive categories (Max $8,000 per unit)	$0.02 x total annual lbs of laundry processed	$100
Space Heating	Air Curtain Single Pedestrian Door 7' x 3'	$300	$100
	Air Curtain Single Pedestrian Door 7' x 6'	$400	$100
	Air Curtain Single Pedestrian Door 8' x 6'	$500	$100
	Air Curtain Double Pedestrian Door (2) 7' x 3'	$600	$100
	Air Curtain Double Pedestrian Door (2) 7' x 6'	$800	$100
	Air Curtain Double Pedestrian Door (2) 8' x 6'	$1,000	$100
	Air Curtain Shipping and Receiving 8' x 8 or 8' x 10'	$1,200	$100
	Air Curtain Shipping and Receiving 10' x 10'	$1,800	$100
	Boiler Cycling Controls - Purchase	$3,000 per building	$100
	Boiler Cycling Controls – Lease (min5 year)	$1,200 per building	$100
	Condensing Boiler - ≤ 299 MBtu/hr	$1,000	$100
	Condensing Boiler - 300 to 999 MBtu/hr	$2,000	$100
	Condensing Boiler - ≥ 1,000 MBtu/hr	$6,000	$100
	Condensing Make-up Air (MUA) Constant Speed	$0.30/CFM per unit	$100
	Condensing Make-up Air (MUA) 2 Speed	$0.35/CFM per unit	$100
	Condensing Make-up Air (MUA) VFD	$0.40/CFM per unit	$100
	Condensing Furnace	$200	$50
	Condensing Unit Heater	$75	$100
	ERV (no existing ERV, or not required by code)	$1.15/CFM/unit*	$100
	ERV Improved Effectiveness ≥65% to ≤ 74%	$0.50/CFM per unit*	$100
	ERV Improved Effectiveness ≥75% to ≤ 84%	$0.75/CFM per unit*	$100
	ERV Improved Effectiveness ≥85%	$1.15/CFM per unit*	$100
	HRV (no existing HRV, or not required by code)	$0.75/CFM per unit**	$100
	HRV Improved Effectiveness >65% to < 74%	$0.25/CFM per unit**	$100
	HRV Improved Effectiveness >75% to < 84%	$0.50/CFM per unit**	$100
	HRV Improved Effectiveness >85%	$0.75/CFM per unit**	$100
	Infrared Heater Single Stage	$300	$100
	Infrared Heater Two Stage	$400	$100
	Demand Control Ventilation (DCV) Retail, Rooftop Unit (RTU)/MUA < 5,000 sq. ft.	$400	$50
	DCV Retail RTU/MUA ≥ 5,000 sq. ft.	$500	$50
	DCV Office RTU/MUA < 2,500 sq. ft.	$200	$50
	DCV Office RTU/MUA ≥ 2,500 sq. ft.	$300	$50
Commercial Kitchen	ENERGY STAR® Fryer	$700 per vat	$50 per vat
	ENERGY STAR® Dishwasher - Undercounter	$100	$50
	ENERGY STAR® Dishwasher – Stationary Rack	$200	$50
	ENERGY STAR® Dishwasher – Rack Conveyor	$450	$50
	DCKV Fast Food - ≤ 4,999 CFM	$1,400	$100
	DCKV Full Menu - 5,000 – 9,999 CFM	$3,200	$100
	DCKV Dinner House - 10,000 – 15,000 CFM	$4,600	$100
	ENERGY STAR® Convection Oven	$300	$50
	ENERGY STAR® Steam Cooker	$400	$50
	High Efficiency Under-Fired Broiler	$500	$50

**For ERVs: Min $200/Max $6,000 per unit; **For HRVs Min $200/Max $4,000 per unit

Further information on how the technologies work and can help customers reduce energy costs can be found on Union's website.[21]

Market Delivery

All of Union's CI energy efficiency offerings are aligned and delivered under the brand platform EnerSmart. This ensures a seamless, recognizable brand throughout Union's franchise.

For the CI prescriptive offering, Union continued to rely on a combination of direct and indirect delivery channels supported by a comprehensive set of marketing tools and strategies customized by segment.

Delivery Channels

Within each segment, Union identified and targeted key influencers and leaders. Offers were delivered both directly to the customer, supported through Union's Account Management team, and indirectly, through delivery channels comprised of manufacturers, distributors, and service providers.

Direct delivery channels focused on end-use customers and included:

- Direct Sales. Union account managers worked directly with end-use customers to explore potential improvements to the energy efficiency of their facilities, provide technical support to implement changes and apply for financial incentives.
- Mass Market. A number of tactics were used to reach the widest range of CI end-use customers, such as digital and social media, bill inserts, direct mailing campaigns, email blasts, and segment specific advertising. Union also engaged customers and industry partners alike through event-based marketing such as tradeshows, customer workshops, sponsorships, and other similar events.
- National Accounts. Union's National account managers develop and maintain relationships with customers where decisions impacting multiple property locations are made using a top-down, centralized approach.

[21] uniongas.com/business/save-money-and-energy/equipment-incentive-program

Indirect channels, such as strategic relationships with trade allies and delivery agents, allow Union to maximize alliance opportunities and influence the market as a whole. These industry allies promote or install energy efficient equipment and are in a position to directly educate or influence Union's customers to adopt natural gas energy efficient equipment. Cultivating and maintaining relationships with each of the following industry allies ensures that they are aware of the savings, benefits and incentives provided by Union's programs and offerings and can market long-life energy-efficient technologies to their customers:

- Manufacturers. Manufacturers are a key ally to promote higher efficiency equipment through their network of distributors and service providers. Union's account management team provided educational and promotional materials on Union's CI program to manufacturer representatives and engineering consultants.

- Distributors. Distributors were also targeted by Union's account management team and received marketing materials. Further, Union offered a $50 incentive in 2016 to any distributor who influenced the sale of an applicable technology and administered the application process. Condensing gas water heaters, condensing unit heaters, ERVs, HRVs, and infrared heaters were measures eligible for the incentive.

- Service Providers. HVAC contractors, engineering consultants, design architects and other service providers play an integral role in the sales cycle to encourage uptake of energy efficient technologies. Union worked directly with service providers across the province, hosted information sessions and provided reference materials to increase awareness of energy efficient technologies and advance adoption of this equipment in the market. Union provided a $50 to $100 incentive to service providers to recognize their impact in endorsing prescriptive DSM measures directly with end-use customers and administering the application process.

Marketing Tools and Strategies

In 2016, Union used an integrated marketing strategy to target CI customers as well as trade allies in key markets; promoting both prescriptive measures and custom offerings. A number of marketing tools and tactics were deployed through the delivery channels:

- Printed materials were developed to communicate Union's CI program offerings to the mass CI market as well as targeted segments. Sell sheets and brochures served as

discussion tools and reference sheets to support customer and trade ally decision making. Figure 5.3 is one of the brochures used in 2016 to broadly communicate Union's CI prescriptive and CI custom offerings.

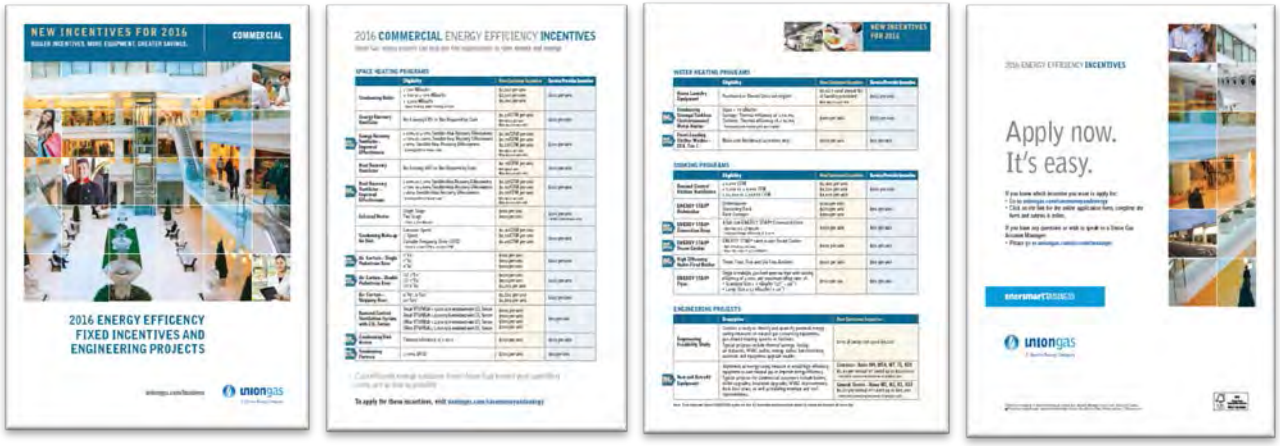

Figure 5.3 - 2016 Energy Efficiency Fixed Incentive & Engineering Projects Brochure

- Email marketing was used by the account management team in 2016 as part of the ongoing promotion of the prescriptive offering and to communicate special offers. Messaging was developed to convey the benefits of energy-efficient technology, incentives available and highlight specific measures in the commercial and industrial customer segments.

- Union distributed targeted bill insert communications (Figure 5.4) monthly in 2016 to select customer segments with customized information on applicable measures and program offerings. Targeted segments included Healthcare, Hospitality, Education, Foodservice, Manufacturing, Multi-Unit Residential, and Municipalities.

Figure 5.4 - Bill Insert Targeting Manufacturing Customers

- An *Energylink* newsletter was also distributed with gas bills to all CI customers to provide education on energy efficient practices and equipment and highlight the support Union can provide in implementing such practices.

- Digital and social media campaigns were designed to reach end-use customers and trade ally decision makers in the Education, Healthcare, and Multi-Residential segments as well as the CI market as a whole.
  - Display ads and search ads in Google and LinkedIn appeared on website pages of the targeted audience and directed customers to Union's dedicated EnerSmart website page[22] to learn more about energy efficient equipment and CI program offerings.
  - A LinkedIn campaign in 2016 displayed information on Union's program offerings in LinkedIn members' feed for all CI segments and trade allies; while LinkedIn InMail sent direct email messages to LinkedIn members based on industry, job title and role/seniority.
  - Magazine advertising in industry publications provided wide-ranging access to end-use CI customers and key trade allies and allowed for segment-specific content to be communicated. In 2016, Union carried out association advertising through a number of publications, such as Canadian Healthcare Facilities (Figure 5.5), Canadian Facility Management & Design, Canadian Property Management, and Heating, Plumbing & Air-Conditioning Magazine, to name a few.

Figure 5.5 - Content featured in the Canadian Healthcare facilities Magazine

[22] uniongas.com/business/save-money-and-energy

5.2.2 Commercial/Industrial Direct Install Offering

The newest offering added to the CI program is the direct install offering. In response to the Board's 2015-2020 DSM Plan Decision, the proposed direct install pilot was modified to a full program offering on the resource acquisition scorecard. The direct install offering differs from the prescriptive offering by providing commercial customers with direct equipment installation to seamlessly upgrade current equipment and technologies to more efficient options. This simplified, turnkey process will address barriers to participation providing energy savings to typically hard-to-reach small commercial customers.

To transition to a full program offering, activities in 2016 for direct install focused on program offering design and establishing and finalizing an agreement with an electric Local Distribution Company. The goals were to coordinate, design and integrate delivery into an existing offering between the gas and electric utilities for small to mid-sized businesses and determine appropriate natural gas technologies and incentive requirements.

Union identified a co-delivery opportunity with Alectra Utilities (previously Horizon Utilities), that will create an all-inclusive experience for customers. Union and Alectra investigated various program offering models and determined that Alectra's small business lighting program will provide the best fit for initial collaboration of Union's direct install offering efforts in the market.

Target Market

The direct install offering will target small to mid-sized businesses who do not typically participate in DSM, specifically those who:

- pay their own natural gas bill; whether they rent or own the building,
- are in the Union/Alectra franchise area, and
- are commercial customers who operate less than two buildings (national account customers are not eligible).

Market Incentive

Union's direct install offering will initially focus on pedestrian air curtains and provide an incentive up to 100 percent of the total cost of installation. Other prescriptive measures that yield a TRC-plus ratio exceeding 1.0 may also be recommended to customers.

Market Delivery

Program delivery will be implemented through a third party delivery agent/program administrator who will operate on behalf of Union and Alectra. The program administrator will function as a central channel for program coordination, including direct outreach to customers, identifying and installing measures through channel partners, organizing payments and producing reports for Union and Alectra.

5.2.3 Commercial/Industrial ("CI") Custom Offering

Union's custom offering is the largest offering of the CI programs in terms of cumulative natural gas savings (m^3) as well as the largest contributor to achievement on the resource acquisition scorecard. The custom offering focuses on opportunities where energy savings are linked to unique building specifications, design concepts, processes and/or new technologies that are outside the scope of prescriptive and quasi-prescriptive measures. The offering and incentives were targeted directly to the end user, while trade allies involved in the design, engineering and consulting communities assist to expand the message of energy efficiency.

The goal of the CI custom offering is to generate long-term and cost effective energy savings in CI facilities while supporting continuous energy use improvement through long-term relationships with customers.

Custom DSM project savings are determined for each customer specific project by considering a high efficiency option compared against a lower efficiency base case option.

A few changes were made to the CI custom offering in 2016:

- General Service customers received an enhanced incentive to recognize that projects for this customer size typically require additional funding to drive participation

- Customer incentives were no longer available for routine maintenance projects due to a shift of focus to other custom initiatives; and,
- As part of the 2015 audit, the Evaluation Contractor recommended that Union and Enbridge achieve better uniformity in custom offering input assumptions. Consistent with this recommendation and supported by audit findings, Union aligned with Enbridge's 25-yr default EUL for boilers in their custom offering.

Target Market

The CI custom offering focused on commercial /industrial general service, contract and mid-sized contract customers.

Targeted market segments included, but were not limited to: Manufacturing, Industrial Processing and Refining, Municipalities, Universities, Schools, Hospitals, Warehouses and Greenhouses.

Market Incentive

Custom incentives addressed non-prescriptive energy savings opportunities to improve natural gas usage and were based on the estimated annual gas savings of the project. Other incentives were also available for studies, meters and education. Table 5.14 outlines the incentives available in the CI custom offering.

Table 5. 14 - 2016 Commercial/Industrial Custom Incentive Guidelines

Measures	Commercial Incentives	Industrial Incentives
New and Retrofitted Equipment	**Contracts** $0.10/m^3 up to $100,000 **General Service** $0.20/m^3 up to $40,000	**Contracts** $0.10/m^3 up to $100,000 **General Service** $0.20/m^3 up to $40,000
	Incentive cannot exceed 50% of project cost	
Engineering Feasibility Studies	50% up to $4,000	50% up to $10,000
Process Improvement Studies	--	66% up to $20,000
Meters	--	50% of installed cost up to $3,500 limit of 5 meters a year per site
Total incentives capped at $250,000 a year per site		

New and Retrofitted Equipment and Process Improvements

Customer financial incentives were provided to encourage the installation of new equipment, retrofit equipment, and building/system optimization that resulted in energy efficiency gains and/or improvements in the productivity of the customer's operations.

Studies, Meters and Education

Engineering feasibility and process improvement studies help customers identify, justify and prioritize DSM custom project opportunities. Quantifying the financial costs and benefits of energy efficiency opportunities underpins the customer's internal decision making process and is a crucial element in the CI custom offering. Customers received financial incentives to support the installation of energy meters. Customers were also able to apply for incentives to help cover the cost of training and education courses that increase their knowledge of energy efficiency.

Market Delivery

The custom offering relied on a direct sales, customer centric approach to market. The most effective way to promote and encourage energy efficiency is by considering the individual energy needs of each customer.

Union's value proposition to its customers is the technical expertise and guidance provided with respect to energy-related decision making and business justifications. Union's guidance, along with financial incentives, help customers prioritize energy efficiency projects against their own internal competing factors (such as those activities which are deemed more business critical) and demonstrate the competitive advantage customers can gain through efficiency upgrades.

Custom projects were identified and supported through the collaborative efforts of Union's account managers and project managers. Account managers administer the full range of applicable services within the Union service portfolio, including DSM offerings. They are uniquely positioned to identify customer-specific information and custom project savings opportunities. Project managers are Professional Engineers who assist customers in recognizing and developing specific energy efficient natural gas based solutions to their business problems. The project manager works with the account manager as well as third party engineers, equipment manufacturers, service providers and others, as necessary, to

complete the DSM custom project application and confirm the appropriate base case, high efficiency option and measure life for the project.

Savings claims were subsequently assessed through Union's internal quality assurance/quality control process to validate the project results.

Internal Quality Assurance/Quality Control ("QA/QC")

A rigorous quality control process was used for all custom projects. Each custom project underwent an internal QA/QC project review prior to finalizing the savings and issuing the incentive cheque to the customer. The review was conducted by Engineers within the Commercial/Industrial Energy Efficiency Programs team who assessed the calculated savings and underlying customer-specific factors including base case, high-efficiency case and project life assumptions as well as "other" factors affecting gas demand (e.g. production and weather) and project costs.

Project savings calculations were based on the best information available at the time of review.

5.2.4 Education and Awareness

A wide variety of training materials and workshops were used to promote and expand knowledge of energy efficient technologies to CI customers. The objective was to educate stakeholders (including service providers and trade allies) on how to identify energy conservation opportunities, supply them with the resources to research and evaluate possible solutions, and motivate them to take action to install and/or market these technologies.

Education and awareness initiatives for the CI program included:

- EnerSmart website
- GasWorks newsletter
- Workshops promoting the efficient use of natural gas and awareness of energy savings opportunities
- Participation in independent professional development groups, trade organizations, and government workshops
- Attendance and sponsorship at trade shows and specific industry events; and,

- Partnering in pilot projects and studies.

EnerSmart Website

Union's dedicated webpage for the EnerSmart program (Figure 5.6)[23] provides:

- Program details and incentives for the prescriptive and custom offerings
- Instructions on how to contact an account manager or a Service Provider (a directory of trade allies that have experience with Union's CI program and offerings was added in 2016)
- Instructions on how to submit an application
- Tools and calculators for customers to assess their energy usage, evaluate energy sources and reduce energy costs; and,
- Equipment details and tips. Enhanced in 2016 with easy-to-understand information on energy saving equipment, such as how the equipment works and its benefits, typical building applications and maintenance information to optimize equipment performance.

Figure 5.6 - EnerSmart Webpage

[23] uniongas.com/business/save-money-and-energy

GasWorks Newsletter

GasWorks is a technology and energy conservation newsletter targeted to CI customers. *GasWorks* provides industry trends, technology and energy efficiency information to help businesses improve process productivity, enhance reliability of equipment and control energy expenses. The newsletter was distributed to CI customers and was also available on Union's website.

Workshops and Educational Forums

Union was involved with two large workshop and educational outreach efforts in 2016:

1. Canadian Boiler Society ("CBS") Educational Days: Raising the Bar on Raising Steam

   Union partnered with CBS to deliver educational forums in London, Burlington, Toronto and Kingston to over sixty attendees. Participants learned common boiler solutions to increase energy efficiency and save natural gas; with a focus on boiler selection and sizing, operation and maintenance, burner upgrades for lower emissions, and improved performance.

2. HVAC Information Sessions

   Union hosted 23 information sessions across its franchise to educate and train local HVAC contractors. Content included information on energy efficient equipment, incentive offerings available to end use customers, and ways to promote the benefits of higher efficient equipment. Materials were provided to session participants to use with customers to guide discussions on higher efficient equipment and Union's available offerings.

Additionally, Union sponsored, participated and presented at a number of conferences and events throughout 2016, including:

- Cap and Trade Strategies for all Manufacturers with Canadian Manufacturers and Exporters
- CBS Technology Fair and Educational Forum
- Canadian Healthcare Engineering Society Conference
- Energy Monitoring, Targeting and Reporting Workshop
- Union's Large CI Customer Conference
- Union's Greenhouse Growers Luncheon

Participation in Industry Organizations

Union benefits from shared learning by working closely with government and professional organizations to understand the latest trends and technologies. Some examples of industry partnerships include:

- Consortium for Energy Efficiency ("CEE"). Union networked with energy efficiency program administrators from across Canada and the United States with a focus on developing common approaches to advancing energy efficiency.
- Energy Solutions Centre. Union collaborated with energy utilities, municipal energy authorities, equipment manufacturers, and vendors to discuss strategies for accelerating the acceptance and deployment of new energy efficient, gas-fueled technologies.
- Canadian Boiler Society. Union partnered with CBS to provide technical training through the CBS Educational Days workshop; helping customers learn to operate their equipment at optimum efficiency.

Tradeshows and Events

Tradeshows and organized events provided Union with an opportunity to engage, educate and influence customers and trade allies. Associations hosting these events are credible sources of information and attendees rely on the content and resources they provide. As shown in Table 5.15, Union participated in a number of tradeshows and association events in 2016, both as an exhibitor and sponsor, to create awareness of CI program offerings and generate leads among attendees.

Table 5. 15 - 2016 Tradeshow Participation

Name	Target Audience
Canadian Mechanical & Plumbing Exposition Tradeshow	Manufacturers Service Providers
Hamilton & District Apartment Association Tradeshow	Multi-unit Residential Owners Property Managers Service Providers
London Poultry Show	Agricultural Customers
Federation of Rental-Housing Providers of Ontario : 2 Information Sessions, Golf Tournament and Annual Gala	Multi-unit residential owners Property Managers Service Providers
Ontario Association of School Business Officials Annual Conference & Education Industry Show	School Board Officials
Natural Resources Canada Energy Summit	Energy Efficiency Experts Industry Decision Makers
Canadian Healthcare Engineering Society Conference	Healthcare Facility Managers
Operations, Maintenance & Construction Annual Conference	College/University/School Board Decision Makers
London Property Management Association Tradeshow and Golf Tournament	Multi-unit Residential Owners Property Managers Service Providers
Eastern Region of APPA, Leadership in Education Facilities Annual Conference	College/University/ School Board Decision Makers
Professional Retail Store Maintenance Association National Conference	Large Retail Customers

Pilot Projects and Studies

By partaking in pilot projects and studies, Union can gain insight into the viability of potential energy-efficient technologies and important information to shape program design and delivery. Partnering with other utilities and distribution companies also allows Union to assess collaboration opportunities between natural gas and electricity utilities; all with minimal investment.

Union was involved in two ongoing pilot projects/studies in 2016: the Performance-Based Conservation Pilot and the Energy Pathfinder Initiative.

- **Performance-Based Conservation Pilot**

  This pilot was launched in 2015 and continued through 2016. Led by the Toronto Region Conservation Authority and Enerlife Consulting, project partners include: Union, Enbridge, IESO, Halton Hills Hydro, Milton Hydro, Brampton Hydro One, Region of Peel Water, Halton Region Water and the Real Property Association of Canada.

  The strategic concept of the pilot is to use large-scale energy benchmarking diagnostics to enhance conservation program performance and drive the adoption of energy benchmarking as a standard practice in the Ontario Commercial & Institutional sector. The pilot seeks to enroll up to 150 buildings to assess high-potential buildings by market segment, identify facility-specific conservation measures, quantify energy (gas and electricity) and water savings opportunities, and monitor and verify performance improvements over time.

  In 2016, the pilot was still in the Data Collection and Analysis stage. Union has enlisted 10 public buildings in the Town of Halton Hills and 17 buildings of the Halton Hills Catholic District School Board to participate.

- **Energy Pathfinder Initiative**

  The Energy Pathfinder Initiative is a pilot project initiated by the Canadian Manufacturers and Exporters in collaboration with ICF International, Union, Enbridge, IESO and Hydro One Networks Inc. The pilot is designed to explore, define and quantify opportunities to optimize end-use operations and energy intensive processes, as well as develop best practices for energy optimization and waste energy reduction within the Ontario manufacturing sector. The project was kicked off in 2015 and continued through 2016.

  Union Gas has recruited an industrial facility into the pilot. A data logging system, including pulse meter and sub-meter, have been installed at the customer site. The consultants are currently analyzing natural gas and electricity consumption data to investigate energy savings opportunities at the facility.

5.4.2 Lessons Learned

Prescriptive and Quasi-Prescriptive Offering

- **Downstream incentive model limitations**
  An end-user incentive model coupled with complex measures is creating challenges in driving incremental results. Union will continue to investigate and test additional program delivery channels as well as upstream and midstream incentive models in 2017.

- **Responding to best available information**
  The CI prescriptive offering must remain responsive to changing information on the characteristics and long-term energy savings of equipment by continually assessing and modifying the measure mix in the prescriptive portfolio; adding new measures supported by research and vetted through the TRM process and discontinuing measures where savings are unable to be reliably substantiated. For example, in 2016, tankless water heaters were added to the available measure list while destratification fans were discontinued.

Direct Install Offering

- **Designing a cost-effective program offering that addresses small to mid-sized business barriers is challenging**

  High upfront cost of equipment and installation limits market potential for many energy-efficient prescriptive measures. The investment required to provide a turnkey model design, all while striving to achieve cost-efficient savings, were also difficult barriers to manage in designing a suitable program offering.

  To address this, Union sought out opportunities to cost share with an electric utility while also choosing a solution that should aid in customer adoption. Promoting technologies such as air curtains provides both natural gas and electricity savings, improves the potential incentive level that can be offered to the customer and boosts the overall cost effectiveness of the offering.

Custom Offering

- **Aligning definitions and terminology**

  To ensure clarity amongst all stakeholders, it is important to use common definitions and terminology. Where differences between internal and external language has been found, Union has begun modifying internal terminology to align with the framework or Board Decisions. In 2016, for example, Union modified the labelling of project measure types to align with the measure categories in the framework: Early Replacement, Natural Replacement, New Construction and Retrofit.

- **Continuous improvement of custom project documentation**

  To demonstrate influence in custom projects and the due diligence put forward in estimating custom project savings, Union must remain focused on standardizing and improving documentation practices based on the feedback of customers, account managers, project managers, auditors and other stakeholders. In 2016, Union continued to improve on the base case documentation form introduced in 2015. Additional information on operating characteristics of the base case condition, less efficient options customers considered, and changes in process or operations that could impact estimated savings will now be gathered in one place; on the base case form.

CI prescriptive and custom program offerings will be offered throughout the 2016-2020 timeframe of this framework. Union will continue to refine its approach to market to increase participation from customers who have not yet embraced a culture of conservation in their facility, increase awareness and knowledge of energy efficient best practices, and generate significant long term energy savings in C/I facilities.

Union's direct install program offering will launch in 2017, delivered in partnership with Alectra Utilities.

6. Low-Income Scorecard

A low-income program is a resource acquisition program tailored to low-income customers; recognizing the unique characteristics and special needs of this customer segment. Given the distinctive features of a low-income program and additional guiding principles and design characteristics set out in the framework, this program is included on a separate low-income scorecard.

Performance on the low-income scorecard is measured by three metrics: single family cumulative natural gas savings (m^3), social and assisted multi-family cumulative natural gas savings (m^3), and market rate multi-family cumulative natural gas savings (m^3).

In 2016, the single family metric consists of cumulative natural gas m^3 savings from the Home Weatherization Program ("HWP") offering and the furnace end-of-life upgrade offering. The multi-family metrics consist of cumulative natural gas m^3 savings from the multi-family offering, which includes social and assisted multi-family housing as well as low-income market rate multi-family buildings.

Table 6.0 presents the results of the low-income scorecard. Union achieved 103 percent of the overall scorecard target, resulting in a DSM Shareholder Incentive of $1.152M.

Table 6. 0 - 2016 Low-Income Scorecard Results

Metrics	Metric Target Levels			Weight	Achievement	% of Metric Achieved	Weighted % of Scorecard Achieved
	Lower Band	Target	Upper Band				
Single Family Cumulative Natural Gas Savings (m^3)	28,339,761	37,786,348	56,679,522	60%	45,783,307	121%	73%
Social and Assisted Multi-Family Cumulative Natural Gas Savings (m^3)	13,836,358	18,448,477	27,672,716	35%	10,894,573	59%	21%
Market Rate Multi-Family Cumulative Natural Gas Savings (m^3)	2,252,430	3,003,240	4,504,860	5%	8,151,190	200%	10%
					Total Scorecard Target Achieved		***103%***
					Scorecard Utility Incentive Achieved		***$1,151,656***

6.1 Low-Income Program

The low-income program is designed to reduce the energy burden facing low-income single family and multi-family dwelling customers and minimize the barriers that low-income customers face in participating in energy conservation programs.

Building on past successes, Union enhanced the low-income program beginning in 2016 in the following manner:

- Single family offerings
    - Continued expansion of the Home Weatherization offering to new and smaller geographic areas across Union's franchise to ensure that the offering is accessible to low-income customers across the province
    - Introduced a furnace end-of-life upgrade offering in the social and assisted housing market that provided incentives to upgrade to a 95 percent or greater AFUE rating when an existing furnace reaches end-of-life and is being replaced; and,
    - Designed an Indigenous offering that combines delivery of the Home Weatherization and furnace end-of-life upgrade offerings within Indigenous communities (expected to launch in 2017).

- Multi-family offerings
    - Extended the current multi-family offering to market rate buildings that are occupied by low-income tenants, since a portion of low-income customers reside in such buildings, to ensure that they can also benefit from the DSM offerings.

Table 6.1 shows the results of the low-income program. The total spend for the low-income program is administered on a program level. Table 6.2 breaks down the total spend into its components.

Table 6. 1 - 2016 Low-Income Program Results

Program	Offering	Units	Annual Net Gas Savings (m^3)	Cumulative Net Gas Savings (m^3)	Total Spend	Net TRC-Plus	TRC-Plus Ratio
Low-Income	Home Weatherization	1,867	1,831,630	45,754,201	$10,400,612	$4,899,408	1.50
	Furnace End-of-Life	24	1,617	29,106			
	Multi-Family	119	837,653	19,045,763			
Low-Income Total		**2,010**	**2,670,900**	**64,829,070**	**$10,400,612**	**$4,899,408**	**1.50**

Table 6. 2 - 2016 Low-Income Program Spend

Item	Total
Incentives	$ 6,664,457
Administration	$ 861,489
Evaluation	$ 161,733
Promotion Costs	$ 2,712,933
Total Low-Income Program Spend	**$10,400,612**

Table 6.3 shows the calculation of the low-income program's TRC-Plus ratio.

Table 6. 3 - 2016 Low-Income Program Cost-Effectiveness

	TRC-Plus Benefits (a)	TRC Costs (b)	Net TRC-Plus (c)=(a-b)	TRC-Plus Ratio (d)=(a/b)
Measures	$ 14,759,156	$ 6,123,593	$ 8,635,563	2.41
Administration		$ 861,489		
Evaluation		$ 161,733		
Promotion		$ 2,712,933		
Low-Income Program Total	**$ 14,759,156**	**$ 9,859,748**	**$ 4,899,408**	**1.50**

6.1.1 Home Weatherization Program ("HWP") Offering

The HWP offering falls under the single family metric on the low-income scorecard and is a full service retrofit program that provides low-income customers living in single family homes with free energy assessments, weatherization upgrades, and prescriptive conservation measures to improve the energy efficiency of the customer's home. A single delivery agent entity coordinates all elements of the offering – from energy assessments to installation of measures; ensuring ease of participation. Customers also benefit from one-on-one energy conservation education by auditors and contractors.

An initial home energy assessment identifies the eligible building envelope upgrades, including attic insulation, wall insulation, basement insulation and draft-proofing measures. To capture lost opportunities for energy savings, spray foam insulation was introduced in 2016; allowing homes with a rubble/ concrete finish in the basement to fully participate in all deep measures. After all upgrades are completed, a final post renovation home energy assessment is conducted to evaluate the energy savings realized in the home using NRCan's HOT2000 modelling software.

Basic measures, such as showerheads, aerators, pipe insulation and programmable thermostats, are installed for qualified customers at the time of the home energy assessment if they have not previously received them.

To improve health and safety in low-income customer's homes and ensure income eligible customers can participate, Union addressed treatable environmental hazards within the building envelope identified during the assessment and prior to commencing any installation work. Hazards include: inadequate ventilation, combustion safety, mould, moisture and excessive clutter. The issues are often the result of poor structural design, age of the home, as well as the inability of the homeowner to address maintenance concerns due to lack of time, knowledge and money. Another safety measure, a carbon monoxide detector, was left behind for self-installation in all participating homes where one was required.

Union successfully delivered the HWP offering to 172 homes in the social housing market and 1,576 homes in the private market for a total of 1,748 homes. Approximately four percent of the natural gas savings were derived from social housing and ninety-six percent from the private market.

Target Market

HWP targeted both the social and assisted housing market and the private market. Income verification was required to participate in the offering and customers had to meet the following criteria:

Social and Assisted Housing Market:

- Household income was at or below 135 percent of the most recent Statistics Canada Pre-Tax Low-income Cut-Offs ("LICO") for communities of 500,000 or more; and,
- Customers were occupants of a single/semi-detached, town/row house or low-rise multi-family housing (three stories or less, as defined by Part 9 of the Ontario Building Code).

Private Market:

- Household income was at or below 135 percent LICO OR the customer had received one of the following social benefits in the last twelve months prior to participation:
    - National Child Benefit[24]
    - Allowance for Survivors
    - Guaranteed Income Supplement
    - Allowance for Seniors
    - Ontario Works
    - Ontario Disability Support Program; or
    - Low-income Energy Assistance Program Emergency Financial Assistant Grant.

AND,

- Customer was an occupant of a single/semi-detached, town/row house; and,
- Customer was a private homeowner or tenant who paid their own gas bills.

In 2016 Union expanded the geographic reach of the HWP offering into smaller Northern communities, to include: Muskoka, Whitefish, Elliott Lake, Val Therese, South River, Azilda, Ingersoll, Walkerton, Hanover, Wingham and Dunnville. Union also continued to broaden participation in the communities that are currently served by the offering, such as: Sudbury,

[24] The National Child Benefit was repealed July 2016. It is no longer included in income qualification criteria.

Thunder Bay, North Bay, Belleville and Cobourg in the North and Cambridge, Hamilton, Waterloo, Windsor, London, Grey Bruce County, Huron County, Sarnia and St. Thomas.

Market Incentive

The HWP offering was delivered at no cost to the customer, including energy assessments, all recommended thermal envelope upgrades, basic prescriptive measures, carbon monoxide detectors, individualized energy conservation education, and health and safety work. The health and safety incentive varied by home and depended on the expected cost-effectiveness of the home.

Market Delivery

HWP relied on experienced and reliable delivery agents to provide a turnkey solution - from energy assessments to measure installation and calculation of savings. In 2016, delivery agents of the HWP offering were Ecofitt and EnviroCentre.

To maximize uptake of HWP, Union approached the social and assisted housing market and private market uniquely.

Social and Assisted Housing Market Delivery

A primary focus in previous years was building awareness of the offering in this segment and establishing delivery channels. In 2016, Union continued to approach the social and assisted housing market through a direct sales approach executed by Union's account managers targeting housing providers directly backed by association and organization partnerships.

Union developed and continued to foster partnerships with key associations and organizations including, but not limited to: the Ontario Non-Profit Housing Association, the Ontario Municipal Social Services Association, and the Institute of Housing Management. Through these relationships, Union gained key housing provider contacts and insights that account managers were able to use in their outreach efforts.

Private Market Delivery

In 2016, Union shifted focus to educate and encourage participation in the private market. Several tools were used to further this goal, including traditional and new media marketing, partnerships and community outreach, and the Union Gas customer contact centre.

Traditional Marketing

- To create awareness and demand within the private market, an aggressive mass media campaign on TV, radio and through digital platforms was launched in August 2016. This was the first time such an expansive and multi-dimensional campaign was used in the private market. Nearly 73 percent of the annual leads originating from Union's website were generated post campaign, demonstrating the effectiveness of this strategy.

Several mass marketing campaigns were also launched to attract new customers, including:

- Direct mail advertising and advertorials in community newspapers - these efforts have proven successful in generating customer interest in the past and were increased in 2016.
- Advertising was placed in libraries, via posters and bookmarks.
- Advertising was displayed on televisions in Tim Horton's stores and drive-thrus.
- Bill inserts (Figure 6.0) were piloted in 2 cities, Thunder Bay and Hamilton, to assess the ability to effectively reach low-income customers without creating confusion and unintended traffic from non-low-income customers. This proved to be a successful communication tool and will be continued in 2017.

Figure 6.0 - 2016 Bill Insert

- New Media Marketing
    - Search Engine Marketing was used to target customers looking for information about energy conservation programs through Google search. When users searched key phrases, such as "weatherization program Ontario", HWP was promoted by increasing the visibility in search engine results.
    - Online digital display advertising was launched on the Weather Network as well as Postmedia and Metroland Media platforms that deliver advertising on local news, shopping, lifestyle, and entertainment websites. These digital advertisements (Figure 6.1) were strategically placed to target the low-income private customer market segment and generate internet traffic to the HWP webpage.

Figure 6.1 - Digital Display Advertising

- Union's HWP webpage
  Union's HWP offering webpage[25] gave private homeowners, renters and social housing providers the ability to explore the benefits of the offering, obtain information on eligibility criteria and to apply. The webpage was updated to provide an improved user experience; adding customer testimonials, FAQ's and yet another option to apply - to download the income qualification documents and email them directly to 'weatherization@uniongas.com'. This complimented the online application tool and the information on how to apply by phone.

[25] uniongas.com/weatherization

- Partnerships and Community Outreach
  Union worked with several organizations in its franchise area to promote and deliver HWP to low-income customers.

  - United Way
    In 2016, Union entered into an agreement with United Way Simcoe Muskoka to provide referrals for HWP. United Way Simcoe Muskoka is the lead intake agency for all Hydro One Low-Income Energy Assistance Program Grants. The objective of the program was to screen Union customers applying for a the grant for HWP eligibility.

  - United Way Sudbury Tax Clinic
    Union sponsored a tax clinic hosted by the United Way of Sudbury, where low-income community members received help in filing free Canadian income tax returns. Marketing materials, volunteers and a representative from the delivery agent were on hand to promote the offering during the clinic. Having this presence was an efficient way to address the barrier of gathering the necessary income eligibility documentation as well as targeting the low-income customer segment.

  - Emerge Guelph
    In 2016, Union continued a second year of partnership with Emerge Guelph. Emerge Guelph is a social and environmental organization that connects citizens to innovative solutions that maximize resource efficiency and community wellbeing. Home owners sign up for a free one-hour consultation where they are led through a structured interview about their home that identifies and recommends efficient retrofits and behavioural changes that save money and improve home comfort. As part of the process, the home is screened for HWP eligibility, and qualified applicant information is automatically forwarded to the delivery agent servicing the Guelph area.

  - Community Outreach
    A new pilot outreach strategy was developed to engage customers one-on-one at community-based events. The goal was to increase participation in HWP and

provide the delivery agent with completed applications ready for an initial assessment. GreenBrain, a marketing company, was hired to attend three street festivals in Hamilton over the summer months in 2016. The community-based outreach program was successful in providing a local presence as well as engaging and educating the community about HWP. While there were interested customers at these events, there was a lower than anticipated number of applicants that were both home and income eligible.

- Union Gas Customer Contact Centre
  Union's customer contact centre has daily contact with low-income customers in need of assistance with their bills. To increase awareness and encourage participation in the program, customer service representatives are trained to promote HWP to callers identified to have a high propensity to be home and income eligible. Interested customers are transferred to the appropriate delivery agent or provided with a phone number to call the delivery agent at a later time. Alternatively, representatives inform customers about the online application tools available.

6.1.2 Furnace End-of-Life Upgrade Offering

The furnace end-of-life upgrade offering is another offering counted towards the single family metric on the low-income scorecard. The offering provides social and assisted housing providers and private market customers with an incentive to upgrade to a 95 percent or greater AFUE rating furnace when their existing furnace reaches end-of-life and is being replaced.

Target Market

In 2016, the furnace end-of-Life upgrade offering targeted social and assisted housing providers with tenants that met the following eligibility criteria:

- A household income at or below 135 percent of the most recent Statistics Canada Pre-Tax LICO for communities of 500,000 or more (income eligibility was confirmed by the housing provider); and,
- An occupant of either a:
  - Single family detached home, semi-detached home, row home or town home

OR

- Part 9 building (as defined by Part 9 of the Ontario Building Code).

Market Incentive

Social and assisted housing providers were provided with an incentive amount equal to approximately half of the incremental cost of upgrading to a 95% or greater AFUE rating furnace as indicated in the Technical Reference Manual substantiation document. In 2016, this amounted to $275.

Market Delivery

The furnace end-of-life upgrade offering was included in delivery efforts aimed at the social and assisted housing market through HWP. See *Market Delivery* under section 6.1.1 for more information.

6.1.3 Indigenous Offering

The final single family offering on the low-income scorecard is the Indigenous offering. It combines the home weatherization and furnace end-of-life offerings and will be delivered within Indigenous communities. Eligible customers will receive free weatherization upgrades and natural gas energy efficiency measures installed by a delivery agent as well as a financial incentive to upgrade their existing furnace to an energy efficient furnace when it needs to be replaced. Through this offering, customers will also benefit from direct installation of an energy saving kit/basic measures and supplied with a carbon monoxide detector.

In 2016, Union focused on securing a First Nations delivery agent that has experience working with Indigenous communities. This will be critical to building customer trust and generating awareness and participation based on the unique culture and characteristics of this customer group. The RFP process was completed in mid-December 2016. After evaluating bids from five vendors, the contract was awarded to First Nations Engineering Services Ltd.

Target Market

The Indigenous offering detailed and approved as part of Union's 2015 – 2020 DSM Plan (EB-2015-0029) stated a target market of 13 Indigenous communities reserves with residential

gas service in Union's franchise area. Union revised the scope of work to include all 16 locations within its franchise area as of 2016. Union will continue to assess the potential target market for this offering as new communities begin to be serviced by Union with natural gas.

Market Incentive

The Indigenous offering will adopt the incentive structure for HWP (section 6.1.1) and furnace end-of-life upgrade offering (section 6.1.2).

Market Delivery

Union will leverage existing Band Council relationships and the expertise of the delivery agent, First Nations Engineering Services, to form a promotion and delivery approach that ensures maximum buy-in and take-up of the Indigenous offering.

6.1.4 Multi-Family Offering

There are two multi-family metrics on the low-income scorecard: social and assisted multi-family and market rate multi-family. These metrics represent the markets serviced by the multi-family offering. The Multi-family offering provides social and assisted housing and low-income market rate multi-family customers with incentives for a variety of energy efficiency measures, energy assessments and education. In recognition of the limited capital available for upgrades in social housing and to encourage housing managers to invest wisely in their housing stock, Union offers enhanced incentives to implement any measures available to commercial multi-family customers in the CI prescriptive offering, including prescriptive measures and custom projects.

Target Market

The multi-family offering targets two markets: social and assisted housing and low-income market-rate multi-family.

Social and Assisted Housing

Social and assisted housing is housing developed, acquired or operated under a federal, provincial or municipally funded program. To be eligible, providers must operate Part three

buildings with tenants who have a household income at or below 135 percent of the most recent Statistics Canada Pre-Tax LICO for communities of 500,000 or more. Income eligibility was confirmed by the housing provider.

Examples of social and assisted housing are:

- Non-profit corporations as outlined in the Social Housing Reform Act, 2000
- Public housing corporations owned by municipalities directly or through Local Housing Corporations
- Non-profit housing co-operatives as defined in the Co-operative Corporations Act, 1990; and,
- Non-profit housing corporations that manage or own rural and native residential housing.

Union has established strong relationships with 27 municipal social housing providers in its franchise area and assists them in proactively planning their energy efficiency upgrades. The majority of these 27 municipal housing providers have participated in the offering over the past five years. In 2016, Union continued to increase its focus on the 400+ smaller housing providers, including non-profit housing providers, low-income co-operative housing providers and faith- and ethnic-based providers.

Low-Income Market-Rate Multi-Family

Low-income market rate housing consists of privately owned, multi-family, Part Three buildings that have a high propensity of low-income tenants as determined by building location and average rents of the building. To be eligible:

1. The building must be located in a low-income neighbourhood according to one of the following data sources:
    - The forward sortation area (i.e. the first three digits of a postal code) has a 70percent or greater likelihood of being low-income, as determined by data sourced from Statistics Canada LICO information
    - Census tract data shows there is a 40percent or greater likelihood of being low-income, as determined by data sourced from Statistics Canada Low-income Measure
    - A poverty or other neighbourhood report indicating that it is low-income

- A high percentage of Ontario Works recipients, as determined by data sourced from Municipal Ontario Works recipient postal code maps; or,
- Any neighbourhood or building identification method as agreed upon through consultation with low-income stakeholders.

AND,

2. Average rents of the building must be at or below the average market rent for that municipality based on one of the following:
    - Rent roll review, demonstrating average rent levels
    - Existence of Rent Geared to Income or rent supplement contract(s) with the designated Service Manager Office; or,
    - The building has participated in Ontario Renovates or Canadian Housing and Mortgage Corporation's Residential Rehabilitation Assistance Program in the last five years.

Market Incentive

Through the offering, multi-family customers could receive enhanced incentives for energy efficient upgrades, conducting a building assessment, and basic hot water conservation in suite-measures as well as benefit from education initiatives.

Enhanced incentives encourage energy efficient upgrades by addressing the capital barriers that face this customer group. Eligible upgrades include:

- Prescriptive measures such as condensing boilers, condensing make up air units, and gas water heaters; all measures offered to the multi-family segment within the standard CI prescriptive offering; and,
- Custom projects such as building envelope improvements and controls.

Prescriptive measures and custom projects – customers could receive $0.10 per cumulative m^3 saved up to 50 percent of the fully installed project cost.

Building / Energy Assessments – Housing providers could receive up to $5,000 per building (to a maximum of $25,000 per housing entity for the year) for conducting building / energy assessments. These assessments identify and recommend high-efficiency space heating,

water heating and envelope upgrade opportunities that will generate energy savings at the site.

Basic Measures - Eligible multi-unit properties could receive installation of up to two energy efficient showerheads with kitchen and bath aerators left behind for free.

Education - building operators and tenants were educated about their building's energy usage and ways to increase energy efficiency at no cost.

Market Delivery

Consistent with Union's single family offering, direct sales and association and organization partnership channels have been found to be the most successful and cost effective means to reach these customer segments and address barriers for participation.

Direct Sales

Union's account managers met directly with housing providers and building owners to assess the energy needs of their buildings, provide support in developing multi-year energy conservation plans and to present Union's suite of offerings. A sales package, or sell sheet, was used as a discussion tool to communicate the incentives and benefits of the offering (Figure 6.2).

Figure 6.2 - Sales Package for Social and Assisted Housing Providers

For the social and assisted housing market, Union continued targeting key influencers in municipalities and district social services administration boards. Building and leveraging relationships with consolidated municipal service managers also remained a focus in 2016. These service managers administer the distribution of subsidies and technical services to all social housing providers in a given municipality, including municipal, non-profit and co-operative housing organizations. This relationship provides valuable insights into the social housing market structure, funding models, building condition assessments and decision making processes associated with the different types of housing while allowing Union to promote participation in the multi-family offering.

Association and Organization Partnerships

To support the direct sales efforts, Union leveraged the same housing and social service associations from the HWP offering as well as the Housing Services Corporation ("HSC"), the Federation of Rental Housing Providers of Ontario, and Municipal Property Management Associations.

Union engaged in specific partnership opportunities with Ontario Non-Profit Housing Association ("ONPHA") and HSC to connect with housing provider, building owner and property managers' contacts and increase exposure to the offering.

- Partnership with the ONPHA
  Union has found that this partnership is an effective means of educating social and assisted housing providers on the cost benefits of Union's multi-family offering and driving participation from members. Union sponsored regional meetings in London, Windsor, Sudbury, Hamilton, Kingston, Kitchener and Thunder Bay; participated in the 2016 ONPHA tradeshow in Toronto; continued to advertise in the ONPHA bi-monthly newsletter Quick Connections; and, posted program information on a section of the ONPHA website dedicated to funding opportunities.

- Partnership with HSC
  Union has a long-standing partnership with HSC, a non-profit organization that delivers province-wide programs to Ontario's affordable housing sector. In 2016, Union was a key sponsor for the Measuring Matters Conference for the third year in a row. This conference provided practical energy efficiency solutions for social housing providers. Real-life case studies were used to illustrate how to reduce natural gas consumption

by understanding and integrating energy benchmarking data, overcoming technical and organizational challenges, and maximizing human and financial resources. These case studies included past DSM participants who discussed how their organization had benefitted from Union's multi-family offering and achieved significant natural gas savings in several multi-family buildings.

6.1.5 Education and Awareness

Educational and awareness initiatives are the foundation of all low-income program offerings, included in market delivery efforts and are always provided at no cost to customers.

In 2016, the mass media campaign allowed Union to reach new customers, both single family and multi-family, to increase awareness of energy conservation and promote participation in DSM program offerings.

For multi-family building owners and housing providers, materials were provided to distribute to tenants to increase their understanding and impact of energy use in their building. Housing providers were also eligible for free enrollment in a benchmarking tool that provides active monitoring and reporting for two subsequent years. This tool increases housing providers' awareness of energy measurement and management and can assist them in identifying areas of improvement.

Organization partnerships have provided the opportunity to participate in special educational forums. In 2016, Union continued to be a participant in the Community Champions Workshop, delivered by HSC. A total of seven workshops were conducted in multiple communities including: Simcoe, Thunder Bay and Cochrane District Social Services Administration Board. HSC's Community Champion Program supports the development of healthy, sustainable communities within Ontario's social housing sector by educating, engaging and supporting staff and residents in conservation activities. Training sessions addressed a variety of topics, including reducing energy and water consumption and minimizing waste.

6.1.6 Lessons Learned

HWP Offering

- **Community Outreach**
  Feedback from the community outreach sessions conducted by GreenBrain revealed that there was confusion over income criteria and documentation required to participate in the program. Union is refining the process with its delivery agents to provide additional follow-up and assistance in completing applications.
- **Mass Media Campaign**
  The mass media campaign was successful in generating awareness of HWP. To maximize results, the campaign needs to be launched earlier in the year, possibly in the first quarter, to help generate sufficient leads and target channels with high viewership.
- **Improvements in the Application Package**
  In assessing why some customers elected not to continue with or complete participation in HWP, a couple of potential improvements were identified regarding the application package. First, prospective customers pointed out the value in highlighting the workmanship and material guarantee from the contractors on the HWP consent form. Second, application packages should be modified to include better samples of income criteria documentation and clearer instructions on redacting sensitive information to reduce customers' privacy apprehension. Union has made these modifications in 2017.

Furnace End-of-Life Upgrade Offering

- **Furnace end-of-life upgrade offering was launched**
  The furnace end-of-life upgrade offering was launched in September 2016 to the social housing market. By the end of the year, Union was able to incent 30 furnace upgrades and expects participation to grow significantly by the end of 2017 as awareness increases through additional marketing and promotion initiatives as well as cross-promotional opportunities with the other offerings. This offering provides a new opportunity to help customers reduce their natural gas consumption in a finite market, and contributes to a well-rounded and comprehensive incentive program for the low-income market.

Multi-Family Offering

- **Overlapping programs**
  New funding programs from the provincial government add an extra layer of complexity in delivering DSM programs. It is important that Union remains apprised of competing or complimentary funding sources available to customers to ensure attribution agreements are made, where required, or that application processes include consideration of stacking incentives. Union's multi-family offerings, in conjunction with provincially funded energy conservation programs, provide considerable opportunities to improve energy efficiencies and reduce greenhouse gas emissions in many of the province's large social housing buildings.
- **Basic Measure Installation**
  Union has provided free installation of showerheads to eligible multi-family housing properties for several years. Review of these measures has concluded that they are no longer financially viable and the market is greatly saturated. For these reasons, Union has decided to discontinue this element/incentive at the end of 2016.

Significant natural gas savings were achieved in both the single family and multi-family low-income markets in 2016. While municipal social housing entities comprised the majority of participation in the multi-family offering, the non-profit and co-operative segment of the market continues to grow.

The Low-income program is well positioned heading into 2017 to build on past successes while expanding into new markets and exploring new offerings. The HWP offering, furnace end-of-life upgrade offering, and multi-family offerings (social and assisted housing as well as low-income market-rate) will continue throughout the 2016-2020 timeframe of this framework. The Indigenous offering will launch in 2017.

7. Large Volume Scorecard (Rate T2/Rate 100)

The large volume program is a resource acquisition program targeted towards Union's largest natural gas users with very high natural gas consumption. The delivery model for the large volume program differs from other resource acquisition programs and, as such, is measured on a dedicated large volume scorecard.

According to Union's Board approved 2015-2020 DSM Plan (EB-2015-0029), Rate T1 has been moved into the CI program on the resource acquisition scorecard in 2016 rather than remain part of the large volume program, where it has been since 2012. This change reflects the significant differences between Rate T1 and Rate T2 in terms of daily contracted demand and annual consumption as well as the fact that DSM program offerings for Rate T1 customers have been consistent with the CI custom offering on the resource acquisition scorecard since 2012.

The 2016 large volume scorecard consists of cumulative m^3 natural gas saved from customers within Rate T2 and Rate 100.

Table 7.0 presents the results of the large volume scorecard. In 2016, Union achieved below the threshold that earns a DSM Shareholder Incentive on this scorecard.

Table 7. 0 - 2016 Large Volume Rate T2/Rate 100 Scorecard Results

Metrics	Metric Target Levels			Weight	Achievement	% of Metric Achieved	Weighted % of Scorecard Achieved
	Lower Band	Target	Upper Band				
Cumulative Natural Gas Savings (m^3)	668,168,041	890,890,721	1,336,336,082	100%	79,848,302	9%	9%
					Total Scorecard Target Achieved		***9%***
					Scorecard Utility Incentive Achieved		***$0***

7.1 Large Volume Program

As part of the 2015-2020 DSM Plan Decision, the Board directed Union to continue its large volume self-direct program offering rather than adopt a program focused solely on technical support and training. In response, Union has extended the large volume program by continuing the Large Volume Direct Access ("DA") offering into 2016, with a similar structure from previous years.

The large volume program has a single offering – the DA offering. Results for the large volume program are shown in Table 7.1. Table 7.2 breaks down the total program spend into its components and Table 7.3 shows the large volume program's TRC-Plus ratio.

Table 7. 1 - 2016 Large Volume Program Results

Program	Offering	Units	Annual Natural Gas Savings (m^3)	Cumulative Natural Gas Savings (m^3)	Total Spend	Net TRC-Plus	TRC-Plus Ratio
Large Volume	Direct Access Offering	71	6,772,053	79,848,302	$2,989,176	$ 13,142,160	5.20
Large Volume Program Total		**71**	**6,772,053**	**79,848,302**	**$2,989,176**	**$ 13,142,160**	**5.20**

Table 7. 2 - 2016 Large Volume Program Spend

Item		Total
Incentives	$	2,441,233
Administration	$	509,939
Evaluation	$	37,682
Promotion	$	322
Total Large Volume Program Spend	**$**	**2,989,176**

Table 7. 3 - 2016 Large Volume Program Cost-Effectiveness

	TRC-Plus Benefits (a)	TRC Costs (b)	Net TRC-Plus (c)=(a-b)	TRC-Plus Ratio (d)=(a/b)
Measures	$ 16,272,683	$ 2,582,579	$13,690,103	6.30
Administration		$ 509,939		
Evaluation		$ 37,682		
Promotion		$ 322		
Large Volume Program Total	**$ 16,272,683**	**$ 3,130,522**	**$13,142,160**	**5.20**

7.1.1 Large Volume Direct Access ("DA") Program Offering

To better address the unique characteristics of large volume customers, generate broad customer participation, and encourage these customers to pursue all cost-effective conservation, Union uses a self-directed funding model. The direct access budget mechanism grants each customer direct access to the incentive budget they pay in rates. Under this model, customers know exactly how much funding they have available each program year. This ensures they can appropriately plan their expenditures to reduce energy usage in their facility.

Customers are required to submit an Energy Efficiency Plan ("EEP"), authored with the assistance of Union's energy experts. The EEP serves as a roadmap allowing customers and Union to actively work together, driving energy efficiency projects at customers' operations, sites and facilities. Projects identified on the EEP are earmarked for funding.

If a customer elects not to submit an EEP or if the direct access budget funds are not fully earmarked or used by a certain date, the funds are dispersed via an aggregated pool approach. Funds transferred to create the Large Volume Aggregate Pool are used to fund energy efficiency projects for all Rate T2 and Rate 100 customers.

This 'use it or lose it' approach ensures each customer has first access to the amount of incentive budget funded by their rates, which minimizes cross-subsidization.

Target Market

The DA offering is exclusive to large volume firm service contract customers that are either Rate T2 (Union South) or Rate 100 (Union North).

Large volume customers are those with very high natural gas consumption and include large volume industrial operations, power generators, chemical plants, and petroleum refineries.

Market Incentive

The large volume market is heterogeneous, with most projects tied directly to unique processes or technology requirements. Accordingly, all large volume projects are custom.

Table 7.4 shows the incentive guidelines for the 2016 large volume DA offering.

Table 7. 4 - 2016 Large Volume Direct Access Offering Incentive Guidelines

Offer	Incentive
Engineering Feasibility Study	50% of the cost, up to $10,000
Process Improvement Study	66% of the cost, up to $20,000
Steam Trap Survey	50% of the cost, up to $6,000
Meters	50% of the cost, up to $3,500 per meter
Customer Education	Provided by or funded by Union Gas
New and Retrofit Equipment, Process Improvement & Operational Improvement	
Direct Access Budget	$0.10 per annual m³ saved, up to $100,000*
Aggregate Pool Funded	$0.05 per annual m³ saved, up to $40,000*

*Incentive cannot exceed 50% of project cost

Engineering Feasibility Studies

Engineering feasibility studies include an analysis of natural gas equipment as well as electricity, compressed air, water and wastewater. These feasibility studies help customers formulate a priority list of energy efficiency projects geared to site-specific energy plans and budgets. As required, Union also assists the customer's technical staff in generating business cases to enable the customer to secure corporate capital funding for energy efficient equipment and/or process changes.

Process Improvement Studies

Union provided customer incentives for conducting detailed engineering analyses and designing specific process equipment or operational improvements identified with or without a general plant assessment. This included performance testing and analyses of industrial boilers, total steam plants, thermal fluid heaters, vaporizers, furnaces and special process equipment. Testing identifies and quantifies energy saving opportunities, cost saving opportunities, and implementation costs as well as related environmental benefits.

Steam Trap Surveys

Steam trap surveys conducted by qualified service companies can identify losses from steam distribution systems. Each survey identifies leaking, over-sized or under-sized, blocked and/or flooded traps, as well as possible performance improvements in condensate return systems.

Meters

Incentives were offered for customers to install a natural gas, steam or hot water meter to measure and monitor energy usage. This allows customers to better manage the energy intensity of their operations and identify energy-efficiency improvements.

Customer Education

Union provided education, training and technical expertise to increase awareness of energy efficiency opportunities and benefits.

New Equipment, Process Improvement and Operational Improvements

Union's role in promoting and implementing energy efficient options continued to help companies control energy costs and remain competitive in today's global economy. With the continual focus on cost reduction, many industrials lack the resources required to analyze potential energy saving opportunities. Union helps fill this gap with its reliable and knowledgeable Project Managers in conjunction with incentives designed to influence equipment choices.

Retrofit Equipment

Union worked with customers to identify and incent retrofit custom projects that the customer would not have otherwise completed. Projects are related to the repair, replacement, or optimization of an existing piece of equipment or system.

Market Delivery

All CI custom offerings, including those targeted to large volume customers, are jointly delivered through a direct sales approach by Union's account managers and Project Managers since these projects require in-depth knowledge of individual business facilities and customer energy needs.

Account managers work with customers to identify opportunities and gather customer and site specific information, which are critical inputs into the assessment of project savings estimates.

The Project Managers (who are all engineers with a Professional Engineering designation in Ontario) work with the account managers as well as third party engineers, equipment

manufacturers and service providers, as necessary, to complete the custom applications. Union's experienced Project Managers effectively become energy conservation and/or technology subject matter experts with respect to the customer businesses, support these customers in identifying best-practice energy conservation solutions to meet their needs, and assist them throughout the project implementation process.

The DA offering also used similar marketing tools and strategies as the CI program. An EnerSmart sell sheet specific to large volume customers and the large volume direct access offering is just one tool used to promote the offering (Figure 7.0).

Figure 7.0 - EnerSmart Large Volume Brochure

All custom projects undergo an internal project review for Quality Assurance/Quality Control ("QA/QC") conducted by engineers within Union's Commercial/Industrial Energy Efficiency Programs team. Refer to *Internal QA/QC* under section 5.2.3 for further details.

7.1.1 Education and Awareness

To coordinate efforts and optimize program spending, education and awareness activities for the CI program extend to large volume customers with topics and information tailored to this customer group. This includes use of the EnerSmart website, a GasWorks newsletter, EnerCase reports, workshops, and participation in independent professional development groups, trade organizations, and government workshops. Refer to section 5.2.4 *Education and Awareness* for further details.

7.1.2 Lessons Learned

- ***DA Offering Observations***

  The following outlines some key observations of the DA offering in 2016:
  - 97 percent of Rate T2/Rate 100 customers (35 out of 36) participated by submitting energy efficiency plans
  - 61 percent of Rate T2/Rate 100 customers (22 out of 36) submitted energy efficiency plans and completed at least one project
  - 44 percent of Rate T2/Rate 100 customers (16 out of 36) used all of their budget
  - 42 percent of Rate T2/Rate 100 customers (15 out of 36) received additional funding from the Aggregate Pool; and
  - Approximately 25 percent of the total Rate T2/Rate 100 program savings were funded by the Aggregate Pool.

- **EEP Template Modification**

  Extending Union's focus on continuous improvement in custom project documentation, modifications were also made to the EEP template. Union wanted to more clearly demonstrate involvement and influence on projects as well as prior support and expertise provided to facilitate the implementation of a project. These influence types include such activities as studies, meters, participation on Energy Teams, training and past incentives. Projects marked as "No Influence" were not eligible for incentives through the large volume direct access offering.

- **Decrease in Natural Gas Savings Achieved**

Union's 2016 large volume cumulative natural gas savings achievement was smaller relative to the prior three years. This can be attributed to a few main drivers, including: changes in the contracts of the power producers from base load to peaking plants, lack of funding for capital projects due to economic constraints, and modifying the eligibility requirements for routine maintenance projects in 2016.

The Large Volume Direct Access Program offering assisted Union's largest volume customers in reducing gas consumption in their facilities by installing or upgrading energy efficiency equipment and implementing process improvements. This program will continue to be offered to Union's large volume customers (Rate T2 and Rate 100) in 2017.

8. Market Transformation Scorecard

Market transformation programs are intended to create a lasting change in market behavior by removing barriers and accelerating the adoption of specific energy efficiency technologies or concepts to the point that they become standard practice. They are designed to make a permanent change in the market place over a long period of time.

Union's market transformation program is captured on a distinct market transformation scorecard. Table 8.0 presents the results of the market transformation scorecard. While Union was able achieve the 100 percent target for Optimum Home, the new CSBD offering was not launched early enough in the year to meet the Board-set targets. This resulted in Union only achieving 50 percent of the overall weighted scorecard, which does not meet the threshold to earn DSM Shareholder Incentive.

Table 8. 0 - 2016 Market Transformation Scorecard Results

Metrics	Metric Target Levels			Weight	Achievement	% of Metric Achieved	Weighted % of Scorecard Achieved
	Lower Band	Target	Upper Band				
Optimum Home: Homes Built (>20% above OBC 2012) by Participating Builders	53%	70%	100%	50%	70.09%	100%	50%
Commercial New Construction: New Developments Enrolled by Participating Builders	6	8	12	50%	0	0%	0%
				Total Scorecard Target Achieved			***50%***
				Scorecard Utility Incentive Achieved			***$0***

8.1 Market Transformation Program

In Union's 2015–2020 DSM Plan (EB-2015-0029), Optimum Home was the sole market transformation offering and was intended to conclude at the end of 2016 until the timing and efficiency requirements of the pending 2017 Ontario Building Code ("OBC") were clearly

known. The Board, in its Decision,[26] approved the Optimum Home offering as proposed in 2016; while also finding that the offering should continue from 2017 to 2020.

Additionally, the Board directed Union to establish a new market transformation offering, similar to Enbridge's Commercial Savings By Design ("CSBD"), targeting the commercial and industrial new construction market.

The resulting 2016 market transformation scorecard consists of two metrics:

1. The Optimum Home Metric measures the percentage of homes built by enrolled builders to a 20% higher energy efficiency standard than the 2012 OBC in relation to the total number of homes built in 2016 by builders who remain enrolled in the program. Only homes that have an activated gas service are included in this metric

2. The CSBD Metric sets a targeted number of participants to enroll in the offering.

Table 8.1 breaks down the total spend for the market transformation program into its components.

Table 8. 1 - 2016 Market Transformation Program Spend

Item		Total
Incentives	$	167,641
Administration	$	302,149
Evaluation	$	7,933
Program Costs	$	526,970
Total Market Transformation Spend	**$**	**1,004,693**

8.1.1 Optimum Home Offering

The Optimum Home offering addresses barriers to the wider adoption of high efficiency homes in residential new construction; avoiding lost opportunities and setting the stage for long-term energy savings in the residential market. Optimum Home examines all aspects of the builder's business in an attempt to create fundamental change toward energy efficient building practices using a whole-home approach.

[26] Decision and Order on 2015-2020 DSM Plans (EB-2015-0029 / EB-2015-0049), January 20, 2016

Envisioned to run from 2012-2016, the first three years of the Optimum Home offering focused on recruiting participants from the fifty largest builders in Union's franchise area and teaching them, through a three phase consulting process, to build homes to the Optimum Home standard (the "OH standard"), which is at least 20 percent above 2012 OBC. The last years of the offering concentrated on supporting enrolled builders in completing the three phases and increasing both the demand and the market penetration of homes that are built to the OH standard.

Participating builders entered into a multi-year, three phase consulting process partnering them with leading building science experts who provide cutting edge advice on how to build residential homes to the OH standard as well as integrate these new best practices and designs into their daily business functions and new housing starts. The consulting process is comprehensive, tailored to each builder's individual needs and considers every aspect of their business including marketing, sales, contracts, construction, services and trades. In doing so, the offering works to identify and address barriers to energy efficient construction, develop capacity within builder organizations to build to this higher efficiency and to help builders realize cost efficiencies to reduce incremental costs of building to the higher efficiency standard.

Between 2012 and 2014 twenty-two of the top fifty builders in Union's franchise area were successfully enrolled into the offering. By the end of 2015, nineteen builders had completed Phases Two and Three. In concluding the original version of Optimum Home in 2016, all builders have now successfully completed all of the offering's phases and Union met its 2016 target of having 70 percent of all homes built by participating builders constructed to 20 percent above 2012 OBC.

The Optimum Home phases are:[27]

Phase	Activities
Phase One: Discovery	• Builders are paired with a building science expert to begin the consultative process along with a cross-functional team from the builder's organization. • An on-site assessment and analysis establishes a baseline by benchmarking current construction and business practices. • New technologies, building practices and other options are assessed and extensively modelled using NRCan's HOT2000 software. This produces a new Builder Option Package; a customized handbook of building specifications to achieve the OH standard. • At least one prototype home (Discovery Home) is built and must be verified to achieve the OH standard, as determined by a third-party Certified Energy Advisor.
Phase Two: Production	• The design team tests the Builder Option package, identifies efficiencies in the builder's internal business processes, examines lessons learned, and establishes training requirements. • High performance housing stock is being built and verified to the OH standard.
Phase Three: Transformation	• A sustainability plan is developed to maintain momentum of building to the new level of efficiency. • A wrap up session is held to discuss program accomplishments, lessons learned and to identify and address any remaining internal barriers to incorporating the OH standard across the majority of the builder's housing starts. • The builder is encouraged to embrace the new philosophy into company culture and to fully implement and expand rollout of the OH specifications.
Incremental Engagement (after Phase 3 is complete)	Incremental consulting support was available in 2015 and 2016 to support: • Working through unanticipated technical and quality issues resulting from the increased tightness of the home or use of new and previously untested energy efficient technologies/building materials; • Conducting production related trades training; • Next Generation planning; and, • Sales and marketing support in "selling" higher efficiency homes. While sales support was available throughout the phases, many builders were initially more focused on learning to build higher efficiency homes. Once this was accomplished, there was a need to shift attention to selling them.

[27] Up to 30 Consultant days are available to each builder over the three phases of the program.

Target Market

Optimum Home targets stakeholders who influence the market and drive demand for high performance homes, including:

- Participating builders
  The primary target market is the 22 existing Optimum Home participants enrolled throughout 2012-2014; who are among the fifty largest builders in Union's franchise area based on the previous year's housing starts at time of enrollment.

- Consumers / new home buyers
  In order for builders to fully embrace the program and build a significant number of housing starts to the OH standard, home buyers need to be willing and wanting to purchase them.

- Non-participating builders
  Union engages builders that are not participating in the Optimum Home offering, but build homes in Union's franchise area, to encourage spillover by demonstrating the success of participating builders.

Market Incentive

The builder incentive for the original three offering phases and new incremental engagement phase is outlined below in Table 8.2. The incentives come in the form of consulting services, education and training.

Table 8. 2 - 2016 Optimum Incentives

Phase	Incentive
Phase One: Discovery	Up to $30,000 value per builder
Phase Two: Production	Up to $30,000 value per builder
Phase Three: Transformation	Up to $15,000 value per builder
Incremental Engagement (after the completion of Phase 3)	Up to $17,500 value per builder over the 2015-2016 period

- Union also provided an incentive of $2,500 per builder in Phase One towards the cost of the prototype Discovery Home.

Market Delivery

Optimum Home is implemented through two main channels:

1. Supply-side. These are all activities that drive participants to successfully complete the original offering phases. The cornerstone of this approach, and the offering as a whole, is partnering enrolled builders with building science experts who provide customized, one-on-one support throughout the term of the Optimum Home commitment.

   Union's residential sales team also plays a role by monitoring builder engagement, helping to troubleshoot issues as needed, and leveraging manufacturing and channel partner relationships to provide product knowledge and education.

2. Demand-side. These efforts help builders to increase their effectiveness in selling higher efficiency homes to new home buyers as well as creating demand for these new homes by creating awareness amongst new home buyers about the benefits of higher efficiency homes. It also includes broader market initiatives aimed at builder sales centres and non-participating builders to encourage the adoption of higher efficiency homes as standard market practice.

8.1.2 Commercial/Industrial Savings by Design ("CSBD") Offering

CSBD is a new market transformation offering added to Union's portfolio and market transformation scorecard by the Board in its 2015-2020 DSM Plan Decision. Union's CSBD offering has adopted the same structure and name as Enbridge's offering to satisfy the Board's direction to expand the geographical reach of the offering and provide consistency in the market, especially for province-wide chains, franchises and companies.

The offering encourages commercial developers and builders to design and build new construction developments to a level that is above current building code through an integrated design process ("IDP") and financial incentives. IDP follows the internationally recognized IDP principles and takes a holistic approach to high performance building design and construction. Through detailed analysis and modelling of various building elements and alternatives, such as equipment sizing and design, building envelope characteristics, and

optimization of systems, participants can achieve the offering target of building to 15% above the 2017 Ontario Building Code ("OBC") Part Three requirements.[28]

As a completely new offering not contemplated as part of Union's 2015-2020 DSM Plan (EB-2015-0029), efforts in 2016 focused on determining an effective and appropriate offering design as well as developing a delivery strategy. Union was unable to fully launch the offering in time to achieve the Board-set target of enrolling participating builders in 2016.

Target Market

CSBD targets builders and developers of new commercial, industrial, institutional, or multi-residential buildings. Builders and developers are eligible to participate in the offering multiple times for different projects assuming the eligibility criteria are met.

Eligibility criteria include the following:

- Construction projects must have a minimum threshold of 50,000 square feet. A project is defined as either a single building or multiples of the same building by the same company, i.e. "same construction", that add up to 50,000 square feet or more.
- Building(s) must be in the design phase or earlier in the process; and,
- Building construction must be completed within five years of the IDP session, and commissioning must be completed no more than one year after that.

Market Incentive

CSBD is a multi-phase offering; beginning early in the design planning stage to post-commissioning of the site.

In committing to CSBD for a five year period, participants are eligible to receive design and performance incentives, as described below in Table 8.3, to cover the cost of the IDP and design phase as well as pre and post construction phase incentives when deliverables are met.

[28] 25% above the 2012 OBC for building permits dated prior to January 1, 2017.

Table 8. 3 - CBSD Incentive Structure

Project Phase	Incentive	Conditions
Planning/Design: Integrated Design Process ("IDP")	Up to $30,000 value	Includes visioning session and report, preliminary energy model and IDP energy model, IDP session (including logistics, catering, facilitation, and design expert fees), and final IDP session report.
Energy Performance Incentive	$15,000	Available if the pre-construction energy model meets the specified energy performance targets and the participant submits the final design stage plans and specifications.
Commissioning Incentive	$15,000	Provided upon completion of a final as-constructed energy model that demonstrates the building meets the specified energy performance target, along with the final Commissioning Report.

Market Delivery

Union uses a direct sales approach and expert sales team to promote and deliver commercial, industrial, and multi-residential DSM offerings. CSBD will be delivered through the same successful model and can be integrated into existing account management activities. Through regular customer outreach efforts, account managers can promote and educate builders and developers on this new offering and discuss eligibility of any potential upcoming projects.

Account managers can also leverage existing, long-term relationships with municipalities and government entities to create awareness and explore prospective projects these customers are considering or engaged in.

8.1.3 Education and Awareness

Optimum Home

To sustain market transformation, there was significant focus on demand-side efforts in 2015 and 2016 to increase awareness and drive demand for high efficiency homes in the market. This was facilitated through mass-media promotions, industry partnerships and builder forums.

Mass-media promotions

In 2016, mass-media campaigns were launched targeting builders and consumers (new home buyers) in the franchise area to communicate the benefits of high performance / ENERGY STAR® homes.

- Builder Marketing Campaign

A new section was created on the Union Gas website[29] to provide all builders (including those who were not enrolled in the offering) with information on the upcoming Code changes in 2017, the business advantages of building stock to a higher energy standard, key insights into why customers want these homes, and the technologies and construction processes involved in achieving this standard. Part of the content was direct feedback from Optimum Home participants.

To drive builders to the website, Union used traditional and digital media. Full page, colour ads were placed in trade publications, such as Home Builder Magazine and Ontario Home Builder. Animated digital ads (figure 8.0) appeared in the electronic versions of these magazines, available online.

Figure 8.0 - Digital Ad from Online Trade Publication

[29] uniongas.com/highperformancehomes

- Consumer Marketing Campaign

There is a lack of awareness among new homebuyers of the differentiation between a new home built to current Code versus a new home built to a higher standard. To address this gap, Union launched a campaign centered on the message, "All homes are not created equal."

A new section was added to Union's website[30] to create a repository of information where residential customers could find benefits, features and other considerations (i.e. environmental impacts) of choosing a new build high performance home prior to making the purchase decision. Customers could also access additional resources or find a certified ENERGY STAR® New Homes builder.

A highly impactful, animated 'behind the walls' video tour was added on the website to highlight the difference between new homes built to the current OBC and new homes built to a higher energy efficiency standard. It demonstrated how unseen features such as better insulation, heating and cooling, and ventilation, translate into a whole home approach to save energy, lower energy bills, increase comfort, and improve air quality, to name a few benefits.

Online digital media ads, 30 second radio spots, bill inserts, digital ads on e-bills, and a customer brochure (figure 8.1) for builders to include in their marketing packages were all used to drive customers to the new website.

[30] uniongas.com/energystar

Figure 8.1 – Optimum Home Customer Brochure

Industry Partnerships

Union has partnered with the Ontario Home Builders' Association ("OHBA") for several years as part of an ongoing commitment to the builder community. Support from the OHBA provided Union with the ability to enhance market intelligence related to energy efficiency, sustainability and better building in the new housing market. Since 2013, Union has been participating in the OHBA Builder Forums, and has attended various events throughout the year with the OHBA's local chapters.

Builder Forums

An integral part of influencing continued market transformation is disseminating lessons learned and best practices to the entire builder community. Union's outreach program, i.e. builder forums, targeted all builders in the Union building community to educate and inspire them to build high efficiency homes.

In March 2016, four free builder forums were held in Hamilton, Ingersoll, Huntsville and Kingston. More than 50 builders attended that were not part of the Optimum Home offering. Attendees were provided with networking opportunities to meet and learn from other

builders who participated in the Optimum Home offering about advanced technology, best building practices and navigating challenges through the process.

Optimum Home building science experts were also present to help attendees:

- Understand pending Code changes;
- Learn how voluntary programs like ENERGY STAR® helps builders exceed Code in a cost-effective manner; and,
- Learn how to build and market the higher standard / ENERGY STAR® home.

The Builder Forums were promoted by Union account managers contacting and meeting with builders in their territories, through direct mail brochures to all builders (figure 8.2), and through the partnership with OHBA and OHBA's local chapters in the communities where the forums were hosted.

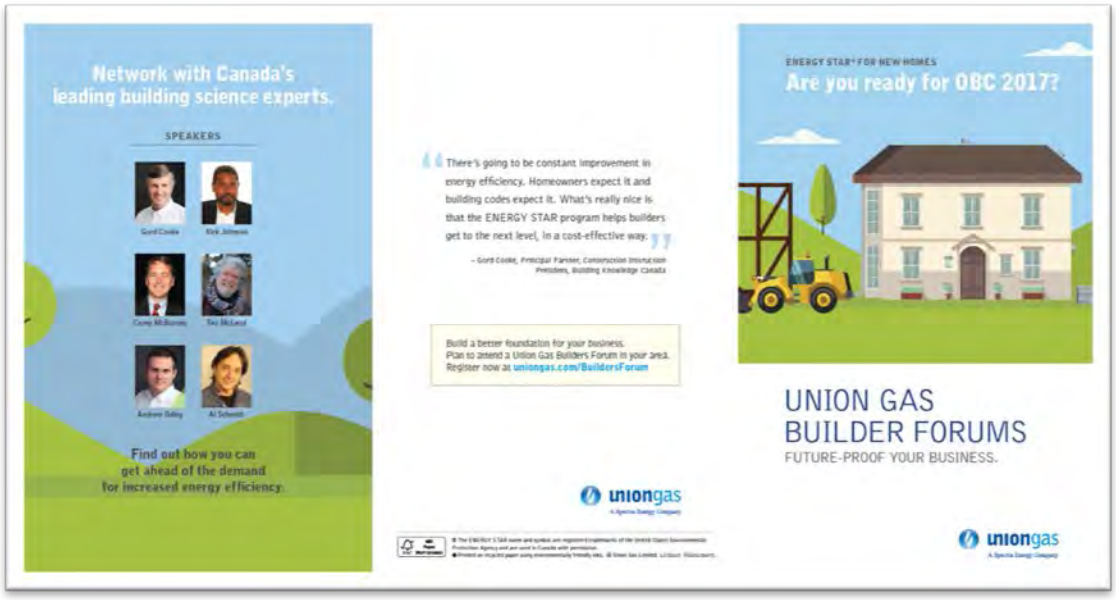

Figure 8.2 - Builder Forum Brochure

CSBD Offering

Since CSBD is a new offering in Union's DSM portfolio and is underpinned by a direct sales approach, initial education and awareness efforts were internally focused on Union's account management teams. A sales training and Q&A session was developed and delivered, with participation from Sustainable Buildings Canada, early in the Fall of 2016.

Along with generating internal awareness, a Savings By Design section was added to Union's website so commercial/industrial customers searching for ways to save on energy or who may have been directed to the website through other mass media campaigns, could learn about the offering and how to apply.

8.1.4 Lessons Learned

Optimum Home

- **Builders value the offering**
  The participating builders found tremendous value from the Optimum Home offering and are very supportive of cascading their learning and experience to other builders in the province. Union recognizes that sharing knowledge and builder experience gained from the offering across the larger builder community is critical in maintaining momentum in transforming the Ontario residential new build market. The builder forums hosted across Union's franchise area were an effective step in achieving this goal. There is an opportunity to further influence the adoption and sustainability of high performance homes by increasing efforts in "telling the builder story"; highlighting the builder journey, key successes and lesson learned to motivate other builders in the franchise area.

- **Strong supply side impact could be enhanced further by increasing demand-side impact**
  Optimum Home results showed that Union has had a tremendous impact on the supply side of the home builder market. Union learned that most participating builders would like more support on the sales and marketing side to drive awareness, interest and demand from home buyers. Enhancing the marketing support and training provided to the builders would help them promote their high performance homes and pursue

strategies to convert the technical improvements into "common speak", making the unseen values apparent and developing advocates for high performance homes.

- **Compliance paths**
  In an attempt to remain label-neutral, the original offering allowed for multiple compliance paths for builders to verify that their homes were built to 20 percent above 2012 OBC. The majority (95 percent) of participating builders chose to build to the ENERGY STAR® New Homes Version 12 requirements. ENERGY STAR® labelling is the most recognizable consumer brand and the preferred compliance path of builders. The future iteration of Optimum Home will simplify the compliance pathways and focus on ENERGY STAR® only.

CSBD

- **To achieve consistency in the market, as envisioned by the Board, Union will need to reach provincial builders/developers**
  Promotion, education, and awareness efforts will need to be extended to reach builders and developers that may be located outside of Union's franchise area but operate province-wide.

  Since Enbridge has been delivering this offering in the market for several years, there may be the opportunity to exploit the familiarity that Toronto-area commercial builders and developers may have of the CSBD offering to identify province-wide project opportunities.

  This is consistent and integrates well into Union's national account management strategy for commercial, industrial and multi-residential customers.

- **CSBD provides the opportunity to increase green building practice awareness and education across the commercial new construction market**
  One of the hallmarks of CSBD is its ability to educate builders, developers and design teams about green building practices. Participants get exclusive access to Canadian green build experts through Sustainable Buildings Canada, a collaborative of industry practitioners committed to actively achieving market transformation outcomes. By

capitalizing on this expertise and knowledge base, leading edge green building options can be considered during the early planning phase of a project, before purchase and design decisions have been finalized. This is the optimal time to influence adoption of building practices and equipment that not only achieve sustainability goals but also improve energy efficiency well above the current OBC standards.

Optimum Home has made great strides both in increasing the number of high efficiency homes built and the consumer demand for these products. Building on the success and lessons learned from the original offering, Optimum Home will be re-launched in 2017 and focus exclusively on building ENERGY STAR® high performance homes. These homes are built 20 percent above 2017 OBC.

With the experience and lessons learned from delivering a market transformation offering for residential new construction, Union is optimistic that it can drive similar success in the commercial new construction market. CSBD launched in December 2016 and will be energetically promoted and supported by Union's expert sales team.

The market transformation offerings are designed with multi-year structures and will continue for the duration of the 2015 - 2020 DSM plan period.

9. Performance-Based Scorecard

The final scorecard used to measure Union's DSM performance is the performance-based scorecard. Performance-based conservation benchmarks a customer's energy use to evaluate energy saving opportunities and then measures on-going savings using an evidence-based approach (e.g. comparing before and after metered billing data).

Union's 2016 performance-based scorecard focused on Participant Metrics from the two offerings, RunSmart and Strategic Energy Management ("SEM").

Table 9.0 presents the results of the performance-based scorecard. Union successfully enrolled the target participants in both offerings and achieved 108 percent of the overall scorecard target. This results in a DSM Shareholder Incentive of $61,844.

Table 9. 0 - 2016 Performance-Based Scorecard Results

Metrics	Metric Target Levels			Weight	Achievement	% of Metric Achieved	Weighted % of Scorecard Achieved
	Lower Band	Target	Upper Band				
RunSmart Participants	21	28	41	50%	32	115%	58%
Strategic Energy Management Participants	2	3	5	50%	3	100%	50%
				Total Scorecard Target Achieved			***108%***
				Scorecard Utility Incentive Achieved			***$61,844***

9.1 Performance-Based Program

Union proposed a distinct performance-based program as part of the 2015-2020 DSM Plan (EB-2015-0029) that included two offerings: RunSmart and SEM. The program was to be measured on a separate scorecard with a dedicated shareholder incentive amount to encourage focus on the success of the program and ensure it was not overshadowed by larger resource acquisition programs. The performance-based program and scorecard were approved in the 2015-2020 DSM Plan Decision for 2016 to 2018.

Table 9.1 breaks down the total program spend into its components.

Table 9. 1 - 2016 Performance-Based Spend

Item		Total
Incentives	$	-
Administration	$	140,948
Evaluation	$	401
Program Costs	$	133,255
Total Performance-Based Spend	**$**	**274,604**

9.1.1 RunSmart Offering

Union's RunSmart offering is focused on optimizing commercial building equipment to operate as efficiently as possible by accelerating energy efficiency practices and identifying low-cost or no cost measures and operational efficiency opportunities.

The enhanced 2016 RunSmart offering is intended to:

- Reach previously untapped commercial markets
- Bring building energy performance back to original design intent
- Increase operational efficiency with a systematic process of identifying and implementing tune-up measures
- Increase customer's awareness and knowledge of energy efficient practices and provide education on how to operate in an energy efficient manner; and
- Generate long term energy savings in commercial facilities.

RunSmart participant savings are evaluated using an evidence-based approach, comparing before and after measured billing data. Upon enrolment into the offering, baseline consumption analysis is conducted. A site walk through is administered by a third party expert at no cost to the customer to identify opportunities to more efficiently use heating equipment and systems in place. Customers must then complete recommended RunSmart actions outlined on a checklist and monitor and maintain these actions over a 12-month time period. Energy savings are based on the new annual consumption for the site compared to the customer's baseline consumption as related to operational improvements outlined in the checklist.

By following the RunSmart checklist and completing recommended actions, customers can receive financial incentives for achieving consumption reductions of five to fifteen percent from the previous year.

Target Market

This offering is directed towards Union's general service mid-size commercial customers, such as offices, multi-family buildings, schools, and hospitals, with an annual consumption in excess of 50,000 m^3.

Additionally, RunSmart specifically targets customers that have not recently implemented energy conservation measures at their site (e.g. non-DSM participants and/or customers who have not participated in the last two years).

Market Incentive

Through this offering, customers gain access, at no charge, to a technical expert who can help identify ways to optimize their facility's energy use. Customers qualify for financial incentives when energy efficient measures are implemented and energy savings are achieved.

The incentive structure, based on measured energy performance improvement, is as follows:

- Between five - ten percent demonstrated savings from baseline consumption → $0.20 per annual m^3 saved.
- Between 10 percent -15 percent demonstrated savings from baseline consumption → $0.25 per annual m^3 saved.
- Over 15 percent demonstrated savings from baseline consumption → $0.30 per annual m^3 saved.

Market Delivery

All of Union's custom project offerings use a direct sales, customer relationship focused approach to market. Union identifies and targets eligible customer participants through account management outreach and direct marketing efforts. A number of promotional tools were used in 2016, such as providing sell sheets/brochures to potential participants (Figure 9.0).

Figure 9.0 - RunSmart Sell Sheet

RunSmart also relies on a third-party expert to complete the site evaluation at each participating customer facility and assist in educating customers on energy efficiency practices.

An essential component of the offering is the RunSmart checklist that helps identify building and operational changes to reduce energy consumption. The technical expert has an electronic fillable form version of the checklist to use during facility walk-throughs with the

customer. Additional resources with detailed instructions for the implementation of each of the recommendations/actions are also provided.

9.1.2 Strategic Energy Management Offering

The second performance-based offering is Strategic Energy Management ("SEM"). SEM is the successor to Union's Integrated Energy Management System offering targeting industrial customers.

SEM participants establish a baseline for existing operations by analyzing current energy performance and then track performance over time while identifying and measuring continuous improvement efforts. Through this offering, Union has the opportunity to actively influence customers to adopt and nurture a culture of conservation and continuous energy improvement.

Customers use their own energy data to analyze historic and current energy performance. This analysis allows participants to set energy baselines and targets with the goal of improving energy efficiency of existing operating procedures. Through SEM customers are able to:

- Recognize energy efficiency opportunities that would otherwise go unnoticed;
- Establish and sustain energy team(s) to champion continuous energy efficiency improvements
- Proactively manage natural gas consumption through real-time measurement and analytical tools
- Systematically track baselines, report energy intensity and establish targets
- Quantify, implement, and validate behaviour and process and/or equipment based energy efficiency improvements; and
- Foster a culture of continuous energy improvement consistent with the principles of ISO 50001.[31]

[31] ISO 50001 is the International Standard's Organization's Energy Management system standard – a framework of requirements for an organization to track, report, and improve the way it uses energy on a continuous improvement cycle.

Similar to RunSmart, energy savings for SEM is based on actual metered data, normalized for weather and production, compared against a baseline energy use. However, SEM is structured as a multi-year program that measures results and progressive savings over five years. Incentives and in-kind technical support are available to customers for start-up evaluation and implementation of a monitoring system. Further incentives are provided for demonstrated energy performance improvements over time.

Reporting is a key requirement of SEM to assess effectiveness of continuous improvement actions. To support this, SEM participants receive incentives to install sub-metering to gather comprehensive energy data. Participating customers are also required to submit annual performance reports detailing continuous improvement opportunities and energy usage for the prior 12-month operating period.

SEM participants receive significant support by Union and a third-party consultant throughout the start-up and implementation phase. All reporting commitments are managed by the third-party technical consultant, at no cost to the customer. This encourages commitment to the program by reducing the administrative burden to the customer and reinforces the continued focus on energy efficiency through regular performance reviews with Union and the third-party expert.

Target Market

Eligible participants:

- Have a minimum annual natural gas usage of 1,000,000 m^3
- Do not currently have an Energy Management System[32] in place; and
- Have not previously participated in Union's integrated energy management system offering.

[32] A system used to track, report and plan continuous improvement energy efficiency activities.

Market Incentive

Incentives are structured to support initial start-up costs in baseline and energy plan development, and provide incentives for measured energy efficiency improvements over a 5-year participation period.

- Year One start-up incentives:
  - Up to $25,000 to support the purchase and installation of sub-metering and data management equipment; and
  - In-kind technical support from Union and a third party expert.

- Year Two baseline incentive:
  - Participants continue to receive technical support as baseline data is being collected and analyzed.

- Years Three to Five fixed performance incentives:
  - Year Three: >= 5 percent savings from baseline → $10,000
  - Year Four: >= 10 percent savings from base line → $15,000
  - Year Five: >= 15 percent savings from base line → $20,000

A minimum of five percent savings from baseline is required to qualify for the performance incentive.

Market Delivery

Union identified eligible participants and delivered the offering directly to industrial customers through account management outreach by Union account managers and Project Managers. A promotional brochure, shown below, was used to introduce the program to customers.

Figure 9.1 - SEM Brochure

After signing a Memorandum-of-Understanding outlining their commitment to the program, participating customers gained access to ongoing energy management expertise through dedicated time with technical experts. A third-party expert works with the customer, along with Union, to provide the following services and benefits:

- Conduct site evaluations
- Define energy metrics and metering requirements
- Aid in the development of a continuous improvement energy management plan
- Complete annual reports to identify demonstrated savings, including details on the customer's improvement opportunities implemented and those planned in the future
- Educate and influence energy saving best practices with customers
- Develop customers' capacity to make energy efficiency decisions; and,
- Promote the investigation and implementation of energy monitoring and tracking.

9.1.3 Education and Awareness

Both RunSmart and SEM strive to change energy efficiency awareness and practices. They encourage customers to look at the energy intensity and use of their facilities and to identify and implement opportunities to ensure that equipment is operating optimally and efficiently.

To achieve this, Union relies on the long-term relationships developed and maintained with commercial and industrial customers through account managers and Project Managers as well as the expertise of the third-party consultants. These technical professionals advocate for the use of best practices and work with customers to actualize these practices based on the unique operating conditions of each customer as demonstrated through the site evaluations.

In addition to account management outreach, Union leverages education and awareness activities undertaken for all CI customers to promote RunSmart and SEM. Information on CI education and awareness activities can be found in Section 5.2.4.

9.1.4 Lessons Learned

RunSmart Offering

- ***Increased awareness is needed***
  Since this is the first year of the enhanced RunSmart offering, there is low awareness of the benefits of the offering and incentives available. To address this, Union is rolling out additional promotions in markets where the offering has not been received.

- ***Baseline eligibility and rules were unclear***
  The definition of static baseline was initially being interpreted as either "no Union DSM activities" *or* "no energy savings project implemented" in the past two years. This was confusing and deterring potential participants. Union has clarified that static baseline is only "no Union funded DSM in the last two years" and is communicating this to CI customers.

- ***Process improvements will improve program delivery and customer experience***
  In 2016, account managers, project managers, technical consultants and members of the Commercial/Industrial Energy Efficiency Programs team were all interacting with customers. This was inefficient and becoming burdensome to customers. Union is

working on streamlining the delivery model to simplify administration and communication channels.

Strategic Energy Management Offering

- ***Customer capital restraints are a barrier for participation***
  Some customers do not have the capital to invest in an energy management offering where the return on investment is not tangible upfront. The long-term nature of performance-based programs and commitment to a continuous improvement philosophy can deter customer participation. Union is actively addressing this barrier by using historical data, gate meter and statistical analysis to quantify the potential savings and help customers build the business case for the investment. Union will continue to monitor the impact of this barrier and propose modifications, as required.

- ***Technical consultants need to be knowledgeable and flexible***
  Consultants must be knowledgeable and adaptive when determining energy use measuring requirements in a wide variety of facilities. Identifying recommended actions, adjustments or projects to implement from the results of a site evaluation requires a high degree of expertise. Flexibility to accommodate scheduling with the customer is also essential. These qualities will be of utmost importance when considering consultants and service providers for RunSmart and SEM going forward.

- ***Customer facility size is a challenge***
  The size of a customer's facility can be a challenge due to the possible number of natural gas end uses. Measuring all of the end uses of energy in a facility can be difficult, time consuming and costly. Union will also continue to monitor the impact of this issue and propose modifications, as required.

Union looks forward to seeing actions undertaken by participants in the first year of these offerings translate into measurable savings and successes for customers. Through RunSmart and SEM, Union will continue to encourage customers to adopt a continuous improvement philosophy and to foster an organization-wide energy efficiency culture. The performance-based offerings are designed with multi-year structures and will continue for the duration of the 2015 - 2020 DSM plan period.

10. DSM Shareholder Incentive

Union earns a shareholder incentive based on its performance against targets outlined on the resource acquisition, low-income, large volume, market transformation, and performance-based scorecards.

The DSM shareholder incentive is intended to "*effectively motivate the gas utilities to both actively and efficiently pursue DSM savings and to recognize exemplary performance.*"[33]

The total annual maximum incentive available is $10.45M and is allocated based on the combined program budgets for each scorecard.

The 2016 scorecard results and corresponding DSM Shareholder Incentive earned are presented in Tables 10.0, 10.1, 10.2, and 10.3 below.

Table 10. 0 - 2016 Results - Resource Acquisition Scorecard

Metrics	Metric Target Levels			Weight	Achievement	% of Metric Achieved	Weighted % of Scorecard Achieved
	Lower Band	Target	Upper Band				
Cumulative Natural Gas Savings (m3)	840,194,699	1,120,259,599	1,680,389,398	75%	814,757,886	73%	55%
Home Reno Rebate Participants (Homes)	2,475	3,300	4,950	25%	6,595	200%	50%
					Total Scorecard Target Achieved		***105%***
					Scorecard Utility Incentive Achieved		***$2,907,230***

[33] Report of the Board: DSM Framework for Natural Gas Distributors (2015-2020), EB-2014-0134, p. 20.

Table 10. 1 - 2016 Results - Low-Income Scorecard

Metrics	Metric Target Levels			Weight	Achievement	% of Metric Achieved	Weighted % of Scorecard Achieved
	Lower Band	Target	Upper Band				
Single Family Cumulative Natural Gas Savings (m^3)	28,339,761	37,786,348	56,679,522	60%	45,783,307	121%	73%
Social and Assisted Multi-Family Cumulative Natural Gas Savings (m^3)	13,836,358	18,448,477	27,672,716	35%	10,894,573	59%	21%
Market Rate Multi-Family Cumulative Natural Gas Savings (m^3)	2,252,430	3,003,240	4,504,860	5%	8,151,190	200%	10%
					Total Scorecard Target Achieved		***103%***
					Scorecard Utility Incentive Achieved		***$1,151,656***

Table 10. 2 - 2016 Results - Large Volume Scorecard

Metrics	Metric Target Levels			Weight	Achievement	% of Metric Achieved	Weighted % of Scorecard Achieved
	Lower Band	Target	Upper Band				
Cumulative Natural Gas Savings (m^3)	668,168,041	890,890,721	1,336,336,082	100%	79,848,302	9%	9%
					Total Scorecard Target Achieved		***9%***
					Scorecard Utility Incentive Achieved		***$0***

Table 10. 3 - 2016 Results - Market Transformation Scorecard

Metrics	Metric Target Levels			Weight	Achievement	% of Metric Achieved	Weighted % of Scorecard Achieved
	Lower Band	Target	Upper Band				
Optimum Home: Homes Built (>20% above OBC 2012) by Participating Builders	53%	70%	100%	50%	70.09%	100%	50%
Commercial New Construction: New Developments Enrolled by Participating Builders	6	8	12	50%	0	0%	0%
					Total Scorecard Target Achieved		***50%***
					Scorecard Utility Incentive Achieved		***$0***

Table 10. 4 - 2016 Performance-Based Scorecard Results

Metrics	Metric Target Levels			Weight	Achievement	% of Metric Achieved	Weighted % of Scorecard Achieved
	Lower Band	Target	Upper Band				
RunSmart Participants	21	28	41	50%	32	115%	58%
Strategic Energy Management Participants	2	3	5	50%	3	100%	50%
				Total Scorecard Target Achieved			***108%***
				Scorecard Utility Incentive Achieved			***$61,844***

Union achieved a total of $4.121M in DSM Shareholder Incentive as a result of its program performance results in 2016, as shown in Table 10.4.

Table 10. 5 - Summary of 2016 DSM Shareholder Incentive Achieved

Scorecard	DSM Shareholder Incentive Achieved	
Resource Acquisition	$	2,907,230
Low-Income	$	1,151,656
Large Volume	$	-
Market Transformation	$	-
Performance-Based	$	61,844
Total	**$**	**4,120,731**

11. 2016 Budget and Program Spend

Union's total approved 2016 DSM Budget was $56.821M, with a program budget of $45.586M. As outlined in Table 11.0, total DSM portfolio spending in 2016 was $47.844M with program spending amounting to $42.255M.

11.1 Demand Side Management Variance Account ("DSMVA")

Union is able to spend and recover up to an additional 15 percent of the approved annual DSM budget on incremental program expenses once a 100 percent weighted scorecard target is achieved on a pre-audited basis.

The DSMVA tracks the difference between actual DSM spending versus the budgeted amount included in rates. If spending is less than what was built into rates, ratepayers will be reimbursed. If more is spent than was built into rates, Union will recover the excess through the deferral disposition proceeding following the completion of the annual audit.

As shown in Table 11.0, the 2016 DSMVA amount to be refunded to rate payers is $6.156 M.

DSMVA Adjustment - DSM Tracking & Reporting System Upgrades

As part of Union's 2015-2020 DSM Plan (EB-2015-0029), Union requested a total of six million dollars for DSM tracking & reporting system upgrades (one million in 2015 and five million in 2016). In the Board's 2015-2020 DSM Plan Decision, the six million dollars was approved as requested for the system upgrade.

In 2016, Union spent approximately two million towards system upgrades compared to five million included in 2016 rates, resulting in an underspend of three million. Union proposes not to return the 2016 underspend of three million to ratepayers through the DSMVA since the balance of these funds has been spent in proceeding years. Rather, Union has adjusted the 2016 DSMVA balance to reflect the best information available at the conclusion of the 2016 audit (i.e. October 2018), including costs incurred in 2017 and 2018. The tracking system upgrades were completed in early 2018 and Union spent $4.863M from 2016 to 2018 to do so. This results in a refund of $0.137M to ratepayers.

Table 11. 0 - Summary of 2016 Budget and Spending

	2016 Spend	2016 Budget	Variance	Budget Transfers	DSMVA
	A	B	C=A-B	D	E=C-D
Program Budget					
Resource Acquisition Scorecard					
Residential Program	$10,199,498	$ 8,052,657	$ 2,146,841		$ 2,146,841
Residential Evaluation	$ 1,001,900	$ 559,000	$ 442,900	$ 442,900	$ 0
Commercial/Industrial Program	$ 16,263,967	$ 19,127,176	$ (2,863,209)	$ 222,246	$ (2,863,209)
Commercial/Industrial Evaluation	$ 120,578	$ 189,000	$ (68,422)	$ (68,422)	$ 0
Low-Income Scorecard					
Low-Income Program	$10,238,880	$ 11,187,342	$ (948,462)		$ (948,462)
Low-Income Evaluation	$ 161,733	$ 220,128	$ (58,395)	$ (58,395)	$ 0
Large Volume Scorecard					
Large Volume Program	$2,951,494	$ 3,937,000	$ (985,506)		$ (985,506)
Large Volume Evaluation	$ 37,682	$ 63,000	$ (25,318)	$ (25,318)	$ 0
Market Transformation Scorecard					
Market Transformation Program	$ 996,760	$ 1,676,250	$ (679,490)	$ 59,717	$ (739,207)
Market Transformation Evaluation	$ 7,933	$ 26,820	$ (18,887)	$ (78,604)	$ 59,717
Performance-Based Scorecard					
Performance- Based Program	$ 274,203	$ 513,000	$ (238,797)		$ (238,797)
Performance-Based Evaluation	$ 401	$ 35,000	$ (34,599)	$ (34,599)	$ (0)
Programs Sub-total	$42,255,026	$ 45,586,373	$ (3,331,347)	$ 237,279	$ (3,568,626)
Portfolio Budget					
Research	$ 517,567	$ 1,500,000	$ (982,433)		$ (982,433)
Evaluation	$ 168,121	$ 1,300,000	$ (1,131,879)	$ (237,279)	$ (894,600)
Administration	$2,364,580	$ 2,935,000	$ (570,420)		$ (570,420)
Pilots	$ 183,200	$ 500,000	$ (316,800)		$ (316,800)
DSM Tracking and Reporting System Upgrades	$2,041,209	$ 5,000,000	$ (2,958,791)		$ (2,958,791)
Portfolio Sub-total	$5,274,676	$ 11,235,000	$ (5,960,324)	$ (237,279)	$ (5,723,045)
Incremental DSM Projects 2016 Budget Spend					
Achievable Potential Study	$ 267,199		$ 267,199		$ 267,199
Future Infrastructure Planning Study	$ 46,946		$ 46,946		$ 46,946
Total 2016 DSM Budget (before Adjustments)	$47,843,847	$ 56,821,373	$ (8,977,526)	$ 0	$ (8,977,526)
Adjustments[1]					
DSM Tracking and Reporting System Upgrades 2016 Variance – to be spent in 2017 and 2018	$ (2,041,209)	$ (5,000,000)	$ (2,958,791)		$ (2,958,791)
Remaining DSM Tracking and Reporting System Upgrades spend in 2017 and 2018	$ (2,821,803)	$ (2,958,791)	$ 136,988		$ 136,988
Total 2016 DSMVA					$ (6,155,723)

[1] Given the timing of the finalization of 2016 audit, the DSMVA has been adjusted to reflect best available information with regards to tracking and reporting system upgrades.

11.2 Cost-Efficiency Initiative

The DSM guidelines established a Cost-Efficiency Incentive that allows budget amounts to be carried over and used in the following year if the total aggregate annual lifetime natural gas savings targets are met in a given year based on evaluated results. The Cost-Efficiency Incentive Deferral Account tracks the differences between the annual approved DSM budget and the actual amount spent to achieve the 100 percent targets across all programs.

Union did not meet the eligibility requirements to use this incentive in 2016.

12. Lost Revenue Adjustment Mechanism ("LRAM")

The Board-approved Lost Revenue Adjustment Mechanism Variance allows Union to recover the lost distribution revenues associated with DSM activity.

The LRAM Variance Account ("LRAMVA") is used to track, at the rate class level, the actual impact of DSM activities compared to the forecasted impact included in distribution rates.

Union's LRAMVA captures lost volumes for the contract rate classes only, as established in the 2014-2018 Incentive Regulation Application, Evidence and Settlement Agreement (EB-2013-0202).

For 2016, the LRAMVA amount of $0.182M is based on 2016 delivery rates, the Joint Input Assumption Filing EB-2016-0246, filed December 21, 2016, and net annual natural gas savings of 16.797 million 10^3m^3. The 2016 LRAMVA statement is detailed in Table 12.0 on the following page.

Table 12. 0 - 2016 LRAMVA Statement

Rate class	DSM Volumes (10^3 m^3)												Total Volumes (10^3 m^3)	2016 Delivery Rates ($/$10^3$ m^3)	Revenue Impact
	Jan	Feb	March	Apr	May	June	July	Aug	Sep	Oct	Nov	Dec	(a)	(b)	(a) x (b)
South															
M4 Industrial	1,547	104	647	602	17	46	314	70	75	220	130	98	3,870	11.571	$44,781
M5 Industrial	1,013	338	1,426	1,269	78	79	186	-	20	-	185	17	4,611	25.638	$118,225
M7 Industrial	294	654	837	84	2	281	196	355	741	190	7	282	3,923	3.525	$13,830
T1 Industrial	53	-	64	142	161	-	0	-	237	176	57	77	968	0.760	$736
T2 Industrial	31	-	89	256	320	1,002	-	183	30	608	151	2	2,669	0.082	$219
South Total	**2,938**	**1,096**	**3,063**	**2,354**	**579**	**1,408**	**697**	**608**	**1,103**	**1,194**	**529**	**476**	**16,043**		**$177,791**
North															
20 Industrial	556	-	15	-	-	-	-	18	19	52	6	0	665	5.548	$3,691
100 Industrial	6	-	19	14	10	2	14	-	-	13	11	-	89	2.235	$199
North Total	**561**	**-**	**34**	**14**	**10**	**2**	**14**	**18**	**19**	**65**	**17**	**0**	**754**		$ 3,890
Total	**3,499**	**1,096**	**3,097**	**2,368**	**588**	**1,410**	**711**	**626**	**1,121**	**1,258**	**546**	**476**	**16,797**		**$181,681**

13. Conclusions and Next Steps

Union provides balanced energy solutions that help customers save money and create a sustainable energy future through innovation, partnerships, energy savings programs and actions.

In 2016, DSM programs generated 959 million m^3 of cumulative natural gas savings with solid program performance noted particularly within the resource acquisition and low-income scorecards. Several enhancements were made to existing offerings and new offerings were launched or in the design phase based on the direction of the Board in its 2015-2020 DSM Plan Decision. This section presents a breakdown of 2016 DSM impacts by rate class and highlights major modifications to programming for 2017, as well as showing the methodology to be followed in setting 2017 scorecard targets.

13.1 DSM Rate Class Allocation from 2016 Results

Table 13.0 illustrates the allocation to rate classes of the DSM Variance Account amounts resulting from 2016 DSM programming.

Table 13. 0 - Rate Class Allocation of 2016 DSM Variance Account Amounts

Line No.	Rate Class	DSMIDA	DSMVA	LRAMVA
	South			
1	M1	$ 2,020,574	$ 2,594,963	NA
2	M2	$ 706,006	$ (2,875,780)	NA
3	M4	$ 306,562	$ 338,131	$ 44,781
4	M5	$ 187,060	$ (99,876)	$ 118,225
5	M7	$ 313,361	$ 1,405,607	$ 13,830
6	T1	$ 105,541	$ (284,262)	$ 736
7	T2	$ -	$ (14,123)	$ 219
8		**$ 3,639,104**	**$ 1,064,660**	**$ 177,791**
	North			
9	Rate 01	$ 336,435	$ (3,223,146)	NA
10	Rate 10	$ 96,305	$ (1,377,623)	NA
11	Rate 20	$ 48,887	$ (1,096,374)	$ 3,691
12	Rate 100	$ -	$ (1,523,240)	$ 199
13		**$ 481,627**	**$ (7,220,383)**	**$ 3,890**
14	**Total**	**$ 4,120,731**	**$ (6,155,723)**	**$ 181,681**

13.2 Next Steps - DSM in 2017

Union will continue offering DSM programming in 2017 based on its Board-approved 2015-2020 DSM Plan (EB-2015-0029), with adjustments and refinements resulting from lessons learned in 2016. The enhanced DSM portfolio going into 2017 provides a comprehensive set of programs and offerings to meet the needs of customers while fulfilling the Board's key priorities and guiding principles outlined in the framework.

Major planned modifications for each offering are outlined in Table 13.1.

Table 13. 1 - Planned activities and modifications in 2017

Program / Program Offerings	Planned Modifications in 2017
Residential Program	
• **Home Reno Rebate Offering**	• Offering will be enhanced further by IESO's whole home pilot program collaboration.
Commercial/Industrial Program	
• **Commercial/Industrial Prescriptive Offering** • **Commercial/Industrial Direct Install Offering** • **Commercial/Industrial Custom Offering**	• Continue as planned with refinements resulting from 2016 lessons learned. • Direct Install Offering will be launched in 2017. • Continue as planned with refinements resulting from 2016 lessons learned.
Low-Income Program	
• **Home Weatherization Offering** • **Furnace End-of-Life Upgrade Offering** • **Indigenous Offering** • **Multi-Family Offering**	• Continue as planned with refinements resulting from 2016 lessons learned. • Offering will be expanded to the private market. • Indigenous Offering will be launched in 2017. • Installation of in-suite basic measures has been discontinued as of the end of 2016.
Large Volume Program	
• **Large Volume Direct Access Offering**	• Continue as planned with refinements resulting from 2016 lessons learned.
Market Transformation Program	
• **Optimum Home Offering** • **Commercial Savings By Design Offering**	• New Optimum Home offering to be launched in 2017. • Launched at the end of 2016, continue roll out.
Performance-Based Program	
• **RunSmart Offering** • **Strategic Energy Management Offering**	• Continue as planned with refinements resulting from 2016 lessons learned.

In addition to offering modifications, 2017 market transformation and performance-based scorecards will have new performance metrics. The 2017 scorecards are discussed below.

13.3 2017 Scorecards

The 2017 scorecard targets are established formulaically based on the previous year's final DSM audit. Table 13.2 to Table 13.6 presents the 2017 scorecards that have been calculated based on the audited 2016 performance and updated input assumptions and net-to-gross factors resulting from that annual evaluation process. The calculation methodology of scorecards can be found in Schedule C of the Board's 2015-2020 DSM Plan Decision.

Table 13. 2 - 2017 Resource Acquisition Scorecard

Metrics	Metric Target Levels			Weight
	Lower Band	Target	Upper Band	
Cumulative Natural Gas Savings (m3)	754,211,082	1,005,614,776	1,508,422,163	75%
Home Reno Rebate Participants (Homes)	5,145	6,859	10,289	25%

Table 13. 3 - 2017 Low-Income Scorecard

Metrics	Metric Target Levels			Weight
	Lower Band	Target	Upper Band	
Single Family Cumulative Natural Gas Savings (m^3)	33,776,883	45,035,844	67,553,765	60%
Social and Assisted Multi-Family Cumulative Natural Gas Savings (m^3)	15,839,979	21,119,972	31,679,958	35%
Market Rate Multi-Family Cumulative Natural Gas Savings (m^3)	11,851,284	15,801,711	23,702,567	5%

The 2017 large volume and market transformation scorecard methodology were outlined in Schedule C of the revised 2015-2020 DSM Plan Decision, dated February 24, 2016.

Table 13. 4 - 2017 Large Volume Scorecard

Metrics	Metric Target Levels			Weight
	Lower Band	Target	Upper Band	
Cumulative Natural Gas Savings (m3)	347,662,404	463,549,872	695,324,808	100%

Table 13. 5 - 2017 Market Transformation Scorecard

Metrics	Metric Target Levels			Weight
	Lower Band	Target	Upper Band	
Optimum Home: Participating Builders (Regional Top 10)	8	10	15	20%
Optimum Home: Prototype Homes Built	22.5%	30%	45%	30%
Commercial New Construction: New Developments Enrolled by Participating Builders	6	8	12	50%

Table 13. 6 - 2017 Performance-Based Scorecard

Metrics	Metric Target Levels			Weight
	Lower Band	Target	Upper Band	
RunSmart Participants	57	76	113	20%
RunSmart Savings	7.5%	10%	15%	60%
Strategic Energy Management (SEM) Participants	24	32	48	20%

Appendix A Input Assumptions

The prescriptive input assumptions used to calculate the 2016 DSM scorecard targets and results can be found under Technical Reference Manual / Application and Decisions – Union Gas Limited & Enbridge Gas Distribution Inc. (Joint Filing) – Input Assumptions, Measures & Assumptions Updates, EB-2015-0344, on the OEB website. Prescriptive input assumptions used for LRAM are EB-2016-0246.

https://www.oeb.ca/industry/policy-initiatives-and-consultations/natural-gas-demand-side-management-dsm

Custom NTG factors and results of the 2015 EM&V process can be found on a dedicated DSM Evaluation webpage, also on the OEB site.

https://www.oeb.ca/industry/policy-initiatives-and-consultations/natural-gas-demand-side-management-dsm-evaluation

Appendix B 2016 Avoided Costs

The avoided costs used for the determination of 2016 TRC results are included below for reference.

The inflation rate used is 1.68 percent. The discount factor is 5.75 percent.

Gas Avoided Costs						
	Residential and Commercial				Industrial	
	Baseload ($/m^3)		Weather Sensitive ($/m^3)		Baseload ($/m^3)	
	Rate	NPV	Rate	NPV	Rate	NPV
1	0.20358	0.20358	0.24572	0.24572	0.20311	0.20311
2	0.20317	0.39571	0.24484	0.47725	0.19992	0.39217
3	0.21426	0.58732	0.25674	0.70685	0.21116	0.58100
4	0.23844	0.78896	0.28175	0.94511	0.23587	0.78047
5	0.25692	0.99442	0.30107	1.18587	0.25469	0.98415
6	0.25546	1.18761	0.30047	1.41310	0.25299	1.17547
7	0.25857	1.37252	0.30447	1.63083	0.25599	1.35853
8	0.27615	1.55927	0.32294	1.84922	0.27388	1.54375
9	0.26598	1.72937	0.31368	2.04983	0.26318	1.71205
10	0.28164	1.89969	0.33028	2.24956	0.27910	1.88084
11	0.28364	2.06190	0.33322	2.44012	0.28092	2.04149
12	0.30588	2.22733	0.35642	2.63288	0.30360	2.20568
13	0.30919	2.38545	0.36073	2.81736	0.30677	2.36257
14	0.33200	2.54602	0.38453	3.00333	0.33003	2.52218
15	0.33500	2.69922	0.38856	3.18103	0.33287	2.67441
16	0.34032	2.84640	0.39493	3.35183	0.33810	2.82064
17	0.34716	2.98838	0.40284	3.51659	0.34489	2.96169
18	0.36100	3.12800	0.41776	3.67816	0.35888	3.10048
19	0.37068	3.26357	0.42855	3.83489	0.36859	3.23529
20	0.38563	3.39694	0.44463	3.98867	0.38371	3.36799
21	0.39665	3.52666	0.45681	4.13807	0.39479	3.49711
22	0.40800	3.65285	0.46933	4.28323	0.40620	3.62274
23	0.41968	3.77559	0.48221	4.42426	0.41794	3.74498
24	0.43170	3.89499	0.49546	4.56129	0.43003	3.86391
25	0.44408	4.01114	0.50908	4.69444	0.44247	3.97964
26	0.45681	4.12412	0.52308	4.82381	0.45528	4.09224
27	0.46992	4.23403	0.53748	4.94952	0.46846	4.20181
28	0.48341	4.34095	0.55229	5.07168	0.48204	4.30843
29	0.49729	4.44496	0.56752	5.19038	0.49601	4.41217
30	0.51158	4.54615	0.58319	5.30573	0.51040	4.51312

Water and Electricity Avoided Costs				
	Residential/Commercial/Industrial			
	Water ($/m^3)		Electricity ($/kWh)	
	Rate	NPV	Rate	NPV
1	0.57778	0.57778	0.11470	0.11470
2	0.58749	1.13334	0.11663	0.22499
3	0.59736	1.66753	0.11859	0.33103
4	0.60739	2.18118	0.12058	0.43300
5	0.61760	2.67507	0.12260	0.53104
6	0.62797	3.14997	0.12466	0.62532
7	0.63852	3.60660	0.12676	0.71597
8	0.64925	4.04566	0.12889	0.80313
9	0.66016	4.46784	0.13105	0.88694
10	0.67125	4.87379	0.13325	0.96752
11	0.68253	5.26411	0.13549	1.04501
12	0.69399	5.63943	0.13777	1.11952
13	0.70565	6.00031	0.14008	1.19116
14	0.71751	6.34731	0.14244	1.26004
15	0.72956	6.68097	0.14483	1.32628
16	0.74182	7.00179	0.14726	1.38997
17	0.75428	7.31027	0.14974	1.45120
18	0.76695	7.60689	0.15225	1.51009
19	0.77984	7.89210	0.15481	1.56671
20	0.79294	8.16634	0.15741	1.62115
21	0.80626	8.43003	0.16006	1.67349
22	0.81980	8.68358	0.16274	1.72383
23	0.83358	8.92738	0.16548	1.77223
24	0.84758	9.16180	0.16826	1.81876
25	0.86182	9.38721	0.17109	1.86351
26	0.87630	9.60394	0.17396	1.90653
27	0.89102	9.81234	0.17688	1.94790
28	0.90599	10.01273	0.17985	1.98768
29	0.92121	10.20541	0.18287	2.02593
30	0.93669	10.39067	0.18595	2.06271

Union Gas Limited

Summary Responses to the 2016 Natural Gas Demand Side Management Annual Verification Recommendations

November 30, 2018

The Evaluation Contractor ("EC") submitted its 2016 Natural Gas Demand Side Management Annual Verification report to the Evaluation Advisory Committee ("EAC") on October 30, 2018. Its report included findings and recommendations addressed to Union, Enbridge and on future evaluation work. This summary document provides responses to EC recommendations that were addressed to Union. All tables and sections labeled as a Finding, Recommendation or Outcome are copied verbatim from the EC's 2016 Verification Report. External references mentioned within these sections refer to content within the EC's Verification report.

Union has maintained its strong commitment to accurate energy savings estimates and program results and this is reflected in the EC's overall audit conclusions. For example, the EC's Final Custom Project Savings Verification ("CPSV") report states that Union generally produced solid engineering estimates of savings that are not systematically biased and that many of the changes identified by the EC are driven by changes in operating conditions that are often difficult to anticipate. Union notes that the EC's use of the word "finding" does not refer to a contravention against the DSM guidelines. Rather, findings are more akin to areas for consideration moving forward.

Findings, recommendations and outcomes below are as reported in Section 5 of the EC's report and are broken into three main categories with associated sub-categories as follows:

2015 annual verification recommendations

- Overall annual verification
- Whole home simulation modeling
- Cost-effectiveness recommendations

CPSV recommendations

- Energy savings and program performance
- Verification process
- Documentation and support
- Data management

Measure Life Study Recommendations

- Updates to Measure Lives
- Future Research
- Updates to Custom Measure Life Table

1. 2015 Annual Verification Recommendations

This section presents finding, recommendations and responses for three sub-categories:

- Overall annual verification
- Whole home simulation modeling
- Cost-effectiveness recommendations

1.1 Overall annual verification

Table 1. Overall annual verification - summary of recommendations[1]

#	Finding	Recommendation	Recommended in 2015	Applies to 2016			Primary Outcome		
				Union	Enbridge	Evaluation	Reduce Costs	Improve Accuracy	Decrease Risk
O1	The Enbridge tracking file does not currently include information that allows the evaluator to identify all the projects installed by a single customer.	A: Consider investing in a relational program tracking database.	✓	✓	✓		✓	✓	✓
		B: Enbridge should include site-level information for all measures installed through the program.	✓		✓			✓	✓
O2	The format of Enbridge's tracking data is not well suited to a combined evaluation with the Union data.	A: Enbridge should deliver tracking data in a single flat file.	✓		✓		✓	✓	✓
		B: Consider investing in a relational program tracking database.	✓	✓	✓		✓	✓	✓
O3	Neither Union nor Enbridge tracking databases currently use prescriptive measure descriptions that map directly to the approved energy savings spreadsheet (TRM).	A: Develop, maintain, and use an electronic summary spreadsheet of the TRM.	✓	✓	✓	✓	✓	✓	✓
		B: Once the electronic TRM spreadsheet is developed, track prescriptive savings using unique measure descriptions that map to electronic TRM.	✓	✓	✓	✓	✓	✓	✓
		C: Once the electronic TRM		✓	✓	✓	✓	✓	✓

[1] 2016 Natural Gas DSM Annual Verification Report Table 56

		spreadsheet is developed, utilize the same electronic TRM for both utilities							
		D: OEB: develop means for consistent system				✓	✓	✓	✓
O4	Different TRMs were used by utilities for savings calculations.	A: Explicitly agree to the TRM version to utilize for measure-inputs		✓	✓	✓	✓	✓	✓
		B: Use the same TRM version for both utilities for each program year		✓	✓	✓	✓	✓	✓
O5	DNV GL and other EAC members were sometimes confused about appropriate sources and the definition of terms.	A: Evaluation Contractor: distribute to the EAC a list of the anticipated sources at the start of the verification process, possibly within the scope of work, for review and verification.				✓	✓		✓
		B: Evaluation Contractor: distribute to the EAC a glossary of terms at the start of the verification process, possibly within the scope of work, for review and verification.				✓	✓		✓
O6	Explicit documentation was not available for all program stages, specifically for non-savings metrics	A: Document each required element and stage for non-savings metrics.		✓	✓	✓	✓		✓

O1. Finding: The Enbridge tracking file does not currently include information that allows the evaluator to identify all the projects installed by a single customer.

Recommendation A: Both utilities should strongly consider investing in relational program tracking databases. Relational program tracking databases and customer relationship management (CRM) systems allow for multiple measures and projects to be associated with a single customer and/or customer site. The incremental cost of implementation is low if it is part of the initial database design, populated as projects are started, and updated once they are complete.

Outcome: Reduced burden on utility staff and reduced evaluation costs. A relational database would streamline aggregation of program data for scorecards and make providing data simpler for annual savings evaluation and verification.

UNION RESPONSE: As detailed in its 2015-2020 DSM Plan, Union outlined the need for a DSM

tracking and reporting system upgrade. The Board approved this request in its January 20th, 2016 Decision. This system upgrade was rolled out in 2018.

Recommendation B: Enbridge should include a unique site-level or customer-level identifier for every measure installed in the program to allow the evaluator to identify all projects installed at a single customer, regardless of program.

Outcome: Confirmation that each installation is unique and assessment of interactive effects.

UNION RESPONSE: This recommendation was directed to Enbridge only.

O2. Finding: The format of Enbridge's tracking data is not well suited to a combined evaluation with the Union data, meaning that the format requires a significant investment of time to extract the necessary data for verifying each program's savings. In addition to increased time and thus verification cost, the need for manual extraction of data introduces many opportunities for error, which potentially decreases savings accuracy and increases risk.

Recommendation A: Deliver to evaluators a single, flat file of tracking data.[2] Each record should have measure-level information which includes the information listed below:

- Program identification information, such as scorecard, and program name
- Customer identification information, such as a unique customer ID, rate class, and location
- Measure identification information, such as measure description, unique measure identification, measure group, measure life, free rider rate, and savings per unit for prescriptive measures
- Savings information, such as annual gross and net savings, cumulative gross and net savings, and non-gas savings
- Additional information as needed to allow the evaluator to verify lost revenue and cost-effectiveness

A "verification ready" flat file would not require summary rows, hidden rows or columns, links or formulas but would include all necessary variables in a single tab or table for all projects and measures, regardless of type.

Outcome: Reduced burden on program staff, more flexibility for evaluators.

[2] In this context, a flat file is a table with one record per line and no summary information.

UNION RESPONSE: This recommendation was directed to Enbridge only.

Recommendation B: See recommendation O1A. The utilities should consider investing in a new database.

Outcome: Reduced burden on utility staff and reduced evaluation costs.

UNION RESPONSE: See Union's response to recommendation O1A.

O3. Finding: Neither Union nor Enbridge tracking databases currently use prescriptive measure descriptions that map directly to the approved energy savings spreadsheet (TRM). The EC does note that Enbridge did provide a tab within the excel Tracking File that provided a summary of their prescriptive offers and the savings values associated with these and that Union provided a mapping of Union names to TRM terms. However, these offer names do not consistently match the values described within the TRMs. The EC often struggled to align tracking measures to the correct TRM measure, resulting in increased effort and time in identifying intended TRM measures and repeated back-and-forth between evaluation and the utilities for clarification.

Recommendation A: Develop, maintain, and use an electronic summary of the TRM, such as an Excel file. Each measure (identified as a unique savings value) should have an assigned measure ID number, and new ID numbers should be assigned when a measure is updated with a new savings value. This allows for a historical record of the changes in the TRM and allows the evaluation to identify outdated values. Once developed or agreed to, both utilities should utilize this system for simplification and transparency.

Recommendation B: Once the electronic TRM is developed, track prescriptive savings using unique measure descriptions that clearly map to the electronic TRM.

Recommendation C: Once the electronic TRM is developed, utilize the same electronic summary file for both utilities.

Recommendation D: As the entity with primary ownership of the TRM, the OEB should develop the references for parties to directly refer to specific measures in a consistent way which accounts for variations in energy savings due to capacity or other characteristics.

Outcome: Reduced burden on utility staff and reduced evaluation costs. Fewer errors in the tracking data.

UNION RESPONSE: OEB Staff now coordinates the TRM update process.[3] These recommendations should be directed to OEB Staff. However, Union notes that in 2016 it provided the EC with a detailed electronic mapping of prescriptive measures. This mapping connected measure names in Union's tracking database with the correct subdoc, and noted which input assumption filing the subdocs can be found, including the page number.

A direct one-to-one naming of measures from the TRM to Union's tracking database is not possible in certain cases. For example, a measure offered within two different programs that have different incentive structures (e.g. CI Prescriptive and Low-Income Prescriptive) might refer back to the same subdoc but would require two different names within Union's database.

In 2016, the EC did not find any errors in the Union tracking database related to incorrect mapping of prescriptive measures to the correct subdoc.

O4. Finding: Mid-way through the evaluation and verification process, it was noted that utilities were using different TRMs for reference for savings values. The general rule for use of the best available information, while generally good, does allow for ambiguity. In this instance, the ambiguity created a need for additional verification processes, with new savings values for Union Gas.

Recommendation A: Explicitly state which TRM version applies to the annual savings calculations for savings calculations for both Scorecard/DSM shareholder incentive calculations as well as lost revenue calculations. This explicit agreement on the appropriate TRM should be made prior to the start of the verification cycle, at the very latest.

Recommendation B: Use the same TRM version for both utilities for each program year.

Outcome: Reduced evaluation costs. Decreased risk to utilities that savings estimates are incorrect due to use of "incorrect" TRM, improved savings accuracy.

UNION RESPONSE: Union used the Board-approved prescriptive input assumptions available at the time when setting its 2016 targets, and consistent with the framework, also used those same input assumptions when calculating draft results. These input assumptions were consistent with the March 2015 Input Assumption filing and were filed in Union's 2015-2020 DSM Plan application at Exhibit A, Tab 3, Appendix D.

During the 2016 EM&V process, all EAC members except Union agreed that it was most appropriate to use the December 2015 TRM for both utilities' 2016 results. Union disagreed in principle that

[3] The online portion of the TRM has been transitioned to OEB Staff as outlined in the OEB's March 4 letter regarding the transition of Technical Evaluation Committee Activities.

input assumptions should be changed at all as its 2016 targets are based on the March 2015 TRM and any changes to prescriptive input assumptions should be applied prospectively to the following year. In order to move forward with the audit, Union conceded and asked that Board Staff make note of the disagreement.

To remain consistent with Board Decision that the same set of input assumptions should be used for targets and results, Union updated its 2016 targets to also reflect the December 2015 TRM. This update is presented and discussed within the body of Union's 2016 DSM Deferral application.

For the remainder of the 2015-2020 Framework, input assumptions and net-to-gross factors that are the result of the annual evaluation process will be used to determine subsequent targets for prescriptive programs. Prescriptive results for shareholder savings calculations will use the same input assumptions and net-to-gross adjustment factors that were used to determine Union's targets. Results for lost revenue calculations will use the best available information at the time of the audit.

O5. Finding: Throughout the verification process, DNV GL and other EAC members had questions about the appropriate source to use for items such as TRM savings (March or December), program eligibility requirements, and other information necessary to complete the evaluation. The EAC and EC also had a number of discussions about terminology and the meaning of different terms. These conversations often resulted in small delays in the evaluation work.

Recommendation A: The evaluation team should distribute to the EAC a list of the anticipated sources at the start of the verification process, possibly within the scope of work, for review and verification.

Recommendation B: The evaluation team should distribute a glossary of terms to the EAC at the start of the verification process, possibly within the scope of work, for review and verification.

Outcome: Clearly defined and agreed upon sources, definitions and documentation should reduce the risk for confusion and re-analysis of scorecard metrics and reduce costs.

UNION RESPONSE: Although this recommendation was not directed to Union, Union reiterates the desire to have meeting minutes taken during the EM&V process. Having minutes would enable more opportunity for a transparent review of the issues the EC has raised in support of this recommendation.

For clarity, Union adheres to the glossary of terms developed as part of the Board-approved TRM filed in December 2016 and supports its use for all EM&V purposes. Program eligibility is as defined in Union's Board-approved 2015-2020 DSM Plan. Scorecard metrics and their calculation are as

defined in the Board's Decision on Union's 2015-2020 DSM Plan.

The EC concluded that no changes to Union's 2016 results related to program eligibility, scorecard metrics or their calculation were necessary.

O6. Finding: Explicit documentation was not available for all program stages for programs such as Enbridge's Market Transformation Run It Right program. In that program, there was no documentation for participants moving to step 4 of the program (see Appendix H), only documentation that the participants had completed step 3 and utility confirmation that this is equivalent to engagement in step 4. Similar recommendations are included in section 5.1.2 for whole home simulation modeling programs.

Recommendation A: Documentation for each required element and stage for non-savings metrics should be recorded. The majority of these elements for future years have been identified in this evaluation, in the scorecard and program-relevant appendix sections.

Outcome: Reduced burden on utility staff and reduced evaluation costs.

UNION RESPONSE: Union collects documentation sufficient to support savings calculations, program eligibility and the calculation of its scorecard metrics. The EC concluded that no changes to Union's 2016 non-savings metrics were necessary.

1.2 Whole home simulation modeling

Table 2 Whole Home Simulation Modeling - summary of recommendations[4]

#	Finding	Recommendation	Recommended in 2015	Applies to			Primary Outcome		
				Union	Enbridge	Evaluation	Reduce Costs	Improve Accuracy	Decrease Risk
SM1	Both utilities use building simulation modeling to estimate energy savings	A: Provide both simulation file (HSE) and output file (TSV) to the evaluation team for every project.	✓		✓		✓		✓

[4] 2016 Natural Gas DSM Annual Verification Report Table 57

#	Finding	Recommendation	Recommended in 2015	Applies to			Primary Outcome		
				Union	Enbridge	Evaluation	Reduce Costs	Improve Accuracy	Decrease Risk
SM2	Both utilities collect and deliver *some* photographs to support retrofit site improvements.	A: Provide more explicit support for major measure installations.	✓	✓	✓				✓
SM3	There were some inaccurate savings entries.	A: Consider reviewing and modifying program processes to avoid data entry or outdated simulation result errors.		✓			✓		✓
		B: Provide more explicit support for major measure installations.	✓	✓	✓		✓		✓
SM4	Air sealing as a savings measure is present in a high percentage of single-family home retro-fit projects.	A: Evaluation: distribute before and after equivalent leakage area and energy savings attributable to reduced air leakage (if possible).				✓		✓	✓
SM5	The energy savings from the home retrofit programs rely exclusively on the simulations provided by the delivery agents.	A: Consider funding a study to verify the models produced by the utility agents.	✓			✓		✓	

SM1. Finding: Both utilities use building simulation modeling to estimate energy savings for their home retrofit programs, including Home Energy Conservation, Home Reno Rebate, Winterproofing, and the Home Weatherization Program. HOT2000 is the most common program used for those simulations, which is a program developed and released by NRCan for certified energy advisors. Because of the restrictions on the program, the evaluator could not consistently run the simulation files and produce the same result reported by the program. While Union provided TSV files for all sampled locations, Enbridge did not.

Recommendation A: Provide the building simulation file (HSE), the program output file (TSV), and full supporting documentation for all claimed project measures for every sampled project.

Outcome: Reduced burden on utility staff and reduced evaluation costs.

UNION RESPONSE: This recommendation is not directed to Union.

SM2. Finding: Both utilities collect and deliver some photographs to support many of the changes made at a home retrofit site as well as additional documentation for installed equipment and performed measures. However, the evaluator could not consistently confirm the number or type of major measures installed based on the photographs or other documentation provided.

Recommendation A: Consider providing more explicit support for each measure to eliminate uncertainty around project savings and participation. Full project documentation (pre/post photos, documentation of all installations or actions such as invoices and/or photos of each measure, data collection reports, pre-and post blower door tests for all sites) to the evaluation team. By delivering all documentation, the evaluation team would not have to follow up with the utility to obtain output for models that could not be run but could still verify the output for models that can be run.

Outcome: Greater certainty around scorecard achievements.

UNION RESPONSE: Union endeavours to provide all available supporting information collected on behalf of the offering to the EC as requested. The type of supporting information gathered is consistent with what Natural Resources Canada ("NRCan") requires Certified Energy Advisors ("CEA") to collect for use of HOT2000 software. Building simulation files (HSE) and program output files (TSV) are also provided.

In certain cases, confirming measures after they have been installed is difficult. For example, upgraded wall insulation is sometimes covered up by drywall, paint or other material making a post-installation photo impossible. In such scenarios an invoice confirms that work was complete and is further supported by the post-retrofit energy audit results.

Union will continue to work with the EC to ensure that it has all information available to facilitate the confirmation of measures installed in a home undergoing verification.

SM3. Finding: The evaluator identified a number of inaccurate savings entries due to data entry errors or outdated Union home retrofit simulation results. Many of these errors could be avoided through changes in program processes.

Recommendation A: Consider reviewing and modifying program processes to avoid similar errors in the future.

Recommendation B: Consider providing more explicit support for each measure to eliminate uncertainty around project savings and participation. Full project documentation (pre/post photos, documentation of all installations or actions such as invoices and/or photos of each measure, data

collection reports, pre-and post blower door tests for all sites) to the evaluation team. By delivering all documentation, the evaluation team would not have to follow up with the utility to obtain output for models that could not be run but could still verify the output for models that can be run.

Outcome: Reduced burden on utility staff and reduced evaluation costs.

UNION RESPONSE: Union's program delivery model has energy advisors run HOT2000 in accordance with the requirements of NRCan's protocols, which form the basis of Union's residential program. Energy Advisors are independent consultants and are not under contract with Union.

Union operates under a culture of continuous improvement. Since 2015, efforts have been made to improve upon the process it uses to collect data from its Energy Advisors. Union will continue with similar efforts going forward.

SM4. Finding: Air sealing as a savings measure is present in a high percentage of single-family home retro-fit projects, over 90% of projects in some programs. With such a high percentage of projects relying on a single measure, it is more important to ensure the savings validity of that measure.

Recommendation A: If possible, the evaluation team should evaluate the before and after leakage area and attributable energy savings.

Outcome: Greater certainty around savings estimates.

UNION RESPONSE: This recommendation was not directed to Union.

SM5. Finding: The energy savings from the home retrofit programs rely exclusively on the simulations provided by the delivery agents. Those simulations likely rely on a number of assumptions or standard modeling practices which may or may not follow industry standards. A detailed review of the models was outside the scope of the annual audit.

Recommendation A: Consider funding a study to verify the models produced by the utility agents to ensure they conform to standard industry practice.

Outcome: Greater certainty around savings estimates.

UNION RESPONSE: While this recommendation was not directed at Union, Union would like to clarify that the Home Reno Rebate offering was developed using NRCan's protocols, including CEAs, and has been approved by the Board. The energy advisors complete training to achieve their certification from NRCan, and are trained to simulate home energy usage using NRCan's HOT2000 modeling software. This certification trains advisors to use NRCan industry standard inputs and

modeling practices. Simulation results are then provided to NRCan and are subject to NRCan's QA procedure.

Union considers having Energy Advisors use NRCan standard inputs and modeling practices appropriate to ensure that industry standard practices are followed.

SM6. Finding: Site-level documentation confirmed that an auditor was involved, it does not signal that the auditor was an approved Certified Energy Evaluator.

Recommendation A: Tracking certifications for all energy evaluators and/or auditors submitting records.

Outcome: Ensuring proper credentials for all auditors decreases risk to program.

UNION RESPONSE: This recommendation was not directed to Union.

SM7. Finding: Number of projects for residential retrofit programs was very large.

Recommendation A: Increase sample to include more project files in following verification cycles.

Outcome: Increased sample, along with improved documentation recommended earlier, increases the accuracy of savings estimates for the applicable programs.

UNION RESPONSE: This recommendation was not directed to Union.

1.3 Cost-effectiveness recommendations

Table 3 Cost-effectiveness - summary of recommendations[5]

#	Finding	Recommendation	Recommended in 2015	Applies to			Primary Outcome		
				Union	Enbridge	Evaluation	Reduce Costs	Improve Accuracy	Decrease Risk
CE1	All overhead is still applied at the sector level rather than the program level.	A: Allocate "sector"-level administrative cost and overhead to each individual program	✓	✓	✓			✓	✓
CE2	Water avoided costs are still based on water rates.	A: Explore the possibility of better defining water costs	✓			✓		✓	✓
CE3	The utilities used different discount rates.	A: Use a consistent real discount rate of 4% when using real streams of benefits and costs.	✓	✓	✓		✓		✓
CE4	EUL is inconsistently applied for accelerated projects.	A: Include separate fields in the tracking data to explicitly communicate accelerated, annual and cumulative savings.			✓			✓	
CE5	A reduction factor accounting for removals and non-installs was applied to savings and resource costs.	A:Do not adjust resource costs if the costs are still incurred by the program, even if the equipment is removed.			✓			✓	

CE1. Finding: In 2015, the EC recommended that "sector"-level administrative costs and overhead be allocated to each individual program and the utilities report program-level cost-effectiveness results. In 2016, there are still inconsistencies in how administrative and overhead costs are allocated. For example, Union identifies administration and evaluation costs at the scorecard level

[5] 2016 Natural Gas DSM Annual Verification Report Table 58

whereas Enbridge details spending as direct and indirect at the OEB-defined program level and then has an explicit 'overhead' spend at the scorecard level. To facilitate the analysis, the EC recommends that the utilities report spending in a consistent format and apportion the overhead costs to individual programs.

Recommendation A: Allocate "sector"-level administrative cost and overhead to each individual program and report program-level cost-effectiveness results. Explicit allocation of general administration and evaluation costs will allow for easier cost-effectiveness calculations at the program level.

UNION RESPONSE: Union disagrees with this recommendation in terms of the definition of a program and the allocation requirements of the guidelines. Union does not allocate administration and evaluation costs at the scorecard or "sector" level. Union allocates these costs at the program level, where programs are defined as Residential, Commercial Industrial, Low-Income, Large Volume, Market Transformation and Performance-based as per Union's 2015-2020 DSM Plan.

The EC's reference to "programs" actually refers to "offerings" within these programs. One example of an offering is the CI Prescriptive offering within the Commercial Industrial program. Union will continue reporting its costs on a program-level basis consistent with the programs as defined within its 2015-2020 DSM Plan.

CE2. Finding: Water avoided costs are still based on water rates. The utilities followed the EC's 2015 approach and reduced the water avoided costs by 75% to simulate the removal of the fixed-cost portion of the rate. As is the case for gas and electricity, water avoided costs should only include the marginal impact from reduced consumption. Fixed costs (which, in our experience, can represent about 75% to 80% of water costs) must be excluded. On the other hand, water rates are often predominantly or exclusively variable, notably to promote conservation, and are thus a bad proxy of avoided costs.

Recommendation A: Explore the possibility of better defining water avoided costs.

Outcome: Better defined water avoided costs will result in more accurate cost effectiveness values, reducing the risk of less accurate values.

UNION RESPONSE: This recommendation was not directed to Union. For clarity, Union agrees with the EC that water avoided costs should only include the marginal variable impact from reduced consumption. As part of the 2015 audit, the EC recommended a 75% reduction to Union's avoided water costs (which are based on average water retail costs across its service territory) as a means to better estimate avoided water costs. Union continued to use the EC's approach for 2016.

CE3. Finding: While the discount rate appears to be aligned there was a methodological inconsistency between utilities. Union calculated their discount rate using 4% as their real discount rate and an inflation rate of 1.68% to get a combined discount rate of 5.7472%. Enbridge did not show how their discount rate was calculated and simply applied a discount rate of 5.75%.

Recommendation A: Both utilities should use identical discount rates.

UNION RESPONSE: Union converts the real 4% discount rate recommended by the Board into a nominal discount rate using the formula provided by the EC in its 2015 verification findings. To do so, Union used an inflation rate of 1.68%, which is the inflation rate used for 2016 in Union's 2015-2020 plan.

Without a specific recommended approach for the utilities to use, Union is unclear as to what approach the EC is recommending and will therefore continue to use its current practice.

CE4. Finding: EUL and cumulative gross savings were not provided in a consistent manner in the Enbridge program tracking database extract. The EUL inconsistency is the result of a work-around for advanced (Accelerated) projects used by Enbridge to report accurate dual baseline savings estimates and first year savings. Communicating the work-around consistently with the evaluation team led to some rework.

Recommendation A: Include separate fields in the program tracking database for EUL, RUL, gross first year annual savings, gross post-RUL annual savings, NTG, gross cumulative savings, net cumulative savings, and net first year savings.

Outcome: Improved data integrity results in less evaluation risk and more accurate savings totals. Proving each of the key savings types and their components allows evaluation to confirm that the savings provided are internally consistent.

UNION RESPONSE: This recommendation was not directed to Union.

CE5. Finding: Enbridge applied a reduction factor to both the resource savings and costs for some measures to account for the percent of non-installs and removals. The adjustment factor is correctly applied to the savings; however, it should not be applied to the costs as costs are still incurred.

Recommendation A: Do not adjust resource costs to account for non-installations or removals.

Outcome: A more accurate representation of the costs incurred by the program.

UNION RESPONSE: This recommendation was not directed to Union.

2. CPSV recommendations

This section is broken into four sub-categories:

1. Energy savings and program performance
2. Verification process
3. Documentation and support
4. Data management

2.1 Energy savings and program performance

Table 4 Energy savings and program performance - summary of recommendations[6]

#	Energy Savings and Program Performance		Applies to			Primary Beneficial Outcome			
	Finding	Recommendation	Union	Enbridge	Evaluation	Reduce Costs	Increase Savings	Increase Customer Satisfaction	Decrease Risk
1	Both utilities exhibit a strong commitment to accurate energy savings estimate	The utilities should continue in their commitment to accuracy.	✓	✓				✓	✓
2	The CPSV effort found realization rates near 100% and identified adjustments for most projects.	Continue performing custom savings verification on a regular basis.			✓				✓
3	Relative precision targets were met or surpassed for all programs	Use error ratio assumptions from the results provided in this report in future evaluation years, but with more conservative bounding than performed this year.			✓	✓			✓
4	Some measures have difficult-to-define baseline technologies.	Establish a policy to define rules around energy savings calculation for fuel switching and district heating/cooling measures.	✓	✓	✓				✓

[6] 2016 Natural Gas DSM Annual Verification Report Table 59

#	Energy Savings and Program Performance		Applies to			Primary Beneficial Outcome			
	Finding	Recommendation	Union	Enbridge	Evaluation	Reduce Costs	Increase Savings	Increase Customer Satisfaction	Decrease Risk
5	Review of documentation for gross evaluation showed that several projects were high free rider risks.	Review projects with large incentives for free ridership risk. Develop clear program rules that allow the utility to reject free rider projects.	✓	✓			✓		✓
6	Influence adjustments were made to projects that adjusted the gross savings for "net" or program influence reasons.	Increase transparency of "influence adjustments" and do not include in gross savings	✓				✓	✓	✓
7	There is not a clear policy to determine "standard" baselines.	Establish a clear policy to determine and define "standard" baselines	✓	✓	✓	✓			✓
8	Some measures in each utility program are routine maintenance or periodic repairs that are considered standard care in other jurisdictions.	Establish a clear policy regarding eligibility of maintenance and repair measures for the programs.	✓	✓	✓	✓			✓
9	The programs did not consistently account for interactivity among measures.	Add an interactivity check to the programs' internal QC process for savings estimates.	✓	✓	✓	✓			✓

ES1. Finding: Both utilities exhibit a strong commitment to accurate energy savings estimates. Both utilities have made significant investments in developing calculation tools which model savings accurately. For example, Union's dock door seal calculator is well considered and designed, and Enbridge's Etools calculator is very thorough in attempting to model savings for key measures.

Both utilities chose to retain engineers with strong understanding of their customers' building and process systems and showed a commitment to finding accurate savings estimates. On several

occasions, both on the phone and in writing, the evaluation team suggested a value that would have increased savings in a way that the utility program engineer did not think was valid. When this happened, neither utility was shy in suggesting that we may want to make a more conservative choice.

Recommendation: The utilities should continue in their commitment to accuracy.

Outcome: Accurate energy savings.

UNION RESPONSE: Union is committed to being a high performing organization dedicated to continuous improvement mechanisms in all aspects of its work. Union appreciates the recognition that our engineers are knowledgeable subject matter experts.

ES2. Finding: The CPSV effort this year found realization rates near 100% and identified adjustments for most projects. Across the programs a near equal number of adjustments increased and decreased savings and one third of projects had a large adjustment (verified savings more than 20% different from tracked).

Recommendation: Continue performing custom savings verification on a regular basis. Even a study that results in an adjustment of near 100% is still valuable because the programs know that their savings estimates will be reviewed. Knowing a review will be conducted improves the quality of ex ante estimates. The review itself also results in information that improves future program savings estimates.

Outcome: Accurate energy savings.

UNION RESPONSE: This recommendation was not directed to Union. For clarity, Union agrees that performing custom savings verification on a regular basis is a worthwhile exercise. It might also be worthwhile to explore the frequency with which custom project savings verification is conducted. Alternative options, such as using a proxy value one year based on a previous study, or verifying multiple years of program participants at one time might have gains in efficiency while maintaining a fulsome review of program results. Verification should consider both the relative materiality of potential outcomes versus the cost and resource burden to the EAC and customers.

Union also notes that the EC Final CPSV report states that both utilities generally produced solid ex ante engineering estimates of savings that are not systematically biased and that much of the variation in gross realization rates is driven by changes in operating conditions that are often difficult to anticipate in ex ante savings estimation. With an average of two years between when a

project's energy savings were first estimated and then verified, changes in operating conditions can lead to large adjustments.

ES3. Finding: Relative precision targets were met or surpassed for all programs. The sample design incorporated the previous year's error ratios (ERs) and averaged them with the assumption used in 2015. ERs were further bounded (minimum ER was 0.25, maximum 0.60) to limit the risk of over- or under- collecting data. There was one segment (Union Commercial) where precision was not as good as expected.

Recommendation: The process used to develop error ratios assumptions from the results provided in this report should be continued in future evaluation years, possibly with more conservative bounding (potentially increasing the maximum ER) to avoid under-collection of data for any segments.

Outcome: Realistic estimates of error ratios result in an appropriate amount of data collected to meet targets.

UNION RESPONSE: This recommendation was not directed to Union. For clarity, Union highlights the importance of maintaining a balance between ensuring study results meet a suitable threshold of statistical significance and ensuring that customers are not overly burdened by over sampling. The level of sampling is 2016 met this balance and was more reasonable than the level of over sampling experienced in 2015.

ES4. Finding: Some measures (e.g., geothermal heat pumps, combined heat and power, and those that save district heating energy) have difficult-to-define baseline technologies. Multiple different baselines are possible for these projects depending on how one looks at the scope of the project: how non-gas energy changes and offsite gas use are considered in savings estimates are two of the challenging aspects.

Recommendation: Consider establishing a policy to define rules around energy savings calculations and baselines for fuel switching and district heating/cooling measures.

Outcome: Less risk of adjustment and a better alignment between province energy efficiency goals and program implementation.

UNION RESPONSE: Union continues to adhere to DSM policies and guiding principles as defined in the 2015-2020 DSM Framework and Guidelines and as outlined in its approved 2015-2020 DSM Plan.

ES5. Finding: Through the gross verification process, we reviewed project documentation and had

conversations with customers about their installed measures. While the focus of this report is not on net savings, we did observe a handful of projects (out of the 122 evaluated) that appeared to be clearly at high risk for free ridership. These projects included maintenance type measures, projects that were far along in planning prior to utility involvement, projects with very short paybacks, and projects that included significant non-energy benefits.

Recommendation: Review projects with large incentives for free ridership risk. Develop clear program rules that allow the utility to reject free rider projects.

Outcome: Increased savings, reduced risk of free ridership, more efficient use of program funds.

UNION RESPONSE: Union is committed to reducing free ridership in its CI Custom program and has made a number of changes, as outlined in its DSM Mid-Term Submission (EB-2017-0127) with this objective in mind. Receiving feedback from the EC is a critical part of the process improvement cycle, and the current EM&V lag time has hindered Union's ability to respond to any lessons stemming from it. It would also be helpful if the EC provided specific project examples as opposed to general comments.

ES6. Finding: Union made influence adjustments to projects that adjusted the gross savings for "net" or program influence reasons. Accounting of which projects had these adjustments was not maintained by Union and the adjustments were included in different places in project calculation workbooks, making their identification and validation challenging. In addition, the program NTG was also applied to these projects, effectively double discounting savings in scorecards.

Recommendation: If Union chooses to continue making influence adjustments to the savings upon which it calculates savings, it should make these adjustments more transparent and exclude them from the reported gross savings for the program in scorecards. Instead the specific project influence adjustment should be included in the scorecard in place of the general program or domain level NTG factor.

Outcome: Reduced risk of double adjustments.

UNION RESPONSE: As an outcome of previous audits, Union began applying influence adjustments in 2015 to certain maintenance-related projects (largely steam leak and steam trap repair projects). Union applied the factor so that its claim accounted only for savings it had influenced that are incremental to a customer's standard maintenance practice. However, Union does agree with the EC that applying an influence adjustment in addition to a NTG factor effectively double discounts savings. Eleven projects had influence adjustment factors in 2016 and these were

suitably addressed by the EC during verification.

ES7. Finding: There is not a clear policy to determine what standard to use for replace on burnout or new construction baselines. The 2016 verification used a code or minimum available baseline where required, in alignment with the 2015 net-to-gross study. Without a clear policy there is uncertainty for all stakeholders as to what the appropriate baseline should be. This uncertainty affects all aspects of the programs, including what measures are offered, what incentives are paid and how measures are evaluated.

Recommendation: Establish a clear policy to determine and define baseline standards where an "industry standard" baseline would be applicable.

Outcome: Consistency of approach across utilities, evaluators and studies will reduce risk of adjustment and evaluation cost.

UNION RESPONSE: Union adheres to DSM policies and guiding principles as defined by the Board in the 2015-2020 DSM Framework and Guidelines. In the case of new construction, in line with standard practice in other jurisdictions, code requirements are generally used for baseline consideration. In replace on burnout scenarios for a given technology, where there exists a supported, evidenced-based report to inform an industry standard practice, Union would apply this standard as the appropriate baseline. In the absence of an industry standard, Union attempts to seek an external data source to support a reasonable approach or consider site-specific information to inform the baseline.

ES8. Finding: Some measures in each utility program are routine maintenance or periodic repairs that are considered standard care in other jurisdictions.

Recommendation: Establish a clear policy regarding eligibility of maintenance and repair measures for the programs.

Outcome: Reduced free ridership risk.

UNION RESPONSE: Union continues to adhere to DSM policies and guiding principles as defined in the 2015-2020 DSM Framework and Guidelines, and as outlined in its approved 2015-2020 DSM Plan. Union notes that for at least some of these projects, Union incents an acceleration of maintenance or repairs and Union claims a measure life for only the accelerated portion.

ES9. Finding: The programs did not consistently account for interactivity among measures. In several cases, we saw an overestimation of the combined boiler efficiency improvement yielded by the addition of linkageless controls and condensate heat recovery measures and an overestimation of

savings for subsequent measures that interact with earlier measures within the same program year.

Recommendation: Add an interactivity check to the programs' internal QC process for savings estimates.

Outcome: More accurate savings estimates and a reduced evaluation risk.

UNION RESPONSE: Union agrees that interactivity should be accounted for when estimating savings for custom projects. Union now more clearly confirms that interactive projects are suitably accounted for. This is done in part by way of questions posed in an updated basecase form that accompanies each custom project. It is worth noting that this change resulted from Union's internal continuous improvement processes and did not result from the 2016 EM&V process.

2.2 Verification processes

Table 5 Verification process recommendations[7]

	Verification Process		Applies to			Primary Outcome			
#	Finding	Recommendation	Union	Enbridge	Evaluation	Reduce Costs	Increase Savings	Increase Customer Satisfaction	Decrease Risk
10	DNV GL was unable to obtain access to all the equipment at all the sites selected for verification.	Modify contracts to require participants to agree to comply with EM&V as part of the requirements for participation in the program.	✓	✓		✓			✓
11	Future evaluations should consider large HVAC to be high rigour rather than standard rigour.	Consider large HVAC measures for higher rigour verification.			✓				✓

VF 10. Finding: DNV GL was unable to obtain access to all the equipment at all the sites selected for verification. Both Enbridge and Union have several large projects with industrial companies, including food processing, refineries, and other industries. In many cases, the customer refused to

[7] 2016 Natural Gas DSM Annual Verification Report Table 60

provide SCADA (Supervisory Control and Data Acquisition) system data or similar trend data to allow a reasonable verification of the project. This means we were unable to do more than a reasonableness check on the savings.

A review of the Enbridge contract shows that the customer is not required to provide the information that is necessary for EM&V. The most relevant sections are:

- Item 6: Payment of the Incentive Payment is subject to the completion of a satisfactory site inspection of the improvements, including the installed equipment by an authorized representative of Enbridge.

- Item 9: Upon request within eighteen months of the commissioning date of the Project, and with reasonable notice, the Customer agrees to provide authorized representatives of Enbridge with access to the Project, and with required information or data relating to the project for the purposes of the Application and these General Terms and Conditions.

Neither of these are sufficient for EM&V.

Recommendation: Modify contracts to require participants to agree to comply with EM&V as well as utility representatives as part of the requirements for participation in the program.

Outcome: Reduced evaluation costs and risks. Participant non-compliance requires evaluators to request documentation for a large backup sample, and to survey and/or visit additional sites to obtain sufficient data for the evaluation. The process of contacting a site and getting a refusal costs time and money, as does the substitution of an additional site to make up for the unobtained data. In some cases, there might not be additional sites to sample, in which case the evaluation estimates will have lower precision than they would with full compliance.

UNION RESPONSE: Union encourages its customers to participate with verification activities. When Union still coordinated the verification process prior to 2015, Union did not find the need to include a requirement for EM&V into project participation. 100% of participants selected for verification agreed to participate and to a degree that satisfied the verifiers' ability to defend its findings. Union understands the verification participation rate in 2016 to be 62% for CI and 67% for Large Volume.

The EC notes that in some cases, verifiers were unable to obtain access to all the equipment or participants did not provide all requested data. There are many aspects that can impede third party verification access to equipment, including safety concerns, perceived reasonableness of the request, customer privacy and time lag from measure installation. An average of two years has passed between projects implemented in 2016 and verification activities conducted in 2018. Due to

this time lag, it can be expected that some data may be overly burdensome for the customer to extract or might no longer be available at all.

VF11. Finding: Large HVAC and HVAC controls projects proved more complex to evaluate than planned.

Recommendation: Future evaluations should consider large HVAC to be high rigour rather than standard rigour.

Outcome: Better alignment of rigour with uncertainty will improve accuracy of savings estimates and provide more cost-effective evaluation.

UNION RESPONSE: This recommendation was not directed to Union.

2.3 Documentation and support

Table 6. Documentation and support recommendations[8]

#	Documentation and Support		Applies to			Primary Outcome			
	Finding	Recommendation	Union	Enbridge	Evaluation	Reduce Costs	Increase Savings	Increase Customer Satisfaction	Decrease Risk
12	Incremental improvement in project documentation by both utilities was observed in the 2016 CPSV. Project documentation for some projects lacked sufficient details to allow evaluators to reproduce the calculations made by program staff or third-party vendors.	Take steps to improve documentation: • Implement an electronic tracking system that archives all materials • Include explicit sources for all inputs and assumptions in the project documentation. • Store background studies and information sources with the project files and make them available to evaluators. • Provide evaluators full access to customer data. • Provide pre- and post-installation photos, where available. • Document and provide internal M&V documents where available. • Institute a checklist as part of project closeout to ensure all relevant project documentation is assembled as ready for verification	✓	✓			✓		✓

[8] 2016 Natural Gas DSM Annual Verification Report Table 61

	Documentation and Support		Applies to			Primary Outcome			
#	Finding	Recommendation	Union	Enbridge	Evaluation	Reduce Costs	Increase Savings	Increase Customer Satisfaction	Decrease Risk
13	Explanations of complex projects were not consistently clear making it hard to understand what process is producing energy savings.	Improve clarity and details of documentation explaining the source of energy savings for complex projects.	✓	✓					✓
14	Ex ante savings estimates based on annual energy consumption for industrial sites did not always include sufficient information documenting production.	Include site production totals in relevant years in the savings estimates based on annual energy consumption for industrial sites	✓	✓					✓
15	Enbridge Boilers use a 73% assumed thermal efficiency for in situ boilers that have been in place for more than 10 years.	Estimate boiler degradation from name plate efficiency to determine the baseline boiler efficiency rather than a flat number	✓	✓					✓
16	Pipe insulation is a significant source of savings for the Union Gas programs. Documentation for the source of factors used in calculations and of in situ conditions was not consistently provided.	Document baseline conditions of pipe insulation (and other measures) using photos and text descriptions to provide context. Explicitly tie the documentation of baseline condition to the heat loss rate used for the savings calculation.	✓	✓					✓

#	Documentation and Support		Applies to			Primary Outcome			
	Finding	Recommendation	Union	Enbridge	Evaluation	Reduce Costs	Increase Savings	Increase Customer Satisfaction	Decrease Risk
17	Enbridge documentation did not always include a prose explanation and supporting documentation for baseline types (ROB, ER) and remaining useful life (RUL).	Always complete the "Base Case Overview" in the form with a prose description of the base case. The description should reference included emails and photos to document in situ conditions and features that are carried over into the baseline system.		✓					✓
18	The utilities should use longer duration data in ex ante savings estimates when possible.	Use longer duration data in ex ante savings estimates. When time periods less than a year are used, documentation should be provided to indicate why the period used is applicable to a full year and why a full year was not able to be used.	✓	✓		✓			✓

#	Documentation and Support		Applies to			Primary Outcome			
	Finding	Recommendation	Union	Enbridge	Evaluation	Reduce Costs	Increase Savings	Increase Customer Satisfaction	Decrease Risk
19	In situ boiler name plate information, age and operating condition are all helpful for determinizing the designed performance and reasonable range of actual efficiency for the system as well as providing context to better determine remaining useful life (RUL)	Document in situ boiler name plate information, age and operating condition for all projects where boiler efficiency affects savings	✓	✓					✓
20	Items that may be obvious to the ex ante team can be non-obvious to an outside party.	Review ex ante documentation from an outside perspective to help identify gaps	✓	✓					✓
21	At large sites with multiple spaces containing similar equipment, ex ante documentation did not always identify which space or piece of equipment was affected by the project.	Include additional descriptions of spaces and equipment affected to differentiate among similar spaces and equipment at the site.	✓	✓					✓

#	Documentation and Support		Applies to			Primary Outcome			
	Finding	Recommendation	Union	Enbridge	Evaluation	Reduce Costs	Increase Savings	Increase Customer Satisfaction	Decrease Risk
22	Invoices were not always included with documentation, and sources for incremental costs were not always clear.	Ensure that incremental costs are supported by invoices or other documentation, especially for add-on and optimization measures where the total cost and incremental cost are likely to be the same.	✓	✓				✓	✓
23	Larger projects appeared to fall under the same documentation standards as smaller projects.	Increase the amount of documentation and source material for projects that have greater energy savings.	✓	✓					✓
24	Union's custom project summary workbook is a good approach to documentation. The workbook is not used in a consistent manner across all projects.	Consider providing more training or adding quality control steps to ensure the summary workbook front page is completed and stored in a consistent manner. Identify a common approach for common measures and, if necessary, document deviations and the reasons for the deviations in a clearly labelled field on the summary sheet.	✓			✓			✓

#	Documentation and Support		Applies to			Primary Outcome			
	Finding	Recommendation	Union	Enbridge	Evaluation	Reduce Costs	Increase Savings	Increase Customer Satisfaction	Decrease Risk
25	Enbridge Etools does not sufficiently document sources of inputs and assumptions.	Use a consistent summary workbook.		✓		✓			✓

DS12. Finding: Incremental improvement in project documentation by both utilities was observed in the 2016 CPSV. Project documentation for some projects lacked sufficient details to allow evaluators to reproduce the calculations made by program staff or third-party vendors. Specific issues included:

- Project data or details missing
- Insufficient measure-level details to fully describe what was installed
- Descriptions that were difficult to understand
- Use of black box tools
- Hardcoded information in calculation spreadsheets
- Undocumented assumptions
- Sources referenced but not included or available, such as feasibility studies and historical analysis of energy use that was left out of the project documentation
- Input adjustments that approximate other effects, but are not explained
- Insufficient access to customer data (by customers).
- Modelling files that could not be opened
- Adjustments to savings estimates for safety or influence that were not clearly marked, sourced, or carried out in a consistent fashion

Recommendation: Improve data quality. Possible steps include:

- Implement an electronic tracking system that archives all materials
- Include explicit sources for all inputs and assumptions in the project documentation.
- Store background studies and information sources with the project files and make them available to evaluators.
- Provide evaluators full access to customer data.

- Provide pre- and post-installation photos, where available.
- Document and provide internal M&V documents where available.
- Institute a checklist as part of project closeout to ensure all relevant project documentation is assembled as ready for verification

Outcome: Properly explaining and sourcing the savings calculation method and assumptions allows the evaluating engineer to more easily identify what needs to be verified. It also makes it easier to determine whether the methods and assumptions are reasonable and use ex ante assumptions rather than seek documented values elsewhere.

UNION RESPONSE: Union is pleased to hear that incremental improvement in project documentation was observed in the 2016 CPSV. This speaks to Union's efforts to continually improve the comprehensiveness of custom project documentation even in the absence of any external auditor feedback, given the 2015 audit was not completed until the end of 2017. Union is committed to ensuring that full and detailed inputs and supporting evidence are clearly outlined for each project. It's important to note that all of Union's custom projects are reviewed by an internal QA/QC team of professional engineers. This QA/QC team attempts to apply the same scrutiny to projects as the EC. Nonetheless, Union will examine 2016 specific recommendations for consideration towards project documentation refinement.

DS13. Finding: Explanations of complex projects were not consistently clear making it hard to understand what process is producing energy savings. This was seen with large HVAC control projects with MUAs, AHUs, heat recovery projects, and custom process projects, and others.

Recommendation: Improve the documentation/explanation of the source of energy savings for complex projects that are related to complex systems. Use figures, diagrams, and equations as needed, especially for cascading or multi-staged measures. Parameters such as the heating source, and the efficient case peak and off-peak period flowrates and schedules should be recorded and sourced. If there are additional units not included in the measure, these should be documented and considered in savings estimates (even if the effect is zero).

Outcome: Increased accuracy of savings estimates. Reduced evaluation risk.

UNION RESPONSE: Union strives to ensure its project documentation captures all relevant information regardless of project complexity. This includes use of figures, diagrams, and equations as needed and an explanation of the source of energy savings.

Two independent estimates of project savings and the type of documentation needed will not always align. In some cases, the verifier might request additional clarification documentation. In other cases, Union's documentation might have additional information the verifier was not looking

for. This speaks to the strength of the verification process; the verifier has the ability to request further documentation from the utility, the customer or a third party and regularly does so when needed.

Union will consider the recommendation for greater clarity on complex projects as part of its continuous improvement efforts.

DS14. Finding: Ex ante savings estimates based on annual energy consumption for industrial sites did not always include sufficient information documenting production. The change in energy use pre- and post- measure is sensitive to changes in production.

Recommendation: Savings estimates based on annual energy consumption for industrial sites should include information from the site on amount of production in the years used. It's not enough to say "not much is changed, they run 24/7". If detailed production data are not available, the utilities should get percentage differences year to year (e.g.: if year 1=100%; is year 2 exactly the same, or is it 95% or 110% of production the previous year).

Outcome: Documenting production changes and using them in savings estimates will improve accuracy and reduce evaluation risk.

UNION RESPONSE: Union changes its approach to calculating natural gas savings based on what's driving the savings. When production changes impact natural gas savings, Union includes pre and post production data. If savings are being driven by base load, weather/space heating or other factors, production data may or may not be included.

DS15. Finding: Enbridge Boilers use a 73% assumed thermal efficiency for in situ boilers that have been in place for more than 10 years. This is based on a 2% de-rate of a 2007 combustion efficiency study that found an average combustion efficiency of 74.6% for 39 boilers aged 12-38 years (average 24.5). The study, which EGD provided to the evaluation team, did not attempt to tie the degraded combustion efficiency to the original rated efficiency of the boilers. The study is also now more than 10 years old, so its findings are likely out of date and should only at most apply to 20-year-old or more boilers. For 2016, the evaluation used the 73% value since a better option was unavailable at the time.

Recommendation: Use a degradation from name plate efficiency to determine the baseline boiler efficiency rather than a flat number. The 2017 CPSV effort should include in the scope secondary research to determine a degradation factor or curve to be used for the 2017 and 2018 CPSV and could be incorporated by the utilities for the 2019 program year until primary research is completed or a better approach is developed.

Outcome: Improving this key assumption will improve savings estimates for a significant portion of savings in the Enbridge portfolio and the process would also be applicable to Union sites where baseline boiler efficiencies are required and not based on site tests of boiler performance.

UNION RESPONSE: Union believes this recommendation refers to Enbridge's ETools, which are not used by Union. For clarity, Union strives to use nameplate efficiency unless testing data can support a different efficiency.

DS16. Finding: Pipe insulation is a significant source of savings for the Union Gas programs. Union estimates heat loss rate for damaged baseline insulation less than that from a simple bare pipe assumption, which is reasonable and appropriate. Documentation for the source of the factors used in the calculation and documentation (via photos and/or a description of the pipe insulation condition) was not consistently provided.

Recommendation: Document baseline conditions using photos and text descriptions to provide context. Tie the documentation of baseline condition to the heat loss rate used in a clear way.

Outcome: Improving documentation of baseline conditions and clarity in calculations will reduce evaluation risk improve consistency of approach among the Union engineering team.

UNION RESPONSE: Union will consider improving documentation for pipe insulation base case descriptions for future projects (noting that this recommendation was received in Q4, 2018).

DS17. Finding: Enbridge documentation did not always include a prose explanation and supporting documentation for baseline types (ROB, ER) and remaining useful life (RUL). "See Etools for base case" is not sufficient: Etools is not designed to provide context and sources to support the values included.

Recommendation: Always complete the "Base Case Overview" with a prose description of the base case. The description should reference included emails and photos to document in situ conditions and features that are carried over into the baseline system.

Outcome: Improved descriptions and documentation will reduce evaluation risk and help Enbridge ensure that accurate information has been entered into Etools.

UNION RESPONSE: This recommendation was not directed to Union.

DS18. Finding: Duration of pre- post- data (energy consumption, production output, raw material consumption, etc.) used for savings estimates were too brief in several instances.

Recommendation: The utilities should use longer duration data in ex ante savings estimates when possible. When time periods less than a year are used, the utilities should document why the period used is applicable to a full year and why a full year was not able to be used.

Outcome: Increased accuracy of savings estimates.

UNION RESPONSE: Typically Union strives for a full year of pre and post data when possible. Union's Professional Engineers apply their judgement if a full year of pre and post data isn't required or possible to achieve.

DS19. Finding: The utilities did not always gather boiler nameplate data for in situ systems. The age and operating condition was also not always recorded or described. This was a concern on boiler projects, but also for projects where boiler efficiency has an effect on savings, such as greenhouses, pipe insulation and heat recovery.

Recommendation: In situ boiler name plate information, age and operating condition are all helpful for determinizing the designed performance and reasonable range of actual efficiency for the system as well as providing context to better determine remaining useful life (RUL)

Outcome: Improving documentation of the in situ boiler will reduce uncertainty in savings estimates and reduce evaluation risk.

UNION RESPONSE: Union strives to use nameplate efficiency unless testing data can support a different efficiency. In cases where nameplate or testing is unavailable, Union uses an appropriate and conservative proxy.

DS20. Finding: Items that may be obvious to the ex ante team can be non-obvious to an outside party. Examples from sites this year included in situ burners that could not be turned off and whether heating needs were equal to or greater than the amount of heat recovered.

Recommendation: Review ex ante documentation from an outside perspective to identify where documentation or explanation could be added.

Outcome: Reduced evaluation risk.

UNION RESPONSE All of Union's custom projects are reviewed by an internal team of QA/QC Professional Engineers. This QA/QC team attempts to apply the same scrutiny to projects as the EC.

DS21. Finding: At large sites with multiple spaces containing similar equipment, ex ante

documentation did not always identify which space or piece of equipment was affected by the project.

Recommendation: Include additional descriptions of spaces and equipment affected to differentiate among similar spaces and equipment at the site.

Outcome: Reduced evaluation risk.

UNION RESPONSE: Union will consider the recommendation for greater documentation on additional descriptions of spaces and equipment affected as part of its continuous improvement. To do so, Union requests that specific examples be provided. See also Union's response to DS13.

DS22. Finding: Invoices were not always included with documentation, and sources for incremental costs were not always clear.

Recommendation: Ensure that incremental costs are supported by invoices or other documentation, especially for add-on and optimization measures where the total cost and incremental cost are likely to be the same. Equipment replacement measures may require an additional standard efficiency quote to produce incremental cost.

Outcome: Incremental cost is an important component of simple payback, which is often used to judge the economic benefit of energy efficiency projects. It is also an input to some benefit-cost tests.

UNION RESPONSE: Union does ensure that incremental costs are supported by invoices or other documentation. In some cases, project costs are bundled within invoices for larger work being completed in tandem at a customer site. In others, projects are implemented using internal customer resources and no formal invoice is generated. In such cases, Union uses best available information to estimate incremental costs and these estimates are subject to verification.

DS23. Finding: Larger projects appeared to fall under the same documentation standards as smaller projects.

Recommendation: Increase the amount of documentation and source material for projects that have greater energy savings.

Outcome: Projects that are better documented tend to have more accurate savings estimates and receive fewer evaluation adjustments than those that are less documented. Large projects have a greater effect on overall savings adjustment factors. Therefore, large projects with better documentation are more likely to result in adjustment factors closer to 100%.

UNION RESPONSE: Union strives to ensure its project documentation captures all relevant information regardless of project size.

DS24. Finding: Union custom projects utilized a project application summary workbook that summarizes the key project inputs, calculations, and most details. In general, this is a good approach that facilitates internal review and evaluation. We also found that the workbooks had improved source documentation relative to the 2015 projects. One challenge was that different projects used the workbook in different ways:

- The notes section was sometimes used to identify and highlight specific unique approaches and features in projects, but not always.
- Calculations internal to the summary page were consistent for most projects, but not all (additional factors were sometimes added).
- Sub-methods critical to the calculation were contained in hidden sheets.
- Safety and influence adjustments were inserted in different locations and not always explained.

Recommendation: Consider providing more training or adding quality control steps to ensure the summary workbook front page is completed and stored in a consistent manner. Identify a common approach for common measures and, if necessary, document deviations and the reasons for the deviations in a clearly labelled field on the summary sheet.

Outcome: A consistent summary workbook aids both internal and external quality assurance, quality control, and measurement and verification.

UNION RESPONSE: Union is pleased by the acknowledgement that custom project workbooks had improved source documentation relative to 2015 projects. This speaks to Union's efforts to continually improve the comprehensiveness of its project application summary ("PAS") workbooks. Union agrees that these workbooks are effective tools for summarizing key project inputs and calculations, and understands that different projects might use the workbooks in different ways. Complete uniformity within PAS workbooks across hundreds of custom project will take time and may not always be achievable or appropriate. Union will consider this recommendation as part of its continuous improvement of custom project documentation.

DS25. Finding: Enbridge Etools is used as both a calculation tool and as a communication tool with customers. While it appears to serve the needs of the program, this form of communication is difficult for the evaluation efforts.

- Etools does not easily allow for assumptions to be sourced within the record.
- Some Etools selections may be site-specific and some may be defaults; the calculator does not distinguish.
- Energy savings that are calculated outside of Etools are hard-entered in Etools but not always sourced.

Recommendation: Use a consistent summary workbook.

Outcome: A consistent summary workbook aids both internal and external quality assurance, quality control, and measurement and verification.

UNION RESPONSE: This recommendation was not directed to Union.

2.4 Data management

Table 7. Data management - summary of recommendations[9]

#	Data Management		Applies to			Primary Outcome			
	Finding	Recommendation	Union	Enbridge	Evaluation	Reduce Costs	Increase Savings	Increase Customer Satisfaction	Decrease Risk
26 A	Neither Union nor Enbridge currently track participating customer or participating vendor contact information in their program tracking	Track contacts associated with projects in the program tracking database.	✓	✓		✓		✓	✓
26 B		Strongly consider investing in relational program tracking databases.	✓	✓		✓	✓	✓	✓

[9] 2016 Natural Gas DSM Annual Verification Report Table 62

#	Data Management		Applies to			Primary Outcome			
	Finding	Recommendation	Union	Enbridge	Evaluation	Reduce Costs	Increase Savings	Increase Customer Satisfaction	Decrease Risk
26 C	database. Providing the information to the evaluation puts significant burden on utility staff. In 2016, the data provided by utility staff was much more consistent and clear relative to 2015.	Continue to use improved structure for data integrity in the evaluator request for contact information for the 2017 savings verification and evaluation.			✓	✓		✓	
27	The extracts from the utility program tracking database do not include dates for key project milestones.	Track and provide to evaluators dates for key milestones in the project.	✓	✓		✓			✓
29	EUL and cumulative gross savings were not provided in a consistent manner in the Enbridge program tracking database extract	Include separate fields in the program tracking database for all components of gross and net cumulative and first year savings.	✓	✓			✓		✓

DM 26 Finding: Neither Union nor Enbridge currently track participating customer or participating vendor contact information in their program tracking database. Providing the information to the evaluation puts significant burden on utility staff. In 2016, the data provided by utility staff was much more consistent and clear relative to 2015.

Recommendation A: Track contacts associated with projects in the program tracking database. At a minimum, the program tracking database should include:

- Project site address
- Customer mailing address

- Primary customer contact name
- Primary customer contact phone
- Primary customer contact email
- Primary customer contact mailing address
- Addresses are best tracked as multiple fields including:
    - Street address line 1
    - Street address line 2
    - City
    - Province
    - Postal code

Phone number fields should include data validation to enforce a consistent format and avoid missing or extra digit errors. Phone extensions should be tracked in a field separate from the ten-digit phone number and be restricted to numeric data only.

The best practice is to maintain contacts in a table separate from specific project or customer data. This allows for a single contact to be connected to multiple accounts and/or projects as necessary without creating duplication. This structure also makes it easier to associate multiple contacts with a single project, and decreases quality control costs.

Vendor contact information should also be tracked in the database, in the same table as the participating customer contact information. With a relational database, the contact ID from the table can be added to a project record in the role consistent with the contact's participation (such as vendor, decision maker, or technical expert) with a separate table that allows a single vendor contact to be associated with multiple projects.

Outcome A: Reduced burden on utility staff to seek contact information for projects, whether for internal or evaluation use. Reduced evaluation costs and improved sample design expectations.

UNION RESPONSE: As detailed in its 2015-2020 DSM Plan, Union outlined the need for a DSM tracking and reporting system upgrade. The Board approved this request in its January 20th, 2016 Decision. This system upgrade was rolled out in 2018.

Recommendation B: The utilities should strongly consider investing in relational program tracking databases. Relational program tracking databases and customer relationship management (CRM) systems allow for multiple contacts to be associated with a single account and/or project. The incremental cost of implementation is low if it is part of the initial database design, populated as projects are started, and updated once they are complete.

For the implementation team, a query-able one-stop shop for information provides a wealth of

information that can improve delivery. For example, these databases can help programs understand how contractors work across projects, identify when projects have hit snags and need attention, and give the program team access to key customer context such as historical participation, and different contacts that have worked with the program.

For evaluation, this allows programs to easily clarify aspects of projects during implementation and to provide accurate, timely, and usable contact information to evaluators and verifiers.

Outcome B: Improved customer satisfaction from better delivery, and a reduced burden on utility staff for tracking information. A relational database would also streamline aggregation of program data for scorecards and make providing data simpler for annual savings evaluation and verification.

UNION RESPONSE: Union will continue to track contact information for participating customers and vendors. As detailed in its 2015-2020 DSM Plan, Union outlined the need for an improved DSM tracking and reporting system. The Board approved this request in its January 20th, 2016 Decision. This system has been rolled out in 2018 and includes many upgrades for the 2018 program year.

Recommendation C: When the evaluation requests contact information for savings verification and evaluation, the contact request spreadsheet will continue to provide additional fields to enforce data integrity (e.g., specific fields for a parsed address and company name for the technical and decision-making contacts). If the program tracking databases are able to report contact information, this spreadsheet should be modified to reduce burden on utility staff while maintaining high levels of data integrity.

Outcome C: Reduced evaluation costs due to less data cleaning and research to fill missing information. Improved data collection with less returned advance letters and more accurate connection between projects and contacts.

UNION RESPONSE: This recommendation was not directed to Union.

DM 27 Finding: The extracts from the utility program tracking database do not include dates for key project milestones. Enbridge's data did not include any dates and Union's included only the "install date."

Recommendation: Track and provide to evaluators dates for key milestones in the project. Dates for project start, installation, and those that define the program year provide useful context for interviewers that is not always easy to find in project documentation

Outcome: Improved data collection through more informed interviewers and reduced evaluation costs through less need to search for dates in documentation.

UNION RESPONSE: Union has an on-going relationship with its CI and Large Volume customers. Through this relationship, some projects get proposed, prioritized, deferred and changed over time. Not all projects will have a definitive start date. As per the EC's finding, Union does track an installation date. This date is important as it denotes the date after which installation and commissioning are complete and Union pays out a customer incentive. The program year is defined by the calendar year.

DM 29 Finding: EUL and cumulative gross savings were not provided in a consistent manner in the Enbridge program tracking database extract. The EUL inconsistency is the result of a work around for advanced (accelerated) projects used by Enbridge to report accurate dual baseline saving estimates and first year savings. Communicating the workaround consistently within the evaluation team led to some re-work.

Recommendation: Include separate fields in the program tracking database for:

- EUL
- RUL
- gross first year annual savings
- gross post-RUL annual savings
- NTG,
- gross cumulative gross
- net cumulative savings
- net first year savings.

Outcome: Improved data integrity results in less evaluation risk and more accurate savings totals. Providing each of the key savings types and their components allows evaluation to confirm that the savings provided are internally consistent.

UNION RESPONSE: Union provides the EC with all requested data broken out into specific fields as requested, including those noted in this recommendation.

3. Measure Life Study Recommendations

3.1 Updates to Measure Lives

ML1. Finding: Use a 15-year measure life for boiler controls. This does not include burner modifications, which are currently assigned a separate measure life by Union. Enbridge could consider adding a separate category for burner modifications, which would use a 20-year life similar to Union.

ML2. Finding: Increase the measure life for variable frequency drives for make-up air units to 15

years.

ML3. Finding: Reduce the measure life for loading dock door and ramp seals to 10 years to be consistent with what is used in other cold-weather jurisdictions.

ML4. Finding: Reduce the measure life for pipe insulation to 14 years, which is consistent with the industry average, and accounts for a portion of the insulation being installed outdoors or in hazardous environments where it is unlikely to last 20 years.

ML5. Finding: Use a measure life of 15 years for building automation systems, also known as energy management systems.

UNION RESPONSE to ML1 – ML5: Union accepts the proposed measure life changes to its custom CI, Low-Income multi-family and Large Volume offerings for the purpose of reaching consensus despite concerns with the study methodology, the reliability of results and the basis for which some conclusions were reached. Specifically, Union notes the following concerns:

ML3: Union questions the appropriateness of a 10-year measure life recommendation for dock door seals based on two jurisdictions without considering the variability of the technology itself.

ML4 and ML5: The Measure Life study recommends additional research be undertaken to examine the measure life for pipe insulation and building automation systems. Union agrees that additional research is required to support more robust understanding of the measure lives for these two measures. From the Measure Life Study: "Due to the uncertainty, **Michaels Energy is not recommending immediate updates to two of the measures; pipe insulation and building automation systems**. These were two such measures where primary research should be considered a high priority. Michaels Energy recommends dedicated primary research for the types of applications installed in Ontario to be sure that lifetime values are appropriate."(emphasis added)[10]

To further support its position, Union points to a few flaws in the Measure Life study. For example, Union questions the inference that a measure life for "hazardous installs" or "residential hot water insulation" projects would be applicable to the measure life for commercial and industrial pipe insulation projects. In accordance with Union's measure life guide, Union considers site-specific conditions when estimating the measure life, such as whether the installation conditions are "hazardous." When installed under normal conditions, outdoor pipe insulation should last at least 20 years.

[10] Final Report: Custom Measure Life Review May 10, 2018 Michaels No.: O6717AAN

Another example in a flaw in the analysis pertains to the Building Automation System analysis, for which the study appears to confuse building automation systems with energy management systems. These are not the same measures.

These concerns notwithstanding, Union acknowledges that it has agreed with the EAC to accept the results of Measure Life Study for the 2017 shareholder incentive, 2017 LRAM calculations as well as the 2017 target calculations. This EAC agreement derives from the Board's Decision on Union's 2015-2020 Plan, which notes, "to calculate next year's targets, the OEB directs the utilities to use the new, updated input assumptions and net-to-gross factors that are the result of the annual evaluation process.", and in recognition that the Measure Life study is part of the 2016 evaluation process.

The Measure Life Study was finalized and presented to the utilities on May 10, 2018. As such, Union's 2017 and 2018 custom CI, Low-Income multi-family and Large Volume program delivery did not consider the results of the report. Union recommends conducting additional research in order to appropriately reflect the measures and conditions in question. Until new research is conducted, Union proposes to make the recommended changes for the 2017 CI/LI/LV custom results through the 2017 CI/LI/LV Custom Project Savings Verification or within the 2017 EM&V process under guidance of the EC to ensure changes to measure life are made appropriately. Union also notes that agreement was made at the EAC to also adjust the 2017 targets to reflect the measure life changes.

3.2 Future Research

ML6. Finding: As the top priority, conduct primary research on the type of pipe insulation projects installed in Ontario to determine the appropriate measure life.

ML7. Finding: As the second priority, conduct primary research on recently installed building automation systems to determine how current system measure lives deviate from the primary research conducted approximately 20 years ago.

ML8. Finding: Consider also studying dock door seals, either through vendor interviews or program participant interviews, to determine the appropriate measure life.

ML9. Finding: Collect on-going data, similar to the ASHRAE database referenced in the study, to confirm or deny the assumed measure lives for energy curtains, exhaust fan controls, boiler controls, heat exchangers, and "other" industrial equipment.

UNION RESPONSE to ML6 – ML8: Union agrees that further research should be considered to explore the areas recommended in the Measure Life Study. These studies can be prioritized in

consultation with the EAC.

UNION RESPONSE to ML9 – It is unclear if this recommendation is intended for Union.

3.3 Updates to Custom Measure Life Table

The custom program Measure Life Study recommends the measure lives in Table 8 be adopted as the "default" values for custom programs.

Table 8. Default measure lives recommended by the Measure Life Study

Measure	Recommended Measure Life
All other industrial equipment	20
Boiler – Industrial Process	20
Boiler – Space heating	25
Pipe Insulation	14
Boiler – Domestic Hot Water	25
Boiler Controls	15
Energy Curtains	10
Heat Recovery – Commercial	15
Heat Recovery – Industrial	20
Exhaust Fan Controls	15
Heat Reflector Panels	15
Economizers – Conventional and condensing	20
Steam Trap	6
Infiltration Controls – Air Doors	15
Infiltration Controls – Dock Seals	10
IR Poly	5
VFD retrofit on MUA	15
Heat Exchanger	17
Building Automation System	15
Ovens and Thermal Oxidizers	20
Reverse Osmosis Water Conditioner	20
Building Envelope	25

UNION RESPONSE to Table 8: The Measure Life Study was finalized and presented to the utilities on May 10, 2018. As such, Union's 2017 and 2018 custom CI, Low-Income multi-family and Large Volume program delivery did not consider the findings of the report. Union recommends conducting additional research on the proposed changes to measure lives in order to appropriately reflect the

measures and conditions in question. The EC's Final Verification report[11] notes that it based its verified custom measure life values on those found in the Union's current Measure Life Guide when present and reasonable. Site contacts were asked about their expectations for the life of the measure installed. Whether to use Union's current measure life guide or the site contact information was based on the judgement of the evaluation engineer.

The EC provided no guidance on how to gauge if site-specific information is more reasonable than the default custom measure lives supported through the Measure Life Study. Union intends to rely upon default measure lives in a prescriptive manner. Unless truly compelling site-specific information is available to justify a measure life that is shorter or longer than the default value, Union expects that the default value be used. This acknowledges that the default value is an average; measure lives longer and shorter than this average are to be expected but use of an average value across a population should achieve results that balance out these over and underestimates.

This approach is similar to how prescriptive measure lives are used for prescriptive programs. A particular prescriptive installation of a measure might have a measure life that is longer or shorter than the prescriptive average, but the prescriptive average is used regardless.

[11] 2016 Final Verification Report Appendix Q pg 60-61.