
DNV·GL

ONTARIO GAS DSM EVALUATION CONTRACTOR

2019 Natural Gas Demand-Side Management Annual Verification Report

Ontario Energy Board


Date: December 3, 2020



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AUDIT OPINION

Enbridge Gas Inc. (formerly Enbridge Gas Distribution Inc. and Union Gas Limited)¹ implemented energy conservation programs designed to reduce natural gas use at participating customer's homes and businesses throughout the 2019 calendar year. The programs were approved by the Ontario Energy Board (OEB) and were available to all types of natural gas customers, including residential, low income, commercial, and industrial.

The energy conservation programs, called demand-side management (DSM) programs, are regulated by the OEB. The OEB establishes policy guidance, holds public hearings to determine the merit of utility proposals, and approves the use of ratepayer funding for the utility to implement the programs. Depending on the level of success in meeting its annual OEB-approved targets, the utility may be eligible for a performance incentive, called the shareholder incentive. The maximum possible shareholder incentive for each utility is \$10,450,000, although this amount is only available if utility performance meets 150% of all OEB-approved targets. The utility recovers lost revenue as a result of the lower natural gas sales.

The Evaluation Contractor team² (DNV GL and Dunsky) provides the following opinion on the utility-achieved natural gas savings, lost revenue, shareholder incentive, and cost effectiveness of the DSM programs offered by Enbridge and Union for the calendar year ending December 31, 2019.

Our opinion stems from our review of the program documentation, utility shareholder incentive calculations, and lost revenue calculations as set forth in the report that follows. It is also based on the information available at the time that this report was published.

In our opinion, the following figures are reasonable, subject to the qualifications given above.

Definition	Enbridge Results	Union Results
Shareholder Incentive	\$6,717,372	\$5,950,363
Lost Revenue	\$30,969	\$186,485
Verified Net Cumulative Energy Savings (m ³)	988,545,152	1,087,274,262 ³
Total Dollars Spent (not reviewed)	\$72,843,440	\$65,604,306
Benefit Cost Ratio (TRC-plus test)	2.91	2.31

¹ Enbridge Gas Distribution Inc. (Enbridge) and Union Gas Limited (Union) amalgamated effective January 1, 2019 to become Enbridge Gas Inc. In 2019, Enbridge Gas Inc. delivered the two legacy utility DSM plans in its different rate zones – EGD rate zone and Union rate zones (North and South). For ease of reference, throughout this report, the EC has referred to the legacy utility DSM plans as Enbridge and Union.

² DNV GL leads the Evaluation Contractor team and led the evaluation of the 2019 DSM programs, with contributions from Dunsky.

³ This energy savings value does not include the 0.35% savings from the RunSmart program, which is part of the Performance Based scorecard. The 0.35% savings from RunSmart is estimated to be 42,255 CCM savings.

1 Executive Summary

Enbridge Gas Inc.⁴ delivers demand-side management (DSM) programs under the Demand Side Management Framework for Natural Gas Distributors (2015-2020)⁵ developed by the Ontario Energy Board (OEB). Through the framework development and approval of DSM plans, the OEB sets budgets, targets, and cost effectiveness thresholds, in addition to establishing a shareholder incentive for the successful delivery of the approved programs.

The OEB verifies, on an annual basis, natural gas savings and other aspects of energy conservation programs provided by Enbridge Gas Inc. and funded by ratepayers. The energy conservation programs are designed to reduce customer demand for gas through increases in energy efficient technologies and equipment using various methods such as financial incentives, building modifications, education, and outreach. These programs attempt to impact customers' energy usage (demand), rather than utility energy capacity (supply), which is why they are referred to as demand-side management programs.

This report provides results of the annual verification of natural gas DSM programs delivered in 2019 and offered by Enbridge Gas Inc.⁶ The verification was conducted on behalf of the OEB by its independent, third-party evaluation contractor (EC), the team of DNV GL and Dunsky.

The graphic below provides a general depiction of the broader process of creating DSM programs and their evaluation that led to this evaluation report.



*The OEB's EC conducts an expert, independent review to verify the program results, including natural gas savings and participants, and provides an opinion on the utility performance related to OEB-approved targets

**Eligible amounts include performance incentives the utility may be eligible to receive due to meeting or exceeding OEB-approved targets, lost revenues related to program-related natural gas savings, and changes to costs previously approved by the OEB

Independently verified program results, such as natural gas savings and the number of participants, provides important information to the OEB on the success and effectiveness of the programs and prudent use of ratepayer funding. Additionally, verified results are required for the utility to seek approval of any performance incentive related to OEB-approved targets. The financial incentive is to Enbridge Gas Inc.'s shareholders. The financial incentive is determined by reviewing the utilities' accomplishments against their OEB-set targets, assembled in groupings called scorecards along with associated metrics that are used to determine program achievements. The degree of verified achievement (relative to the metric target) determines the shareholder incentive for each legacy utility DSM plan. The shareholder incentive is paid to the utility shareholders to encourage the utility to deliver DSM programs.

The annual verification uses the findings of any program-specific evaluation study applicable to the 2019 programs and applies them to the natural gas energy savings and achieved scorecard values reported by the

⁴ Enbridge Gas Distribution Inc. (Enbridge) and Union Gas Limited (Union) amalgamated effective January 1, 2019 to become Enbridge Gas Inc. In 2019, Enbridge Gas Inc. delivered the two legacy utility DSM plans in its different rate zones – EGD rate zone and Union rate zones (North and South). For ease of reference, throughout this report, the EC has referred to the legacy utility DSM plans as Enbridge and Union.

⁵ EB-2014-0134

⁶ While Enbridge and Union amalgamated effective in 2019, the DSM framework and 2015-2020 DSM Plans were developed and approved by the OEB before amalgamation. Enbridge Gas Inc. has continued to implement the DSM plans individually, to the EGD rate zone and Union rate zones, through the remainder of the framework. As such, the EC still evaluates each DSM plan separately by legacy utility (Enbridge and Union).

utilities to the OEB. For programs or metrics where no recent studies have been performed, the EC team conducts a due diligence review of program documentation to verify the savings or metrics reported by the utilities.

The overall objectives are to provide an independent opinion on whether natural gas savings achieved through programs are reasonable, and that the corresponding DSM shareholder incentives and lost revenue amounts have been accurately calculated.

Table 1-1 and Table 1-3 show the verified, comprehensive scorecard results for the Enbridge and Union rate zones, respectively.

The OEB also requires the utilities to deliver DSM programs that are cost-effective, which means the benefits produced by the programs outweigh the cost of their implementation (including the benefit of reduced use of natural gas, electricity, and water, the cost of those resources, and carbon emissions). The methods that the EC used to calculate cost effectiveness in 2019 are the same ones used in the 2018 analysis. The cost effectiveness results (in terms of TRC-Plus benefit-cost ratio) for each program are found in Table 1-1 and Table 1-3 in the rightmost column. The bigger the number, the more cost effective the program is. These tables also show the amount of money spent by the utilities to implement the energy efficiency programs.

Table 1-2 and Table 1-4 show the verified revenues that Enbridge and Union lost, respectively, as a result of implementing DSM programs. The lost revenue is shown by rate class and is only the revenue lost during the 2019 calendar year.⁷ A rate class is a group of customers that pay the same rate for their gas usage and service.

In summary:

- Enbridge programs offered in 2019 were verified to achieve:
 - Savings in 2019 of 52,260,727 m³ (equal to heating 22,722 homes in Ontario for a year⁸)
 - Cumulative savings of 988,545,152 m³ (translating to emissions reductions of 1,932,606 tons of CO₂ equivalent⁹)
- Union programs offered in 2019 were verified to achieve:¹⁰
 - Savings in 2019 of 63,421,651 m³ (equal to heating 27,575 homes in Ontario for a year¹¹)
 - Cumulative savings of 1,087,274,262 m³ (translating to emissions reductions of 2,125,621 tons of CO₂ equivalent¹²)

In this report, we made several recommendations for the programs, focusing primarily on issues related to program data and databases, program definitions, energy modeling, and cost effectiveness.

⁷ The lost revenue shown in these tables are not the entire lost revenue the utility realizes from its DSM programs. A forecast DSM amount, built into natural gas rates, accounts for a large majority of lost revenues.

⁸ This calculation uses an average annual natural gas usage of 2,300 m³ per year.

⁹ This calculation uses cumulative savings and an emission factor of 0.001955 tCO₂e/m³ (derived based on the federal carbon price of \$20 in 2019 and the [prescribed charge rate for marketable gas in Ontario](#)).

¹⁰ These energy savings values do not include the 0.35% savings from the RunSmart program, which is part of the Performance Based scorecard. The 0.35% savings from RunSmart is estimated to be 8,451 annual and 42,255 cumulative CCM savings.

¹¹ This calculation uses an average annual natural gas usage of 2,300 m³ per year.

¹² This calculation uses cumulative savings and an emission factor of 0.001955 tCO₂e/m³ (derived based on the federal carbon price of \$20 in 2019 and the [prescribed charge rate for marketable gas in Ontario](#)).

1.1 Enbridge Scorecard Results

Table 1-1. Enbridge savings, spend, cost effectiveness, and incentive results*†

Program	Metric	Verified First-Year Savings (CCM)	Verified Cumulative Savings or Other Metric	Percent of Target Achieved	DSM Shareholder Incentive	OEB-Approved Program Budget	Utility Spending**	Budget/Spending Variance	Benefit Cost Ratio (TRC Plus Test)		Net Present Value (TRC Plus)
									O&A Costs	No O&A Costs	
Resource Acquisition		46,457,325	871,969,429			\$42,056,270	\$48,382,408	\$6,326,138 (15%)	3.03		\$158,352,000
Commercial & Industrial Custom	CCM Savings	24,260,509	450,585,359	118.7%	\$4,827,040	\$7,508,793	\$7,318,213	-\$190,580	5.56	6.35	\$91,336,000
Commercial & Industrial Direct Install	CCM Savings	7,695,663	115,434,947			\$4,853,510	\$3,887,196	-\$966,314	7.21	8.45	\$26,812,000
Commercial & Industrial Prescriptive	CCM Savings	3,017,042	48,760,124			\$2,277,564	\$1,381,605	-\$895,959	4.07	4.42	\$10,386,000
Comprehensive Energy Management	CCM Savings	-	-			\$96,900	\$0	-\$96,900	-	-	-
Energy Leaders Initiative	CCM Savings	-	-			\$0	\$4,600	\$4,600	-	-	-
Residential Adaptive Thermostats	CCM Savings	2,346,921	35,203,822			\$2,218,500	\$1,357,609	-\$860,891	2.74	2.86	\$8,400,000
Run-it-Right	CCM Savings	322,228	1,611,139			\$1,618,946	\$217,725	-\$1,401,221	0.70	0.71	-\$202,000
Home Energy Conservation	CCM Savings	8,814,962	220,374,038			\$18,360,000	\$29,420,859	\$11,060,859	1.48	1.53	\$21,620,000
	Participants		16,480	142.0%							
Resource Acquisition Overhead	N/A	N/A	N/A	N/A		\$5,122,057	\$4,794,602	-\$327,455	N/A	N/A	N/A
Low Income		5,803,402	116,575,723			\$13,576,837	\$13,690,519	\$113,682 (1%)	2.19		\$16,569,000
Home Winterproofing	CCM Savings	1,240,764	27,618,723	134.0%	\$1,159,746	\$6,605,744	\$7,141,896	\$536,152	1.14	1.20	\$934,000
Multi-Residential	CCM Savings	4,562,638	88,957,000	86.7%		\$3,889,562	\$3,278,499	-\$611,063	3.22	3.87	\$15,636,000
New Construction	Applications	N/A	11	100.0%		\$1,428,000	\$1,722,304	\$294,304	N/A	N/A	N/A
Low Income Overhead	N/A	N/A	N/A	N/A		\$1,653,531	\$1,547,820	-\$105,711	N/A	N/A	N/A
Market Transformation		N/A	N/A			\$7,030,304	\$7,479,856	\$449,552 (6%)	N/A	N/A	N/A
School Energy Competition	Schools	N/A	32	100.0%	\$730,586	\$510,000	\$255,413	-\$254,587	N/A	N/A	N/A
Run-it-Right	Participants		84	233.3%		\$322,236	\$528,343	\$206,107			
Comprehensive Energy Management	Participants		7	43.8%		\$923,100	\$223,818	-\$699,282			
Residential Savings by Design	Builders		39	130.0%		\$3,320,443	\$4,178,404	\$857,961			
	Homes		2,989	117.9%							
Commercial Savings by Design	Developments		35	116.7%		\$1,098,300	\$1,492,392	\$394,092			
Market Transformation Overhead	N/A		N/A	N/A		N/A	\$856,225	\$801,486			
Enbridge Program Total		52,260,727	988,545,152		\$6,717,372	\$62,663,411	\$69,552,784	\$6,889,373 (11%)	2.91		\$174,921,000
Portfolio Overhead and Administrative Costs						\$3,758,362	\$3,290,656	-\$467,706 (-12%)			
Enbridge Portfolio Total						\$66,421,773	\$72,843,440	\$6,421,667 (10%)			

*Not all values may compute exactly due to rounding.

†CCM are cumulative cubic meters of natural gas.

**The OEB's DSM Framework allows for utility spending to differ from the approved budget. Sections 6.6 and 11.2 of the [Filing Guidelines](#) provide details for acceptable spending differences.

Table 1-2. Enbridge lost revenue results*

Rate Class	Verified Lost Revenue
Rate 110	\$10,945
Rate 115	\$8,912
Rate 135	\$10,798
Rate 145	\$0
Rate 170	\$315
Total	\$30,969

*Not all values may compute exactly due to rounding.

1.2 Union Scorecard Results

Table 1-3. Union achievement, spend, cost effectiveness, and incentive results*†

Program	Metric	Verified First-Year Savings (CCM)	Verified Cumulative Savings or Other Metric	Percent of Target Achieved	DSM Shareholder Incentive	OEB-Approved Program Budget	Utility Spending**	Budget/ Spending Variance	Benefit Cost Ratio (TRC Plus Test)		Net Present Value (TRC Plus)								
									O&A Costs	No O&A Costs									
Resource Acquisition		52,783,366	935,593,811			\$37,810,983	\$40,581,858	\$2,770,875 (7%)	2.41		\$123,037,000								
Commercial & Industrial Custom	CCM Savings	33,381,737	542,374,593	117.2%	\$4,344,389	\$7,808,000	\$8,865,926	\$1,057,926	2.71	2.90	\$71,003,000								
Commercial & Industrial Direct Install	CCM Savings	4,852,657	72,789,855			\$2,500,000	\$2,011,911	-\$488,089	8.32	10.15	\$14,744,000								
Commercial & Industrial Prescriptive	CCM Savings	7,798,191	157,270,801			\$7,149,000	\$3,242,754	-\$3,906,246	3.10	3.33	\$24,166,000								
Residential Adaptive Thermostats	CCM Savings	561,096	8,416,434			\$1,500,000	\$550,816	-\$949,184	2.15	2.34	\$1,622,000								
Home Reno Rebate	CCM Savings	6,189,685	154,742,128			131.9%		\$12,226,000	\$19,815,812	\$7,589,812	1.37	1.48	\$11,502,000						
	Homes Built	N/A	10,958																
Overhead and Administrative Costs	N/A	N/A	N/A	N/A		\$6,627,983	\$6,094,639	-\$533,344	N/A	N/A	N/A								
Low Income		3,591,373	79,310,259			\$14,144,720	\$13,367,910	-\$776,810 (-5%)	1.59		\$7,341,000								
Home Weatherization	CCM Savings	2,188,998	51,145,673	118.1%	\$1,253,615	\$8,063,000	\$9,254,777	\$1,191,777	1.34	1.46	\$3,261,000								
Furnace End-of-Life	CCM Savings	5,922	106,596			\$919,000	\$36,075	-\$882,925	0.41	0.42	-\$37,000								
Indigenous	CCM Savings	20,737	479,971			\$456,000	\$327,899	-\$128,101	0.51	0.52	-\$115,000								
Multi-Family - Social & Assisted	CCM Savings	192,643	22,803,826			\$3,031,000	\$2,598,715	-\$432,285	2.57	3.02	\$4,231,000								
Multi-Family - Market Rate	CCM Savings	1,183,073	4,774,193			\$1,675,720	\$1,150,443	-\$525,277	N/A	N/A	N/A								
Overhead and Administrative Costs	N/A	N/A	N/A	N/A															
Large Volume		7,046,912	72,370,192			\$4,000,000	\$3,088,606	-\$911,394 (-23%)	2.46		\$8,675,000								
Large Volume	CCM Savings	7,046,912	72,370,192	52.6%	\$0	\$3,150,000	\$2,684,610	-\$465,390	2.46	2.64	\$8,675,000								
Overhead and Administrative Costs	N/A	N/A	N/A	N/A		\$850,000	\$403,996	-\$446,004	N/A	N/A	N/A								
Market Transformation		N/A	N/A			\$2,338,070	\$2,241,994	-\$96,076 (-4%)	N/A		N/A								
Optimum Home	Builders	N/A	4	100.0%	\$352,359	\$841,000	\$817,193	-\$23,807	N/A	N/A	N/A								
	Homes Built		95.45%	127.3%															
	% of Homes Built		28.55%	657.8%															
Commercial New Construction	Developments		22	110.0%		\$1,000,000	\$924,147	-\$75,853											
Overhead and Administrative Costs	N/A		N/A	N/A		\$497,070	\$500,654	\$3,584											
Performance Based		N/A	N/A			\$833,000	\$579,846	-\$253,154 (-30%)	0.02		-\$530,000								
RunSmart***	Participants	N/A	58	103.6%	\$0	\$182,000	\$153,632	-\$28,368	0.05	0.09	-\$232,000								
	% Savings		0.35%	48.5%															
Strategic Energy Management	% Savings			0.00%								0.0%		\$400,000	\$309,007	-\$90,993	0.00	0.00	-\$298,000
	Overhead and Administrative Costs		N/A	N/A								N/A		\$251,000	\$117,207	-\$133,793	N/A	N/A	N/A
Union Program Total		63,421,651	1,087,274,262		\$5,950,363	\$59,126,773	\$59,860,214	\$733,441 (1%)	2.31		\$138,523,000								
Portfolio Overhead and Administrative Costs						\$5,642,000	\$5,744,092	\$102,092 (2%)											
Union Portfolio Total						\$64,768,773	\$65,604,306	\$835,533 (1%)											

*Not all values may compute exactly due to rounding.

†CCM are cumulative cubic meters of natural gas.

** The OEB's DSM Framework allows for utility spending to differ from the approved budget. Sections 6.6 and 11.2 of the [Filing Guidelines](#) provide details for acceptable spending differences.

*** The first-year and cumulative energy savings values do not include the 0.35% savings from the RunSmart program, which is part of the Performance Based scorecard. The 0.35% savings from RunSmart is estimated to be 8,451 annual and 42,255 cumulative CCM savings.

Table 1-4. Union lost revenue results*

Rate Class	Verified Lost Revenue
M4 Industrial	\$143,379
M5 Industrial	\$7,666
M7 Industrial	\$21,646
T1 Industrial	\$512
T2 Industrial	\$621
20 Industrial	\$10,939
100 Industrial	\$1,724
Total	\$186,485

*Not all values may compute exactly due to rounding.

1.3 Report Structure

The table below provides an overview of the report structure and a link to each major section within the remainder of the report.

Section	Contents
2. Glossary of Key Terms and Concepts	This section contains a guide for readers to understand the terminology and concepts used throughout the report.
3. Introduction	This section provides the background of the annual verification report.
4. Scorecard: Resource Acquisition	<ul style="list-style-type: none"> • Scorecard achievements for Enbridge • Scorecard achievements for Union
5. Scorecard: Low Income	<ul style="list-style-type: none"> • Scorecard achievements for Enbridge • Scorecard achievements for Union
6. Scorecard: Large Volume	<ul style="list-style-type: none"> • Scorecard achievements for Union
7. Scorecard: Market Transformation	<ul style="list-style-type: none"> • Scorecard achievements for Enbridge • Scorecard achievements for Union
8. Scorecard: Performance Based	<ul style="list-style-type: none"> • Scorecard achievements for Union
9. Utility Summary of Shareholder Incentives, Program Spending, Cost Effectiveness, and Lost Revenue	<ul style="list-style-type: none"> • Enbridge Results • Union Results
10. Findings and Recommendations	Topics in this section include overall findings and recommendations, whole home simulation modeling, and cost effectiveness.
11. Appendices	<ul style="list-style-type: none"> • Evaluation Background • Metric Verification Activities • Changes from 2018 Evaluation • Summary of Verification Adjustments • Data and Documentation Requests • Resource Acquisition Scorecards • Low Income Scorecards • Large Volume Scorecards • Market Transformation Scorecards • Performance Based (Union) and Market Transformation (Enbridge) Scorecards • Review of Metric Target Calculations • Review of Lost Revenue and DSM Shareholder Incentive Calculations • Lost Revenue and DSM Shareholder Incentive: Detailed Tables • Prescriptive Savings Verification • Program Spending Tables • Cost Effectiveness Methodology • Findings and Recommendations: Summary Tables

2 Glossary of Key Terms and Concepts

Adjustment factor	An adjustment factors is a percentage or ratio that allows evaluation findings from a sample of projects to be applied to and “adjust” the population of projects. An example is an installation rate, which reflects the percentage of participants who installed a prescriptive measure and kept it installed.
Attribution	The energy savings or other benefits that are the result of a utility energy program’s influence, including free ridership and spillover effects (see definitions in this Glossary).
Baseline, base case	The amount of gas used in the absence of a program offering. This could be the amount of gas the equipment in place is using, or the amount of gas that a standard efficiency piece of equipment would use.
Building envelope	Exterior surfaces of a building (for example walls, windows, roof, and floors) that separate the conditioned space from the outdoors.
C&I	Stands for commercial and industrial and can mean building types or customer types.
CCM	Cumulative cubic meters (cumulative m ³), and in this report, represents the volume of natural gas savings verified over the life of the measure.
Code	An action or standard required by local or federal laws for safety, environmental, or other reasons. For example, a building code that requires a minimum fuel efficiency for furnaces.
Cost effectiveness	Refers to the analysis that determines whether or not the benefits of a project/measure (see Glossary) are greater than the costs. It is based on the net present value of savings over the equipment life of the measure.
Cost effectiveness test - PAC	A test that compares the utility's avoided cost benefits with energy efficiency program expenditures (incentives plus administrative costs).
Cost effectiveness test - TRC-Plus	A test that compares benefits to society as a whole (avoided cost benefits plus non-energy benefits) with the participant's cost of installing the measure plus the cost of incentives and program administration.
Custom project savings verification (CPSV)	The process by which the cumulative gross savings estimates of the utilities’ DSM projects are verified. A custom DSM project is based on customer-specific information and considerations, as opposed to standardized projects, which are called prescriptive.
Customer – Enbridge	Enbridge identifies unique customers based on the account number and the contact information. A customer may have multiple site addresses, decision makers, account numbers, and utilities. Customers can only be identified for records for which we received contact information.
Customer – Union	Union identifies unique customers based on the customer identification (ID) number and the contact information. A customer may have multiple site addresses, decision makers, customer IDs, and utilities. Customers can only be identified for records for which we received contact information.
Demand side management (DSM)	The act of modifying customer demand for gas through utility programs using various methods such as financial incentives (such as rebates), education, and outreach.

Domain	A grouping of like projects. For example, a domain may be defined as projects within a specific sector (such as residential homes), or it might be a category of measures (see definition in Glossary), end uses, or other categories.
Dual baseline	A phrase used to describe the baseline for a measure that replaces working equipment with high efficiency equipment, also known as early replacement. The first baseline is the energy used by the existing equipment and the second baseline is the energy used by a standard efficiency piece of equipment.
Early replacement (ER)	The act of replacing a piece of equipment that is not past its expected useful life (EUL) and is in good operating condition.
Early replacement period (ER Period)	Years that the existing equipment would have continued to be in use had it not been replaced early. This is the same as remaining useful life, or RUL.
Effective useful life (EUL)	The length of time that a measure (see definition in Glossary) is expected to provide its estimated annual gas savings. EUL depends on equipment lifetime and measure persistence (see Glossary definition).
Energy advisors	People who work for utilities or their programs to provide information to customers about energy saving opportunities and program participation. This term includes, but is not limited to, Enbridge's Energy Solutions Consultants and Union's Account Managers.
Ex ante	This means "from before" in Latin. Program evaluators use this term to describe claimed or reported inputs, assumptions, savings, etc. for a measure (see definition in Glossary) or program.
Ex post	This means "from behind" in Latin. Program evaluators use this term to describe inputs, assumptions, savings, etc. that are assessed and verified after savings are reported or claimed. The term does not include assessment and verification of the amount of program influence (see free ridership) on inputs, assumptions, savings, etc. This term is sometimes used to mean verified gross savings.
Free rider	A customer who would install or perform the same energy-saving measure (see definition in Glossary) without utility influence.
Free ridership	The portion of a program's verified energy savings that would naturally occur without the utility program.
Free ridership based attribution	The portion of a program's verified energy savings that the utility influenced if one only considers free ridership and not spillover. Free ridership based attribution is the complement of free ridership. (free ridership based attribution = 100% - free ridership).
Gross savings	Changes in energy consumption and/or demand from programs or projects included in utility programs, regardless of reasons for participation.
In situ	This means "on site" or "in position" in Latin. For verification of energy savings, this means the existing measure (see Glossary definition) conditions and/or efficiency.
Incentive	An incentive is often a payment from the utility to participants of a DSM program. Incentives can be paid to customers, vendors, or other parties.

Incremental cost	The difference in purchase price (and any differences in related installation or implementation costs), at the time of purchase, between the energy-saving measure (see Glossary definition) and the base case measure. In some early retirements and retrofits, the full cost of the efficient technology is the incremental cost.
Industry standard practice (ISP)	A common practice used within an industry but not defined by code (see Glossary definition). For example, the agriculture sector is not covered by code, so the “typical” level of insulation used on hot water pipes is considered ISP.
Input assumptions	Operating characteristics and associated units of resource savings for DSM technologies and measures (see Glossary definition). These cover a range of typical DSM activities, measures, and technologies with residential, low-income, commercial and industrial applications.
Lifetime cumulative savings	These are total gas savings (in cumulative cubic meters, or CCM) over the life of a measure (see Glossary definition) and they are sometimes referred to as just “cumulative” or “lifetime” savings.
Maintenance (Maint.)	This is to repair, maintain, or restore to prior efficiency and/or optimum operation.
Measure	Equipment, technology, practice, or behavior that, once installed or working, results in a reduction in energy use.
Measure – Enbridge	For Enbridge, measures are identified in the tracking data as a unique combination of project ID and measure ID. Multiple measures may belong to the same project.
Measure – Union	For Union, measure refers to a project ID and line ID in the tracking data. Multiple measures may belong to the same project.
Measure persistence	How long a measure remains installed and performs as originally predicted in relation to its EUL. This considers events like business turnover, early retirement of installed equipment, and other reasons measures might be removed or discontinued.
Measurement and Verification (M&V)	The verification of energy savings using methods not including attribution/free ridership assessment.
Metric	This is a term used by the OEB to that is used to measure a utility’s program achievement. Under the DSM framework, programs are grouped into categories, called scorecards. Each program within a scorecard is assigned at least one metric that is used to measure utility performance. The metric for many programs is CCM savings, or a reduction in natural gas consumption, while other programs have non-savings metrics such as the number of program participants. Within each scorecard, various metrics are combined to produce an overall scorecard achievement.
MF	Means multifamily (multi-residential) and can be used to describe a building or program.
Net-to-gross	The ratio of net energy savings to gross savings. The NTG ratio is applied to gross program savings to convert them into net program savings.
New construction (NC)	New buildings or spaces.

Non-early replacement period (non-ER period)	The years after the ER period and up to the EUL.
Normal replacement (NR)	A measure that replaces a piece of equipment that has reached or is past its EUL and not in good operating condition.
Program	The OEB uses this term to categorize sub-units of Scorecards. For example, a program could be the C&I Custom Program within the Resource Acquisition Scorecard. DNV GL defines programs consistent with the OEB's Decision and Order approving the 2015-2020 DSM Plans.
Program evaluation	The activities related to the collection, analysis, and reporting of data for purposes of measuring program impacts (including gas savings and participation) from past, existing, or potential program impacts.
Program spending	The amount spent running energy-savings programs, not including the costs of running (called overhead costs) the larger portfolio of programs. This value can be divided into spending for program measures and incentives, as well as program-specific costs.
Project - Enbridge	For Enbridge, projects are identified in the tracking data based on the project ID. A project may have multiple measures as indicated by measure IDs in the current data tracking system.
Project - Union	For Union, projects are identified in the tracking data based on project ID. A project may have multiple measures as indicated by measure IDs in the current data tracking system.
Rate class	The OEB establishes distribution rate classes for Enbridge and Union. Distribution rate classes group customers with similar energy profiles.
Realization rate	This is the ratio of gross evaluated savings to gross claimed savings. This is used to provide a comparison of the savings that were achieved to the savings that were predicted.
Remaining useful life (RUL)	The number of years that the existing equipment would have remained in service and in good operating condition had it not been replaced. This is the same as the ER period.
Replace on burnout (ROB)	A measure that replaces a failed or failing piece of equipment.
Retrofit add-on (REA)	A measure that reduces energy use by modifying an existing piece of equipment.
Scorecard	A scorecard allows for multiple different kinds of metrics such as cumulative natural gas savings and/or participants enrolled to be used simultaneously to measure annual utility performance. Each utility has a scorecard identified for each program year, which can be found in the Ontario Energy Board Decision and Order EB-2015-0029/EB-2015-0049.
Scorecard Achievement	The verified value for program-specific metric targets (CCM, applications, etc.) of each scorecard identified by the Annual Scorecard. This is the value that is verified as the achieved value by the Annual Verification report and used for calculation of the shareholder incentive.
Shareholder Incentive	As part of the current DSM Framework, an annual performance incentive is available to the gas utilities in the event program performance is at or above 75% of the OEB-approved targets up to a maximum of 150%.

Site	Sites are places identified based on unique site addresses provided by Union and Enbridge through the contact information data request. A site may have multiple units of analysis, measures, and projects. Sites can be identified by the evaluation only for records for which we receive contact information – i.e. records associated with account number (Enbridge) or customer ID (Union) that have projects in the sample or backup sample.
Spillover effects	These are reductions in energy consumption and/or demand that occur as a result of the presence of a utility DSM program, but are beyond program-related savings and are not part of the utility’s verified savings. These effects could result from many factors including additional efficiency actions that program participants take outside the program as a result of having participated, changes in store availability of energy-using equipment, and changes in energy use by program non-participants as a result of utility program advertising.
System optimization (OPT)	To improve system or system settings to exceed prior efficiency.
TRM	Technical Resource Manual, which is a document that identifies standard methodologies and inputs for calculating energy savings.
TSER	This means telephone-supported engineering review. This is a method to support the verification of energy savings via telephone.
Union influence factor	Factor applied by Union to a small number of projects. The factor reduces ex ante (claimed) savings to account for anticipated partial free ridership.
Unit of analysis – Enbridge	The level at which data are analyzed, which in 2017 is a “measure” or sub-project level for Enbridge.
Unit of analysis - Union	The level at which data are analyzed, which in 2017 is a project for Union. A project is equivalent to a measure for Union as the database did not have a sub-project level.
Vendors	Program trade allies, business partners, contractors, and suppliers who work with program participants to implement energy saving measures.

3 Introduction

Enbridge Gas Inc.¹³ delivers demand-side management (DSM) programs¹⁴ under the Demand Side Management Framework for Natural Gas Distributors (2015-2020)¹⁵ developed by the Ontario Energy Board (OEB). The 2019 Natural Gas DSM Annual Verification Report has been prepared for the OEB to report the results of the annual verification of the utility's natural gas DSM programs delivered in 2019. These verifications were conducted by the OEB's Evaluation Contractor (EC) team of DNV GL and Dunskey.

As part of the utility DSM plan, programs are grouped into categories, called scorecards. Each program within a scorecard is assigned at least one metric that is used to measure utility performance. The metric for many programs is cumulative cubic meters (CCM) savings, or a reduction in natural gas consumption, while other programs have non-savings metrics such as the number of program participants. Within each scorecard, various metrics are combined to produce an overall scorecard achievement.

Each scorecard metric is assigned a target.¹⁶ The EC uses sampling, engineering reviews, documentation verification, and other techniques to verify the utilities' performance against the target for each program year. The percentage of target achieved for each metric is combined across the scorecard and used to determine the amount the utility is eligible for as a demand-side management shareholder incentive (DSMSI).¹⁷

In addition to the shareholder incentive, the OEB compensates the utilities for the reduced revenue taken as a result of delivering these DSM programs, called "lost revenue", which is also verified by the EC.

The OEB requires the utilities to deliver DSM programs that are cost-effective, which means the verified benefits produced by the programs outweigh the cost of their implementation.¹⁸ Cost effectiveness results can be found in Sections 9.1.3, 9.2.3, and Appendix P.

The OEB formed an evaluation advisory committee (EAC) to provide input and advice to the OEB and the EC on the evaluation and audit of DSM results. The EAC consists of representatives from OEB staff, the utilities, non-utility stakeholders, independent experts, staff from the Independent Electricity System Operator (IESO), and an observer from the Ministry of Energy, Northern Development and Mines. The EC received feedback and input from the EAC on the results of this annual verification. The content included in this report integrates our responses to their input. We thank them for their involvement.

¹³ Enbridge Gas Distribution Inc. (Enbridge) and Union Gas Limited (Union) amalgamated effective January 1, 2019 to become Enbridge Gas Inc. In 2019, Enbridge Gas Inc. delivered the two legacy utility DSM plans in its different rate zones – EGD rate zone and Union rate zones (North and South). For ease of reference, throughout this report, the EC has referred to the legacy utility DSM plans as Enbridge and Union.

¹⁴ Throughout this report, the word "program" is used consistent with the OEB's 2015-2020 DSM Framework and Decision on the utilities' 2015-2020 DSM Plans. See Section 2 for additional detail.

¹⁵ EB-2014-0134

¹⁶ These targets, which were set in part based on 2018 performance, are described in detail in Appendix K.

¹⁷ A minimum weighted scorecard achievement level of 75% is required to earn a portion of the available shareholder incentive for a scorecard.

¹⁸ The cost-effectiveness methodology is described in detail in Appendix P.

4 SCORECARD RESULTS: RESOURCE ACQUISITION

Programs within the Resource Acquisition scorecard provide customers with financial incentives that reduce the cost of upgrading to more energy efficient technologies and equipment. This scorecard comprises the largest share of both utilities' budgets and shareholder incentive.

4.1 Scorecard achievements for Enbridge

The metrics for the Enbridge Resource Acquisition scorecard include:

- Total cumulative large volume customer natural gas savings
- Total cumulative small volume customer natural gas savings
- Number of Home Energy Conservation program participants

A detailed explanation of the verification activities for all Resource Acquisition programs can be found in Appendix F. Verified program achievements are listed in Table 4-1 with DSM shareholder incentive results in Table 4-2.

Table 4-1. Enbridge 2019 Resource Acquisition verified achievements*

Programs	Metrics	Verified Achievement	
		Program-level Achievements	Metric-level Achievements
Home Energy Conservation	Large Volume Customer - CCM	N/A	502,499,656
Residential Adaptive Thermostats		N/A	
Commercial & Industrial Custom		439,093,958	
Commercial & Industrial Direct Install		42,896,376	
Commercial & Industrial Prescriptive		18,898,183	
Comprehensive Energy Management		-	
Run-it-Right		1,611,139	
Home Energy Conservation	Small Volume Customer - CCM	220,374,038	369,469,773
Residential Adaptive Thermostats		35,203,822	
Commercial & Industrial Custom		11,491,401	
Commercial & Industrial Direct Install		72,538,571	
Commercial & Industrial Prescriptive		29,861,941	
Comprehensive Energy Management		-	
Run-it-Right	N/A		
Home Energy Conservation	Participants	16,480	16,480

*Not all values may compute exactly due to rounding.

Table 4-2. Enbridge’s 2019 Resource Acquisition targets, achievements, weights, and incentive* †

Metric	Target	Verified Achievement	Weight	Metric Score	Weighted Metric Score
Large Volume Customer - CCM	435,731,127	502,499,656	40.0%	115.3%	46.1%
Small Volume Customer - CCM	298,605,963	369,469,773	40.0%	123.7%	49.5%
Participants	11,606	16,480	20.0%	142.0%	28.4%
Verified Total Weighted Scorecard Achieved					124.0%
Maximum Scorecard Incentive					\$7,013,471
Verified Scorecard Incentive Achieved					\$4,827,040

*Not all values may compute exactly due to rounding.

†See Appendix L for a detailed description of the scorecard and incentive calculations.

Table 4-3 shows the net cumulative natural gas savings (CCM) by program, as verified by the EC. Unlike Table 4-1, this table shows overall program totals, not broken out by Large or Small Volume metrics.

Table 4-3. Enbridge’s verified 2019 Resource Acquisition savings*

Program	Net Cumulative Savings (m3)
Home Energy Conservation	220,374,038
Residential Adaptive Thermostats	35,203,822
Commercial & Industrial Custom	450,585,359
Commercial & Industrial Direct Install	115,434,947
Commercial & Industrial Prescriptive	48,760,124
Comprehensive Energy Management	-
Run-it-Right	1,611,139
Resource Acquisition Total	871,969,429

*Not all values may compute exactly due to rounding.

4.2 Scorecard achievements for Union

This section summarizes the results of the EC’s review of the Union Resource Acquisition scorecard. The metrics for the Union Resource Acquisition scorecard include:

- Total cumulative natural gas savings
- Number of residential deep savings participants

A detailed explanation of the verification activities for all Resource Acquisition programs can be found in Appendix F. Verified program achievements are listed in Table 4-4 with DSM shareholder incentive results in Table 4-5.

Table 4-4. Union 2019 Resource Acquisition verified achievements*

Programs	Metrics	Verified Achievement	
		Program-level Achievements	Metric-level Achievements
Home Reno Rebate	CCM	154,742,128	935,593,811
Residential Adaptive Thermostats		8,416,434	
Commercial & Industrial Custom		542,374,593	
Commercial & Industrial Direct Install		72,789,855	
Commercial & Industrial Prescriptive		157,270,801	
Home Reno Rebate	Homes Built	10,958	10,958

*Not all values may compute exactly due to rounding.

Table 4-5. Union's 2019 Resource Acquisition targets, achievements, weights, and incentive* †

Metric	Target	Verified Achievement	Weight	Metric Score	Weighted Metric Score
CCM	798,585,979	935,593,811	75.0%	117.2%	87.9%
Home Reno Rebate Homes Built	8,308	10,958	25.0%	131.9%	33.0%
Verified Total Weighted Scorecard Achieved					120.8%
Maximum Scorecard Incentive					\$6,682,671
Verified Scorecard Incentive Achieved					\$4,344,389

*Not all values may compute exactly due to rounding.

†See Appendix L for a detailed description of the scorecard and incentive calculations.

5 SCORECARD RESULTS: LOW INCOME

Programs within the Low Income scorecard provide eligible customers with opportunities to improve the energy efficiency of their homes (for residential customers) and buildings (for building owners and multifamily customers) at no cost.

5.1 Scorecard achievements for Enbridge

This section summarizes the results of the EC’s review of the Enbridge Low Income scorecard. The metrics for the Enbridge Low Income scorecard include:

- Total cumulative natural gas savings for single family homes
- Total cumulative natural gas savings for multi-residential homes
- Total applications for Low Income New Construction

A detailed explanation of the verification activities for all Low Income programs can be found in Appendix G. Verified program achievements are listed in Table 5-1 with DSM shareholder incentive results in Table 5-2.

Table 5-1. Enbridge 2019 Low Income verified achievements

Programs	Metrics	Verified Achievement	
		Program-level Achievements	Metric-level Achievements
Home Winterproofing	CCM	27,618,723	27,618,723
Low Income Multi-Residential	CCM	88,957,000	88,957,000
Low Income New Construction	Applications	11	11

Table 5-2. Enbridge’s 2019 Low Income scorecard targets, achievements, weights, and incentive* †

Metric	Target	Verified Achievement	Weight	Metric Score	Weighted Metric Score
Home Winterproofing CCM	20,605,874	27,618,723	45.0%	134.0%	60.3%
Low Income Multi-Residential CCM	102,544,768	88,957,000	45.0%	86.7%	39.0%
Low Income New Construction Applications	11	11	10.0%	100.0%	10.0%
Verified Total Weighted Scorecard Achieved					109.4%
Maximum Scorecard Incentive					\$2,264,127
Verified Scorecard Incentive Achieved					\$1,159,746

*Not all values may compute exactly due to rounding.

†See Appendix L for a detailed description of the scorecard and incentive calculations.

5.2 Scorecard achievements for Union

This section summarizes the results of the EC’s review of the Union Low Income scorecard. The metrics for the Union Low Income scorecard include:

- Total cumulative natural gas savings for single-family programs
- Total cumulative natural gas savings for “social & assisted” multifamily projects
- Total cumulative natural gas savings for “market rate” multifamily projects

A detailed explanation of the verification activities for all Low Income programs can be found in Appendix G. Verified program achievements are listed in Table 5-3 with DSM shareholder incentive results in Table 5-4.

Table 5-3. Union 2019 Low Income verified achievements*

Programs	Metrics	Verified Achievement	
		Program-level Achievements	Metric-level Achievements
Home Weatherization	CCM	51,145,673	51,732,240
Furnace End-of-Life		106,596	
Indigenous		479,971	
Multi-Family Social & Assisted	CCM	22,803,826	22,803,826
Multi-Family Market Rate	CCM	4,774,193	4,774,193

*Not all values may compute exactly due to rounding.

Table 5-4. Union's 2019 Low Income targets, achievements, weights, and incentive* †

Metric	Target	Verified Achievement	Weight	Metric Score	Weighted Metric Score
Single Family CCM	43,788,748	51,732,240	60.0%	118.1%	70.9%
Multi-Family - Social & Assisted CCM	23,132,372	22,803,826	35.0%	98.6%	34.5%
Multi-Family - Market Rate CCM	7,780,746	4,774,193	5.0%	61.4%	3.1%
Verified Total Weighted Scorecard Achieved					108.5%
Maximum Scorecard Incentive					\$2,499,922
Verified Scorecard Incentive Achieved					\$1,253,615

*Not all values may compute exactly due to rounding.

†See Appendix L for a detailed description of the scorecard and incentive calculations.

6 SCORECARD RESULTS: LARGE VOLUME

Union's Large Volume Program comprises the entire Large Volume scorecard. This program provides large volume customers¹⁹ with training presentations, energy efficiency calculation tools, energy use analysis, and other technical assistance from Union's Technical Account Managers. It uses a self-directed funding model in which eligible customers can access and utilize funds included in their natural gas rates. Funds from customers electing not to participate are dispersed to fund energy efficiency projects for participating Large Volume customers.

Enbridge did not have DSM programs specifically for their large volume customers in 2019.

6.1 Scorecard achievements for Union

This section summarizes the results of the EC's review of the Union Large Volume scorecard. The metric for the Large Volume scorecard is total cumulative natural gas savings. A detailed explanation of the verification activities for the Large Volume program, broken out by prescriptive and custom savings, can be found in Appendix H. Verified program achievements are listed in Table 6-1 with DSM shareholder incentive results in Table 6-2.

Table 6-1. Union 2019 Large Volume verified achievements*

Programs	Metrics	Verified Achievement	
		Program-level Achievements	Metric-level Achievements
Large Volume	CCM	72,370,192	72,370,192

*Not all values may compute exactly due to rounding.

Table 6-2. Union's 2019 Large Volume targets, achievements, weights, and incentive* †

Metric	Target	Verified Achievement	Weight	Metric Score	Weighted Metric Score
CCM	137,666,792	72,370,192	100.0%	52.6%	52.6%
Verified Total Weighted Scorecard Achieved**					52.6%
Maximum Scorecard Incentive					\$706,956
Verified Scorecard Incentive Achieved					\$0.00

*Not all values may compute exactly due to rounding.

**A minimum total weighted scorecard achievement level of 75% is required to earn a portion of the available shareholder incentive.

†See Appendix L for a detailed description of the scorecard and incentive calculations.

¹⁹ Large volume customers are those with very high natural gas consumption, typically large industrial and commercial facilities.

7 SCORECARD RESULTS: MARKET TRANSFORMATION

Programs within the Market Transformation scorecard focus on changing customer behavior and attitudes related to energy efficiency, intending to cause permanent change in the marketplace over time. Although energy savings may result from these programs, savings are typically not the primary goal.

7.1 Scorecard achievements for Enbridge

This section summarizes the results of the EC’s review of the Enbridge Market Transformation scorecard. The metrics for the Enbridge Market Transformation scorecard include the number of:

- Builders for Residential Savings by Design
- Homes built for Residential Savings by Design
- New developments for Commercial Savings by Design
- Participating schools for School Energy Competition
- Participants for Run-it-Right
- Participants for Comprehensive Energy Management

As some programs are similar to Union Market Transformation programs, and others similar to Union Performance Based programs, the programs are divided between Appendix I (Market Transformation Scorecards) and Appendix J (Performance Based (Union) and Market Transformation (Enbridge) Scorecards), as listed in Table 7-1.

Table 7-1. Enbridge Market Transformation program detailed evaluation, by appendix

Enbridge Program	Appendix
Commercial Savings by Design	Appendix I
Residential Savings by Design	
School Energy Competition	
Run-it-Right	Appendix J
Comprehensive Energy Management	

Verified program achievements are listed in Table 7-2 with DSM shareholder incentive results in Table 7-3.

Table 7-2. Enbridge 2019 Market Transformation verified achievements

Programs	Metrics	Verified Achievement	
		Program-level Achievements	Metric-level Achievements
School Energy Competition	Schools	32	32
Run-it-Right	Participants	84	84
Comprehensive Energy Management	Participants	7	7
Residential Savings by Design	Builders	39	39
	Homes Built	2,989	2,989
Commercial Savings by Design	New Developments	35	35

Table 7-3. Enbridge’s 2019 Market Transformation scorecard targets, achievements, weights, and incentive*†

Metric	Target	Verified Achievement	Weight	Metric Score**	Weighted Metric Score
School Energy Competition Schools	32	32	10.0%	100.0%	10.0%
Run-it-Right Participants	36	84	20.0%	200.0%	40.0%
Comprehensive Energy Management Participants	16	7	20.0%	43.8%	8.8%
Residential Savings by Design Builders	30	39	10.0%	130.0%	13.0%
Residential Savings by Design Homes	2,536	2,989	15.0%	117.9%	17.7%
Commercial Savings by Design Developments	30	35	25.0%	116.7%	29.2%
Verified Total Weighted Scorecard Achieved					118.6%
Maximum Scorecard Incentive					\$1,172,402
Verified Scorecard Incentive Achieved					\$730,586

*Not all values may compute exactly due to rounding.

**The metric score for each individual metric is capped at 200%.

†See Appendix L for a detailed description of the scorecard and incentive calculations.

7.2 Scorecard achievements for Union

This section summarizes the results of the EC’s review of the Union Market Transformation scorecard. The metrics for the Union Market Transformation scorecard include:

- Number of qualified builders enrolled in the Optimum Home program
- Number of participating builders that built a prototype home
- Percentage of homes built
- Number of new developments enrolled by participating builders for Commercial New Construction

A detailed explanation of the verification activities for all Market Transformation programs can be found in Appendix I. Verified program achievements are listed in Table 7-4 with DSM shareholder incentive results in Table 7-5.

Table 7-4. Union 2019 Market Transformation verified achievements*

Programs	Metrics	Verified Achievement	
		Program-level Achievements	Metric-level Achievements
Optimum Home	Builders	4	4
Optimum Home	Homes Built	95.45%	95.45%
Optimum Home	Percentage of Homes Built	28.55%	28.55%
Commercial New Construction	New Developments	22	22

*Not all values may compute exactly due to rounding.

Table 7-5. Union's 2019 Market Transformation targets, achievements, weights, and incentive* †

Metric	Target	Verified Achievement	Weight	Metric Score**	Weighted Metric Score
Optimum Home Builders	4	4	10.0%	100.0%	10.0%
Optimum Home Homes	90.00%	95.45%	10.0%	127.3%	12.7%
Optimum Home Percentage of Homes Built	4.34%	28.55%	30.0%	200.0%	60.0%
Commercial New Construction Developments	20	22	50.0%	110.0%	55.0%
Verified Total Weighted Scorecard Achieved					137.7%
Maximum Scorecard Incentive					\$413,228
Verified Scorecard Incentive Achieved					\$352,359

*Not all values may compute exactly due to rounding.

** The metric score for each individual metric is capped at 200%.

†See Appendix L for a detailed description of the scorecard and incentive calculations.

8 SCORECARD RESULTS: PERFORMANCE BASED

Programs within the Performance Based scorecard focus on helping participating organizations make operational enhancements and improve their energy management practices. Although energy savings may result from these programs, savings are typically not the primary goal.

8.1 Scorecard achievements for Union

This section summarizes the results of the EC's review of the Union Performance Based scorecard. The metric for the Performance Based scorecard is the number of participants in the RunSmart and Strategic Energy Management programs respectively. A detailed explanation of the verification activities for all Performance programs can be found in Appendix J. Verified program achievements are listed in Table 8-1 with DSM shareholder incentive results in Table 8-2.

Table 8-1. Union 2019 Performance Based verified achievements*

Programs	Metrics	Verified Achievement	
		Program-level Achievements	Metric-level Achievements
RunSmart	Participants	58	58
	Savings %	0.35%	0.35%
Strategic Energy Management	Savings %	0.00%	0.00%

*Not all values may compute exactly due to rounding.

Table 8-2. Union's 2019 Performance Based targets, achievements, weights, and incentive* †

Metric	Target	Verified Achievement	Weight	Metric Score	Weighted Metric Score
RunSmart Participants	56	58	10.0%	103.6%	10.4%
RunSmart Savings %	0.70%	0.35%	40.0%	48.5%	19.4%
Strategic Energy Management Savings %	4.75%	0.00%	50.0%	0.0%	0.0%
Verified Total Weighted Scorecard Achieved**					29.8%
Maximum Scorecard Incentive					\$147,223
Verified Scorecard Incentive Achieved					\$0.00

*Not all values may compute exactly due to rounding.

**A minimum total weighted scorecard achievement level of 75% is required to earn a portion of the available shareholder incentive.

†See Appendix L for a detailed description of the scorecard and incentive calculations.

9 UTILITY SUMMARY OF SHAREHOLDER INCENTIVES, PROGRAM SPENDING, COST EFFECTIVENESS, AND LOST REVENUE

This section provides the results of the financial performance of the 2019 DSM programs by utility.

9.1 Enbridge Results

9.1.1 Scorecard Weights and Shareholder Incentives

Table 9-1 shows Enbridge scorecard weights by metric and shareholder incentives by target for all programs. These were the metrics reviewed as part of the annual verification. The utility achieved a shareholder incentive of \$6,717,372 or 64% of the maximum possible DSMSI incentive.

Table 9-1. Summary of Enbridge’s 2019 achievement weights and shareholder incentives

Scorecard	Program	Metric	Weight	Utility Incentive
Resource Acquisition	Home Energy Conservation Residential Adaptive Thermostats Commercial & Industrial Custom Commercial & Industrial Direct Install	Large Volume (CCM)	40.0%	\$4,827,040
	Commercial & Industrial Prescriptive Comprehensive Energy Management Run-it-Right	Small Volume (CCM)	40.0%	
	Home Energy Conservation	Participants	20.0%	
Low Income	Home Winterproofing	CCM	45.0%	\$1,159,746
	Low Income Multi-Residential	CCM	45.0%	
	Low Income New Construction	Applications	10.0%	
Market Transformation	School Energy Competition	Schools	10.0%	\$730,586
	Run-it-Right	Participants	20.0%	
	Comprehensive Energy Management	Participants	20.0%	
	Residential Savings by Design	Builders	10.0%	
		Homes	15.0%	
Commercial Savings by Design	Developments	25.0%		
Total Verified Utility Incentive				\$6,717,372
Incentive if 100% of target achieved				\$4,180,000
Maximum possible incentive (if 150% of target achieved)				\$10,450,000

9.1.2 Program Spending Summary

The Enbridge tracking database included reported program spending information. The EC has reported on what was provided by Enbridge but has not verified spending figures or conducted a financial audit. Table 9-2 summarizes the spending across the portfolio. Additional spending detail is in Appendix O.

Table 9-2. Enbridge program cost summary*

Spending Area	OEB-Approved Budget	Utility Spending	Difference (\$)	Difference (%)
Program Sub-total (no overhead)	\$55,031,598	\$62,408,875	\$7,377,277	13%
Program Overhead	\$7,631,813	\$7,143,909	-\$487,904	-6%
Process and Program Evaluation	\$1,736,746	\$1,524,765	-\$211,981	-12%
Other**	\$2,021,616	\$1,765,892	-\$255,724	-13%
Total DSM Budget	\$66,421,773	\$72,843,440	\$6,421,667	10%

*Not all values may compute exactly due to rounding.

**Other includes DSM IT Chargeback, Collaboration and Innovation, and Achievable Potential Study.

9.1.3 Cost Effectiveness Summary

Table 9-3 and Table 9-4 show summary results for the TRC-Plus and PAC tests, respectively, including the benefit cost ratio and the net present value.²⁰ The EC cost effectiveness methodology applied in 2019 is consistent with what was done for the 2018 analysis. Additional details, including the key inputs to used in the TRC-Plus and PAC tests, is provided in Appendix P.

Table 9-3. Enbridge summary of cost-effectiveness ratio results, TRC-Plus Test*

Scorecard	NPV Benefits	NPV Costs	NPV Net Benefits (Benefits – Cost)	TRC-Plus Benefit Cost Ratio
Resource Acquisition	\$236,212,000	\$77,860,000	\$158,352,000	3.03
Low Income	\$30,449,000	\$13,880,000	\$16,569,000	2.19
Total	\$266,661,000	\$91,740,000	\$174,921,000	2.91

*Not all values may compute exactly due to rounding.

Table 9-4. Enbridge summary of cost effectiveness ratio results, PAC Test*

Scorecard	NPV Benefits	NPV Costs	NPV Net Benefits (Benefits – Cost)	PAC Benefit Cost Ratio
Resource Acquisition	\$190,430,000	\$48,906,000	\$141,524,000	3.89
Low Income	\$25,607,000	\$11,968,000	\$13,639,000	2.14
Total	\$216,038,000	\$60,874,000	\$155,163,000	3.55

*Not all values may compute exactly due to rounding.

9.1.4 Lost Revenue by Rate Class

The EC summed the verified net annual savings (prorated by installation month) by rate class and estimated lost revenues. Table 9-5 shows the results for each rate class.

²⁰ Unlike Table 1-1 in the Executive Summary or the Enbridge-specific tables in Appendix P, these tables do not include alternative benefit cost ratios that do not apportion the portfolio-level overhead and administration costs. The alternative ratios are only computed at the OEB-defined individual program level, and not the scorecard or overall portfolio level.

Table 9-5. Enbridge lost revenue results*

Rate Class	Verified Lost Revenue
Rate 110	\$10,945
Rate 115	\$8,912
Rate 135	\$10,798
Rate 145	\$0
Rate 170	\$315
Total	\$30,969

*Not all values may compute exactly due to rounding.

9.2 Union Results

9.2.1 Scorecard Weights and Shareholder Incentives

Table 9-6 shows the Union scorecard weights by metric and shareholder incentives by target for all programs. These were the metrics reviewed as part of the annual verification. The utility achieved a shareholder incentive of \$5,950,363 or 57% of the maximum possible DSMSI incentive.

Table 9-6. Summary of Union's 2019 achievement weights and shareholder incentives*

Scorecard	Program	Metric	Weight	Utility Incentive
Resource Acquisition	Commercial & Industrial Custom Commercial & Industrial Direct Install Commercial & Industrial Prescriptive Home Reno Rebate Residential Adaptive Thermostats	CCM	75.0%	\$4,344,389
	Home Reno Rebate	Participants	25.0%	
Low Income	Indigenous Furnace End-of-Life Home Weatherization	CCM	60.0%	\$1,253,615
	Multi-Family (Social & Assisted)	CCM	35.0%	
	Multi-Family (Market Rate)	CCM	5.0%	
Large Volume	Large Volume	CCM	100.0%	\$0
Market Transformation	Optimum Home	Builders	10.0%	\$352,359
		Homes	10.0%	
		% of Homes Built	30.0%	
	Commercial New Construction	Developments	50.0%	
Performance-Based	RunSmart	Participants	10.0%	\$0
		Savings %	40.0%	
	Strategic Energy Management	Savings %	50.0%	
Total Verified Utility Incentive				\$5,950,363
Incentive if 100% of target achieved				\$4,180,000
Maximum possible incentive (if 150% of target achieved)				\$10,450,000

*Not all values may compute exactly due to rounding.

9.2.2 Program Spending Summary

Union's tracking database included program spending by scorecard. The EC has reported on what was provided by Union and has not verified spending figures or conducted a financial audit. Table 9-7 shows the Union budget for the portfolio overall. Additional spending detail is in Appendix O.

Table 9-7. Union program cost summary*

Spending Area	OEB-Approved Budget	Utility Spending	Difference (\$)	Difference (%)
Programs Sub-total (no overhead)	\$49,225,000	\$51,593,275	\$2,368,275	5%
Program Overhead	\$9,901,773	\$8,266,939	-\$1,634,834	-17%
Research	\$1,000,000	\$770,142	-\$229,858	-23%
Evaluation	\$1,300,000	\$919,748	-\$380,252	-29%
Administration	\$2,842,000	\$3,541,362	\$699,362	25%
Other**	\$500,000	\$512,840	\$12,840	3%
Total DSM Budget	\$64,768,773	\$65,604,306	\$835,533	1%

*Not all values may compute exactly due to rounding.

**Other includes pilot programs, Future Infrastructure Planning Study, Achievable Potential Study, and Open Bill Project.

9.2.3 Cost Effectiveness Summary

Table 9-8 and Table 9-9 show summary results for the TRC-Plus and PAC tests, respectively, including the net present value and benefit-cost ratio.²¹ The EC cost effectiveness methodology applied in 2019 is consistent with what was done for the 2018 analysis. Additional detail is shown in Appendix P.

Table 9-8. Union summary of cost-effectiveness ratio results, TRC-Plus Test*

Scorecard	NPV Benefits	NPV Costs	NPV Net Benefits (Benefits - Cost)	TRC-Plus Benefit Cost Ratio
Resource Acquisition	\$210,216,000	\$87,179,000	\$123,037,000	2.41
Low Income	\$19,800,000	\$12,459,000	\$7,341,000	1.59
Large Volume	\$14,615,000	\$5,940,000	\$8,675,000	2.46
Performance Based	\$11,000	\$541,000	-\$530,000	0.02
Total	\$244,642,000	\$106,119,000	\$138,523,000	2.31

*Not all values may compute exactly due to rounding.

Table 9-9. Union summary of cost effectiveness ratio results, PAC Test*

Scorecard	NPV Benefits	NPV Costs	NPV Net Benefits (Benefits - Cost)	PAC Benefit Cost Ratio
Resource Acquisition	\$180,987,000	\$40,582,000	\$140,405,000	4.46
Low Income	\$15,998,000	\$13,368,000	\$2,630,000	1.20
Large Volume	\$13,257,000	\$3,089,000	\$10,168,000	4.29
Performance Based	\$10,000	\$580,000	-\$570,000	0.02
Total	\$210,252,000	\$57,619,000	\$152,633,000	3.65

*Not all values may compute exactly due to rounding.

²¹ Unlike Table 1-3 in the Executive Summary or the Union-specific tables in Appendix P, these tables do not include alternative benefit cost ratios that do not apportion the portfolio-level overhead and administration costs. The alternative ratios are only computed at the OEB-defined individual program level, and not the scorecard or overall portfolio level.

9.2.4 Lost Revenue by Rate Class

The EC summed the verified net annual savings (prorated by installation month) by rate class and estimated lost revenues. Table 9-10 shows the results.

Table 9-10. Union lost revenue results*

Rate Class	Verified Lost Revenue
M4 Industrial	\$143,379
M5 Industrial	\$7,666
M7 Industrial	\$21,646
T1 Industrial	\$512
T2 Industrial	\$621
20 Industrial	\$10,939
100 Industrial	\$1,724
Total	\$186,485

*Not all values may compute exactly due to rounding.

10 Findings and Recommendations

This appendix contains the findings and recommendations from all studies completed by the EC since the previous annual verification report. For summary tables of these findings and recommendations, see Appendix Q.

10.1 2019 Annual Verification Recommendations

The 2019 annual verification identified several recommendations, some of which were previously identified in annual verification processes.

10.1.1 Overall Annual Verification Recommendations

01.Finding: The Enbridge tracking file does not currently include information that allows the evaluator to identify all the projects installed by a single customer. While Enbridge does provide IDs, these may or may not be consistent across programs or metrics, or from year to year. Enbridge also provides customer contact information for each site in the CPSV sample, which allows the EC to connect across projects with the same customer; however, this is only a small portion of the total number of program participants.

Recommendation A: 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 or program year.

Previously Recommended: Yes – since the 2015 AV Report.

Outcome: Confirmation that each installation is unique as well as the potential for assessment of interactive effects.

Utility Response: The Union rate zones tracking information provided to the EC includes both a Customer ID and a Premises ID for each project and measure installed. A unique Customer ID is assigned to each customer, and customers are connected to one or more sites. A unique Premises ID is assigned to each individual site. This information can identify all projects installed by a single customer and site, regardless of program or program year.

The EGD rate zone tracking information provided to the EC includes an Account Number for each project and measure installed. An Account Number is similar to the Union rate zones' Customer ID. Most Account Numbers are connected to customers that only have one site. When this is the case, the Account Number can identify all projects and measures installed by a single customer and site, regardless of program or program year. Starting with the 2020 verification cycle, EGD rate zone tracking data will also include a unique Premises ID. This ID can identify all projects and measures installed by a single customer and site regardless of whether an Account Number is connected to one or multiple sites.

02.Finding: Both Union and Enbridge tracking databases currently use prescriptive measure descriptions that map directly to *internally* consistent measure names. However, there is not a universally accessible (i.e. public) dataset that is fully transparent and comprehensive for all prescriptive and quasi-prescriptive measures. New versions of the Technical Resource Manual (TRM) provide full documentation for new or updated measures; this limited update does not provide a comprehensive resource for all currently accepted measures nor does it provide a concise location for all items that can impact gross or net savings such as detailed accounting of free ridership.

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. For simplification and transparency, this system should be utilized for both utilities.

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.

Previously Recommended: Yes – since the 2015 AV Report.

Outcome: Reduced burden on utility staff and reduced evaluation costs. Fewer errors in the tracking data.

Utility Response: As per Recommendation D, the OEB has primary ownership of the TRM including the development of a complete electronic TRM and unique measure IDs. Enbridge Gas proposes that Board Staff address the EC's finding.

OEB Response: The OEB agrees that an electronic summary of the TRM has the potential to improve the efficiency of the evaluation process. The OEB will consider options on how to implement this recommendation by December 31, 2021.

03. Finding: Explicit third-party documentation was not available for all program qualification and participation requirements for all programs. The EC found the following:

- Enbridge's School Energy Competition program requires participating schools to "be part of a board within one of the publicly funded systems (English/French/Public/Catholic) in Ontario," Enbridge provided an email written by an Enbridge employee stating that all schools qualified, but no third-party documentation (such as a signed application with this qualification) to support the requirement.
- Enbridge's Run it Right program has four steps for participation, with monitoring as the final step. Enbridge provided third-party documentation for the first three stages, such as invoices, signed applications, and other items. The fourth step was supported by a monitoring start date in an Excel file created by an Enbridge employee, but no independent proof (such as a screen shot of a monitoring program) to support the requirement.
- Union's Run Smart program is limited to participants who have not installed any energy efficiency measures through Union's programs in the last two years. Enbridge provided an Excel workbook created by an Enbridge employee with "yes" or "no" for each Run Smart participant to indicate previous program participation, but no independent proof (such as program tracking data with a consistent customer identification number across years) to support the requirement.
- Union's Optimum Home program has a metric of percent of homes built, which is a function of the number of Optimum Homes built and the total number of natural gas housing starts for each builder. Enbridge provided the total number of natural gas housing starts in an Excel file created by an Enbridge employee, but no independent proof (such as a screen shot of a monitoring program) to support the requirement.

Recommendation A: Third-party documentation for each required element for all non-savings metrics should be collected and delivered to the EC to prove program qualification and participation.

Previously Recommended: Yes – since the 2016 AV report.

Outcome: Reduced burden on utility staff and reduced evaluation costs.

Utility Response:

1. Enbridge Gas provided the EC with Schoolboard Participation Agreement forms with redacted names of schoolboards participating in the 2019 School Energy Competition. Enbridge Gas has reviewed this redaction practice and confirms that unredacted schoolboard names will be shared with the EC starting with the 2020 verification cycle. This will allow the EC to confirm that participating schools are part of a board within one of the publicly funded systems (English/French/Public/Catholic) in Ontario.
2. The Run It Right monitoring start date is pulled from an Excel spreadsheet provided to Enbridge Gas directly from an external third party. It is not generated by a utility employee. Starting with the 2020 verification cycle, Enbridge Gas will forward the email from the third party that includes the monitoring start date spreadsheet as indication that the information comes directly from an external source.
3. The EC is correct that Union rate zones' Run Smart program is limited to participants who have not installed any energy efficiency measures through Union rate zones' programs in the last two years. This is tracked via a consistent Premises ID that is included in the tracking data provided to the EC. The premises claimed for RunSmart can be cross-referenced to participating premises in the prior two years to confirm they do not appear.

Enbridge Gas conducted this cross-reference, which was subject to EC review, and reported that the claimed 2019 RunSmart premises do not appear in 2017 and 2018 Union rate zones' DSM participants by indicating "no" for each in a spreadsheet. Starting with the 2020 verification cycle, Enbridge Gas will continue this practice but will also provide the EC with Premises IDs from all 2018 and 2019 participants so that the EC can confirm that sites participating in the 2020 RunSmart offering do not appear.
4. The total number of natural gas housing starts is information compiled directly by Enbridge Gas and is not pulled from a third party. The Excel file with the total number of natural gas housing starts is created from an internal utility database. Enbridge Gas proposes working with the EC as part of the 2020 verification cycle to determine what additional steps can be taken to address the EC's finding.

04. Finding: Utility-provided documentation was sometimes overly redacted, particularly in program application PDF files delivered to the EC. This included account numbers for non-residential customers, which are generally included in tracking data provided to the EC. This was especially an issue for the RunSmart program, for which the redaction of account numbers left the name of the electronic PDF file as the only identifier tying each participant to the tracking data.

Recommendation A: Enbridge and the EC should review the documentation redaction procedures for future evaluations and determine whether some information, such as account number, can be left unredacted.

Previously Recommended: No.

Outcome: Reduced burden on utility staff and reduced evaluation costs.

Utility Response: Protecting customer privacy is a priority when transferring confidential information to the EC. The redactions made as part of the 2019 audit are consistent with the utility's practices of what information requires redaction. However, before the start of the 2020 verification cycle, Enbridge Gas agrees to work with the EC to review the documentation redactions, understand what additional information the EC would like to see unredacted and determine what can be accommodated under Enbridge Gas' redaction practices.

10.1.2 Whole Home Simulation Modeling Recommendations

SM1. Finding: In past evaluations, the EC had identified that the Union Home Reno Rebate (HRR) program had a number of inaccurate savings values due to data entry errors or outdated simulation results and noted that many of these errors could be avoided through changes in program processes. These issues have steadily improved such that the EC found no such errors in 2019.

Recommendation A: Continue the data and documentation collection, entry, and delivery practices that resulted in a 100% realization rate for the Union HRR program, and apply them to other whole home programs, which still show room for improvement.

Previously Recommended: No.

Outcome: Reduced burden on utility staff and reduced evaluation costs.

Utility Response: Enbridge Gas appreciates the recognition for the Union rate zones' HRR offering realization rate. Enbridge Gas continually improves the data and documentation collection, entry, and delivery practices it employs for all offerings and will continue to do so moving forward.

SM2. Finding: Air sealing as a savings measure is present in a high percentage of single-family home retrofits (over 80% of homes in some programs). With such a high percentage of projects relying on a single measure type, particularly one with such wide variance in savings per household, it is important to ensure the savings validity of that measure. Enbridge has provided air sealing percent improvement for each household for the Home Energy Conservation program, but no other whole home program.

Recommendation A: If possible, Enbridge should provide the EC with air sealing percent improvement and energy savings attributable to air sealing for each household participating in the whole home programs.

Previously Recommended: Yes – since the 2016 AV report.

Outcome: Greater certainty around savings estimates.

Utility Response: Due to interactive effects between all measures installed in a home, energy savings cannot be attributed to any one measure, including air sealing. Enbridge Gas claims and reports energy savings on a whole home basis and will continue to do so moving forward.

Enbridge Gas confirms that it will continue to provide the air sealing percent improvement for each household that participated in the EGD rate zone Residential Home Energy Conservation offering. Starting with the 2020 verification cycle, the utility will also provide this information for each participant in the Union rate zones' Home Reno Rebate offering. As an aside, these two offerings have been jointly rebranded as Enbridge Gas' Home Energy Rebate offering.

SM3. 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. Although these assumptions and practices may follow NRCAN protocols, those protocols were not specifically designed for the delivery of a DSM program and may not be appropriate in this situation. 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.

Previously Recommended: Yes – since the 2015 AV report.

Outcome: Greater certainty around savings estimates.

Utility Response: This recommendation is not directed to utility. For clarity, HOT2000 is the modeling software within Enbridge Gas' OEB-approved DSM Plans for use in whole home modeling offerings. These offerings are delivered by registered Energy Advisors affiliated with NRCAN-licensed Service Organizations, with the expectation that NRCAN HOT2000 protocols/standards are being followed given that this is a licensing requirement. Failure to follow these protocols/standards could result in suspension or loss of licence by NRCAN, which would in turn render Energy Advisors ineligible to participate in Enbridge Gas's program.

OEB Response: The OEB agrees that it is important to study the home retrofit program which is anticipated to be included as a priority activity in the updated EM&V Plan.

SM4. Finding: Some whole home programs (including the Enbridge Home Energy Conservation program) require a Certified Energy Evaluator ("CEE") to assess the home for the homeowner to qualify for participation. While site-level documentation confirmed that an auditor was involved, it did not indicate that the auditor was an approved CEE.

Recommendation A: Enbridge should confirm the relevant certification(s) for all energy evaluators and/or auditors assisting with programs and provide that documentation to the EC.

Previously Recommended: No.

Outcome: Ensuring proper credentials for all auditors decreases risk to program.

Utility Response: The whole-home modelling offerings (Residential and Low-Income) are delivered by certified and registered Energy Advisors. This requirement is outlined in the contracts with Service Organizations, who are all NRCAN-licensed, and is confirmed when they enter into an agreement with Enbridge Gas. At any time, Enbridge Gas can re-confirm this with the Service Organization or NRCAN. In turn, the Service Organizations ensure that all Energy Advisors remain certified, registered and in good standing. This is part of the requirements to be a licensed Service Organization. Lack of compliance could result in suspension or termination of license agreements with NRCAN as well as termination of agreements with Enbridge Gas.

The only exception to this is in select situations for Low-Income Weatherization where there is limited availability of current NRCAN-registered Energy Advisors. Maintaining registration includes training and periodic re-testing, which is a challenging process, and is only offered at certain intervals. In this case, previously certified Energy Advisors may collect the on-site information. However, only a registered

Energy Advisor completes the savings modeling in HOT2000. Enbridge Gas is in the process of ensuring all on-site data collection and modelling is conducted exclusively by current NRCAN-registered Energy Advisors. This is nearly complete and was expected in 2020 but the COVID-19 pandemic has created some delays due to access to training, specifically for those in remote areas.

10.1.3 Cost Effectiveness Recommendations

CE1. Finding: For 2019, administrative and overhead costs are still being allocated differently by each utility. For example, Union identifies administration and evaluation costs at the scorecard level 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. In the absence of clear direction from the utilities, the EC apportioned Enbridge 'overhead' costs based on the distribution of savings. This issue has been identified in every annual verification year since 2015. Enbridge acknowledges that the utilities allocate costs differently, because the DSM Plans were developed in 2015 by separate organizations. However, Enbridge feels (and OEB agrees) that it is not appropriate to make fundamental changes in the middle of the DSM Framework, and full alignment should occur as part of the next DSM Framework and Plan.

Recommendation A: Under the next framework, Enbridge and the OEB should agree on a plan that calculates cost effectiveness at the desired level, allocates administrative costs and overhead to each component at the desired level, and ensure that cost-effectiveness results properly reflect true program costs and benefits.

Previously Recommended: Yes – since the 2015 AV Report.

Outcome: Ensure all costs are properly accounted for and allocated at the appropriate level so cost effectiveness results better reflect the true program costs.

Utility Response: Enbridge Gas' approach reflects the definition of program as per the OEB-approved DSM Plans for the EGD and Union rate zones. It is differences between each rate zone's approved plans that result in differences in how cost effectiveness is reported.

Enbridge Gas agrees with the EC that this issue is best dealt with as part of the next comprehensive DSM Framework, Guidelines and Plan where full alignment between rate zones should occur.

OEB Response: The OEB agrees that the definition of a DSM program should be clarified. The OEB anticipates that this will be addressed as part of a future OEB Decision, likely in relation to Enbridge's next multi-year DSM plan.

CE2. Finding: In 2019, Enbridge only included resource allocation costs in their internal cost-effectiveness analysis for Run-It-Right (RIR). This differs from previous years, when Enbridge included resource acquisition *and* market transformation costs in their internal RIR cost effectiveness calculation. While the EC does not typically conduct cost effectiveness analysis on market transformation programs (because there are no claimed savings), RIR does claim savings and provides incentives. The EC believes all program costs (resource acquisition and market transformation) should be included because savings are claimed for this program.

Recommendation A: Include all costs (resource acquisition and market transformation) in the cost effectiveness analysis for the Run-It-Right program.

Previously Recommended: No.

Outcome: Ensuring accurate cost effectiveness results.

Utility Response: The EGD rate zone Run It Right offering achievements are counted against metrics found in two different scorecards. The Market Transformation scorecard Run It Right metric counts new participants in the offering. The Resource Acquisition scorecard Run It Right metric counts energy savings from participants that signed up in the prior year.

The benefits attributed to Run It Right participation captured in the Market Transformation scorecard cannot be directly quantified in a TRC cost effectiveness test. As such, it is unclear whether the costs attributed to Market Transformation activities should be included in Run It Right cost effectiveness analysis.

Following discussion at the EAC, it was agreed that both resource acquisition and market transformation costs will be included in the EC's Run It Right cost effectiveness analysis but that a footnote be added to indicate all costs are included. Enbridge Gas will take the same approach when calculating Run It Right cost effectiveness moving forward. However, this issue should be re-assessed for the next DSM Plan submission. The approach described in this instance may not be appropriate for future iterations of similar offerings.

CE3. Finding: The utilities have not historically provided their cost effectiveness calculators for annual verification. When there is a discrepancy between the EC's results and the utilities' it is difficult and time-consuming to determine the discrepancy; in some cases, the EC cannot determine the discrepancy without seeing what the utilities have done.

Recommendation A: Provide all cost effectiveness workbooks, calculations, and inputs – along with program tracked savings - at the outset of each annual verification cycle.

Previously Recommended: No.

Outcome: Ensure the EC can effectively validate all calculations and methodologies and ensure efficient use of EC time and resources to minimize costs to the OEB.

Utility Response: The EC has not requested cost effectiveness workbooks or calculations at the outset of each verification cycle. For the next verification cycle, the utility can provide the EC with cost effectiveness workbooks when requested by the EC.

11 APPENDICES

Appendix A Evaluation Background

Enbridge and Union deliver energy efficiency programs under the Demand Side Management Framework for Natural Gas Distributors (2015-2020) developed by the OEB. For the 2015 program year, both utilities “rolled-over” their 2014 plans into 2015 to allow them a smooth evolution into the new DSM framework. For the 2016 program year (and continuing through 2019), the new framework was implemented, resulting in changes to the programs offered, as shown in Table 11-1. Programs included in the plan and offered by the utilities are marked with a check, those in the plan but not offered by the utilities are marked with an X.

Table 11-1. DSM programs offered 2015-2019


Scorecard	Program Name	2015	2016	2017	2018	2019
Enbridge						
Resource Acquisition	C&I Custom	✓	✓	✓	✓	✓
	C&I Direct Install		✓	✓	✓	✓
	C&I Prescriptive	✓	✓	✓	✓	✓
	Comprehensive Energy Management		X	X	X	X
	Energy Leaders Initiative		✓	✓	✓	
	Home Energy Conservation	✓	✓	✓	✓	✓
	Residential Adaptive Thermostats		✓	✓	✓	✓
	Run-it-Right (CCM)	✓	✓	✓	✓	✓
	Small Commercial New Construction		X	X	X	
Low Income	Low Income Multi-Residential	✓	✓	✓	✓	✓
	Low Income New Construction	✓	✓	✓	✓	✓
	Home Winterproofing		✓	✓	✓	✓
Market Transformation	Commercial Savings by Design	✓	✓	✓	✓	✓
	Residential Savings by Design	✓	✓	✓	✓	✓
	School Energy Competition	✓	✓	✓	✓	✓
	Run-it-Right (Participants)		✓	✓	✓	✓
	Comprehensive Energy Management		✓	✓	✓	✓
Home Labelling	Home Labelling	✓				
Union						
Resource Acquisition	C&I Custom	✓	✓	✓	✓	✓
	C&I Direct Install			✓	✓	✓
	C&I Prescriptive	✓	✓	✓	✓	✓
	Energy Savings Kit	✓				
	Home Reno Rebate	✓	✓	✓	✓	✓
	Residential Adaptive Thermostats					✓
Low Income	Home Weatherization	✓	✓	✓	✓	✓
	Furnace End-of-Life		✓	✓	X	✓
	Multifamily (Social and Assisted)		✓	✓	✓	✓
	Multifamily (Market Rate)		✓	✓	✓	✓
	Indigenous			✓	✓	✓
	Affordable Housing Conservation	✓				
Large Volume	Large Volume	✓	✓	✓	✓	✓
Market Transformation	Optimum Home	✓	✓	✓	✓	✓
	Commercial New Construction		X	✓	✓	✓
Performance Based	RunSmart		✓	✓	✓	✓
	Strategic Energy Management		✓	X	✓	X

* ✓=Offered and reported X=Offered but no metrics reported

Table 11-2 shows how the metrics under each scorecard have changed over time.

Table 11-2. Energy efficiency metrics – 2016 through 2019

Scorecard	Metric	2016	2017	2018	2019
Enbridge					
Resource Acquisition	Large Volume Customer Savings (CCM)	✓	✓	✓	✓
	Small Volume Customer Savings (CCM)	✓	✓	✓	✓
	Home Energy Conservation - Participants	✓	✓	✓	✓
Low Income	Home Winterproofing (CCM)	✓	✓	✓	✓
	Low Income Multi-Residential (CCM)	✓	✓	✓	✓
	Low Income New Construction – Project Applications	✓	✓	✓	✓
Market Transformation	Commercial Savings by Design – New Developments	✓	✓	✓	✓
	Comprehensive Energy Management – Participants	✓	✓	✓	✓
	Residential Savings by Design – Builders	✓	✓	✓	✓
	Residential Savings by Design – Homes Built			✓	✓
	Run-it-Right – Participants	✓	✓	✓	✓
	School Energy Competition - Schools	✓	✓	✓	✓
Union					
Resource Acquisition	CCM	✓	✓	✓	✓
	Home Reno Rebate - Participants	✓	✓	✓	✓
Large Volume	CCM	✓	✓	✓	✓
Low Income	Single Family CCM	✓	✓	✓	✓
	Multifamily Social & Assisted CCM	✓	✓	✓	✓
	Multifamily Market Rate CCM	✓	✓	✓	✓
Market Transformation	Commercial New Construction - New Enrolled Developments	✓	✓	✓	✓
	Optimum Home - % of Homes Built	✓		✓	✓
	Optimum Home - Participating Builders		✓	✓	✓
	Optimum Home - Homes		✓	✓	✓
Performance Based	RunSmart - Participants	✓	✓	✓	✓
	RunSmart - Savings %		✓	✓	✓
	Strategic Energy Management - Participants	✓	✓	✓	
	Strategic Energy - Savings %			✓	✓



The OEB hired the EC team to develop an overall evaluation, measurement, and verification (EM&V) plan and lead an annual verification of the reported utility DSM savings and scorecard achievements. This report is a result of that annual verification.

This report applies the results of several, previously completed studies:

- A study measuring the free ridership within the custom projects²² implemented in the 2018 program year²³
- A study verifying the custom project savings (CPSV) during the 2017 and 2018 program years^{24,25}
- A study verifying the prescriptive project savings from prescriptive projects implemented in the 2017 program year²⁶
- A study of custom measure lives, completed in May 2018.²⁷
- A study of the spillover resulting from the implementation of custom projects during the 2013-2014 program years, completed in May 2018.²⁸

²² Low Income custom projects were not included in the NTG study.

²³ 2018 Natural Gas Demand Side Management Free-ridership Evaluation, DNV GL for the Ontario Energy Board, December 27, 2019

²⁴ 2017-2018 Natural Gas Demand Side Management Custom Savings Verification, DNV GL for the Ontario Energy Board, December 26, 2019

²⁵ Due to complications from the COVID-19 pandemic, the EC was unable to complete a planned study verifying the custom project savings (CPSV) during the 2019 program year. Instead, the EC used the same adjustment factors resulting from custom projects implemented in the 2017 and 2018 program years, adjusted for the mix of projects installed in 2019.

²⁶ 2017 C&I Prescriptive Verification: Final Report – Measurement of NTG Factors and Gross Savings Verification, Itron for the Ontario Energy Board, June 7, 2019

²⁷ Final Report: Custom Measure Life Review, Michaels Energy for the Ontario Energy Board, May 10, 2018

²⁸ CPSV Participant Spillover Results, DNV GL for the Ontario Energy Board, May 23, 2018

Appendix B Metric Verification Activities

To verify the metric achievements, the EC conducted the activities outlined in Table 11-3 and Table 11-4. The utilization of each activity depends on the “type” of measure being reviewed. DNV GL defined four different types of measures, listed below. A single program or scorecard metric may have more than one type of measure.

- **Prescriptive (P):** Prescriptive gas savings measures are those where all savings inputs can be identified in the technical resource manual (TRM). This includes not only the prescribed savings but also additional prescribed inputs such as expected useful life (EUL) and free ridership rates.
- **Custom (C):** Custom gas savings measures are those gas measures of equipment or actions (tune up, process) which are not prescribed by the TRM. Examples include measures verified as part of the CPSV process as well as non-prescribed programs like Run-it-Right or Run Smart.
- **Whole Home (W):** Whole home savings are savings calculated using home modelling software (HOT2000).
- **Other (O):** In addition to direct gas savings measures, the scorecards recognize additional metrics, such as the number of enrolled participants, new developments, or schools in a program or the percentage of homes built by a participating builder achieving certain efficiency levels.

Activities to verify the measures fall into three general categories. As previously stated, the utilization of each method is determined by the measure type.

- **Confirm Tracking:** Confirmation that the entries and calculations within the submitted tracking data accurately contribute to scorecard metrics.
 - ♦ *Prescriptive measures:* The EC confirmed that measure-level inputs were appropriately applied from the TRM where appropriate (such as free ridership ratio and savings per unit), then recalculated gross and net savings based on those inputs to verify the tracked net savings for a census of measures.
 - ♦ *Custom measures:* The EC used the results of the custom project savings verification, free ridership, and spillover studies conducted through separate processes.
 - ♦ *Whole Home and Other measures:* The EC confirmed that tracking records matched utility-reported achievement. Additional verification took place in other activities.
- **Apply Factors:** Application of relevant factors that are not otherwise applied in the TRM, such as gross savings adjustments, free ridership adjustments, and spillover ratios.
 - ♦ *Prescriptive measures:* The EC used the results of the C&I Prescriptive Verification and installation rate studies conducted through separate processes.
 - ♦ *Custom measures:* The EC used the results of the CPSV, free ridership, and spillover studies conducted through separate processes.
- **Desk Review:** File review of utility-provided documentation to verify whether the achievements in the tracking data were actually realized. Unless specifically mentioned otherwise, desk review methods were similar to those used in the prior verification.
 - ♦ *Whole Home:* Desk review included tasks such as review of energy software (HOT2000) modelling records for whole home programs.

- ♦ *Other:* For scorecards with Other metrics, program achievements such as customer participation, eligibility for participation, and developer homes were evaluated using program records specific to each scorecard, program, and metric.

Table 11-3 and Table 11-4 identify the measure types within each scorecard and program as well as the method used to evaluate that program, corresponding with the measure type.

Table 11-3. 2019 Annual verification activities by program: Enbridge

Scorecard	Program	Measure Types	Confirm Tracking	Apply Factors	Desk Review
Resource Acquisition	C&I Custom	C		✓	
	C&I Direct Install	P	✓	✓	
	C&I Prescriptive	P	✓	✓	
	Comprehensive Energy Management	No 2019 activity reported			
	Home Energy Conservation	W O	✓	✓	✓
	Residential Adaptive Thermostats	P	✓	✓	
	Run-it-Right	C	✓	✓	✓
Low Income	Home Winterproofing	P W	✓	✓	✓
	Multi-Residential	P C	✓	✓	
	New Construction	O	✓		✓
Market Transformation	Commercial Savings by Design	O	✓		✓
	Comprehensive Energy Management	O	✓		✓
	Residential Savings by Design	O	✓		✓
	Run-it-Right	O	✓		✓
	School's Energy Competition	O	✓		✓

Table 11-4. 2019 Annual verification activities by program: Union

Scorecard	Program	Measure Types	Confirm Tracking	Apply Factors	Desk Review
Resource Acquisition	C&I Custom	C		✓	
	C&I Direct Install	P	✓	✓	
	C&I Prescriptive	P	✓	✓	
	Home Reno Rebate	W O	✓	✓	✓
Large Volume	Large Volume	C	✓	✓	
Low Income	Indigenous	P W	✓	✓	✓
	Furnace End-of-Life	P	✓	✓	
	Home Weatherization	P W	✓	✓	✓
	Multifamily Social & Assisted	P C	✓	✓	
	Multifamily Market Rate	P	✓	✓	
Market Transformation	Commercial New Construction	O	✓		✓
	Optimum Home	O	✓		✓
Performance Based	RunSmart	O	✓		✓
	Strategic Energy Management	No 2019 activity reported			

Desk reviews of Whole Home and Other measures require additional information beyond what is provided in the tracking data. For example, the EC requested HOT2000 files and other documentation to confirm participation and eligibility for a sample of relevant participants in the Home Energy Conservation, Home Reno Rebate, Winterproofing, Indigenous, and Home Weatherization programs. Table 11-5 and Table 11-6 show the number of projects for which the EC requested additional documentation.

Table 11-5. Desk Review Sample: Enbridge

Scorecard	Program	Additional Sample
Resource Acquisition	Home Energy Conservation	30 Randomly Selected Homes
	Run-it-Right	10 Randomly Selected Projects
Low Income	Home Winterproofing	30 Randomly Selected Homes
	New Construction	Census
Market Transformation	Commercial Savings by Design	10 Randomly Selected Sites
	Comprehensive Energy Management	Census
	Residential Savings by Design	5 Randomly Selected Builders 5 Randomly Selected Homes
	Run-it-Right	Census
	School's Energy Competition	Census

Table 11-6. Desk Review Sample: Union

Scorecard	Program	Additional Sample
Resource Acquisition	Home Reno Rebate	60 Randomly Selected Homes
Low Income	Home Weatherization	60 Randomly Selected Homes
	Indigenous	Census
Market Transformation	Optimum Home	Census of Builders Census of Prototype Homes Built 5 Randomly Selected Homes
	Commercial New Construction	Census
Performance-Based	RunSmart	Census

Appendix C Changes from 2018 Annual Verification

There were no major changes between the 2018 and 2019 program year evaluations, though there were several small changes. These included:

- **Programs not previously executed:** Union’s Furnace End-of-Life program was implemented/executed in 2019 but had not been in 2018.
- **Programs previously executed:** Union’s Strategic Energy Management program was implemented/executed in 2018 but had no activity in 2019 despite being offered.
- **Programs no longer offered:** Enbridge’s Energy Leaders Pilot and Small Commercial New Construction program (which never had any activity) ceased to be offered in 2019.
- **Changed scorecard metrics:** One metric was altered, and another eliminated, as a part of the 2019 Scorecards.
 - **Union’s Optimum Home:** The 2018 Optimum Home metric, Percentage of Homes Built, measured homes that exceeded Ontario Building Code 2012 by at least 20%. The equivalent 2019 metric measures the percentage of Homes Built by participating builders that exceeded Ontario Building Code 2017 by at least 15%, as shown in Figure 11-1.

Figure 11-1. Union 2018 and 2019 Market Transformation Scorecards

Union Gas Limited - 2018 Market Transformation Scorecard		Metric Target			Weight
Programs	Metrics	Lower Band	Target	Upper Band	
Optimum Home	Participating Builders (Regional Top 10)	6	8	12	10%
	Prototype Homes Built	45%	60%	90%	30%
	Percentage of Homes Built (>20% above OBC 2012) by Participating Builders	3.75%	5%	7.5%	10%
Commercial New Construction	New Developments Enrolled by Participating Builders	75% of Target	2017 metric achievement / 2017 actual program spend without overheads x 2018 program budget without overheads x 1.1	150% of Target	50%

Union Gas Limited - 2019 Market Transformation Scorecard		Metric Target			Weight
Programs	Metrics	Lower Band	Target	Upper Band	
Optimum Home	Participating Builders (Regional Top 10)	3	4	6	10%
	Prototype Homes Built	68%	90%	100%	10%
	Homes Built (>15% above OBC 2017) by Participating Builders	75% of Target	2018 metric achievement / 2018 actual program spend without overheads x 2019 program budget without overheads x 1.1	150% of Target	30%
Commercial New Construction	New Developments Enrolled by Participating Builders	75% of Target	2018 metric achievement / 2018 actual program spend without overheads x 2019 program budget without overheads x 1.1	150% of Target	50%

- **Union’s Strategic Energy Management:** The Participants metric within the Union Strategic Energy Management program was removed from the 2019 scorecard, as shown in Figure 11-2.

Figure 11-2. Union 2018 and 2019 Performance Based Scorecards

Union Gas Limited - 2018 Performance-Based Scorecard		Metric Target			Weight
Programs	Metrics	Lower Band	Target	Upper Band	
RunSmart	Participants	75% of Target	2017 metric achievement / 2017 accrued program cost without overheads x 2018 program budget without overheads x 1.1	150% of Target	10%
	Savings (%)	75% of Target	2017 metric achievement / 2017 accrued program cost without overheads x 2018 program budget without overheads x 1.1	150% of Target	40%
Strategic Energy Management (SEM)	Participants	75% of Target	2017 metric achievement / 2017 accrued program cost without overheads x 2018 program budget without overheads x 1.1	150% of Target	10%
	Savings (%)	4%	5%	8%	40%

Union Gas Limited - 2019 Performance-Based Scorecard		Metric Target			Weight
Programs	Metrics	Lower Band	Target	Upper Band	
RunSmart	Participants	75% of Target	2018 metric achievement / 2018 accrued program cost without overheads x 2019 program budget without overheads x 1.1	150% of Target	10%
	Savings (%)	75% of Target	2018 metric achievement / 2018 accrued program cost without overheads x 2019 program budget without overheads x 1.1	150% of Target	40%
Strategic Energy Management (SEM)	Savings (%)	75% of Target	2018 metric achievement / 2018 accrued program cost without overheads x 2019 program budget without overheads x 1.1	150% of Target	50%

Appendix D Summary of Verification Adjustments

Table 11-7 and Table 11-8 provide a combined summary of metrics for Enbridge programs and Union programs, respectively. These tables show where the EC made adjustments of greater than 1% from the values identified in *tracking data*.

Table 11-7. Enbridge Metrics with Verified Value Greater than 1% Different from Tracked

Programs	Metrics	>1% Difference?
Resource Acquisition		
Commercial & Industrial Custom	Large Volume Customers CCM	✓
Commercial & Industrial Direct Install		
Commercial & Industrial Prescriptive		✓
Comprehensive Energy Management		
Run-it-Right		
Home Energy Conservation (HEC)	Small Volume Customers CCM	✓
Residential Adaptive Thermostats		
Commercial & Industrial Custom		✓
Commercial & Industrial Direct Install		
Commercial & Industrial Prescriptive		✓
Comprehensive Energy Management		
Home Energy Conservation (HEC)	HEC Participants	
Low Income		
Home Winterproofing	LISF (CCM)	✓
Low Income Multi-Residential	LIMR (CCM)	✓
Low Income New Construction	LINC Applications	
Market Transformation		
School Energy Competition	SEC Schools	
Run-it-Right	RiR Participants	
Comprehensive Energy Management	CEM Participants	
Residential Building by Design	RSBD Builders	
	RSBD Homes	
Commercial Building by Design	CSBD Developments	

Table 11-8. Union Metrics with Verified Value Greater than 1% Different from Tracked

Programs	Metrics	>1% Difference?
Resource Acquisition		
Home Reno Rebate	RA (CCM)	
Residential Adaptive Thermostats		
C&I Custom		✓
C&I Direct Install		
C&I Prescriptive		✓
Home Reno Rebate	HRR Participants	
Low Income		
Home Weatherization	LISF (CCM)	✓
Furnace End-of-Life		
Indigenous		✓
Multi-Family	LIMF-SA (CCM)	✓
	LIMF-MR (CCM)	✓
Large Volume		
Large Volume	LV (CCM)	✓
Market Transformation		
Optimum Home	Participating Builders	
	Prototype Homes Built	
	Percentage of Homes Built	
Commercial New Construction	CNC Developments	
Performance Based		
RunSmart	RS Participants	✓
	RS Savings %	
Strategic Energy Management	SEM Savings %	

Appendix E Data and Documentation Requests

There were officially two data and documentation requests sent during the 2019 annual verification. In addition, there was repeated back-and-forth between the EC and Enbridge Gas Inc. with questions and follow-up information which functioned as a third request. OEB staff was included in all interactions between the EC and Enbridge Gas Inc. This appendix shows the first formal documentation request, sent as a memo on March 5, 2020.

First Documentation Request

Memo to:
Utility staff

Date: March 5, 2020

Copied to:
DNV GL and OEB staff

Prep. By: DNV GL employee

Ontario Gas Portfolio Data Request

This memo formally requests, for delivery by **Wednesday April 1, 2020**, for all Enbridge and Union DSM programs:

- Anonymized program tracking data, including
 - Documentation that individually lists all projects/sites/builders/etc. not included in tracking data (e.g. list of Residential Savings by Design Homes), and any available operational and quality documentation.
- Other data
 - Annual spend data
 - Rates
 - Avoided Costs
- 2019 DSM Program Reports (Draft), by legacy utility

Tracking Data Requested

The EC team is requesting the following items in association with the tracking data:

- Tracking database including all individual measures and projects, for all programs.
- Where program records are not included with tracking data, a copy of the spreadsheets or other documentation that confirms all 'Other' (non-CCM) metrics for Year 2019,
 - Spreadsheet documentation should include listing of *all individual* projects/homes/builders/etc. so that a random sample can be drawn and verifiably requested.
 - For programs where both participants and projects are measured (e.g. participants and homes), it is requested that the data be structured so that a participant can be matched to all its projects for 2019 as well as previous years.
 - In previous years, initial documentation sometimes included a summary of projects instead of a listing of all individual projects/measures; this is intended to clarify that a full listing is needed for selecting sample.
- Any available documentation of operational and quality assurance associated with the tracking database

The programs/projects for which we are requesting 2019 tracking data are shown in Data Request Table 1. Please provide all anonymized records associated with the measures installed through these programs as

part of the 2019 program year. Please note: if there are deviations from the programs identified in Data Request Table 1, such as the omission of a program, the EC asks that data also be provided for those programs; the intent of this request is for tracking data from all 2019 programs.

Data Request Table 1: 2019 Programs Requested

Union Programs	Enbridge Programs
Resource Acquisition Requested	
Home Reno Rebate	Residential Home Energy Conservation
Commercial & Industrial Prescriptive	Residential Adaptive Thermostats
Commercial & Industrial Direct Install	Commercial & Industrial Prescriptive
Commercial & Industrial Custom	Commercial & Industrial Direct Install
	Commercial & Industrial Custom
	Small Commercial New Construction
	Energy Leaders
	Comprehensive Energy Management
	Run-It-Right
Large Volume Requested	
Large Volume	
Low Income Requested	
Furnace End-of-Life	Home Winterproofing
Home Weatherization	Low Income New Construction
Indigenous ²⁹	Low Income Multi-Residential Housing
Low Income Multi-Residential Housing	
Market Transformation Requested	
Commercial New Construction	Commercial Savings by Design
Optimum Home	Residential Savings by Design
	School Energy Competition
	Run-It-Right
	Comprehensive Energy Management
Performance Based Requested	
RunSmart	
Strategic Energy Management	

²⁹ Originally named the Aboriginal Program in the Decision and Order EB-2015-0029 / EB-2015-0049

Evaluation requires the database fields shown in Data Request Table 2. The names of the fields are indicative of the content and do not reflect the names that the utilities use in their tracking systems.

Data Request Table 2: Minimum Database Fields Required for Matching Database to Utility Filings

Required Database Field	Field Description
Measure ID	Unique Identifier – smallest grain of analysis, a measure is a unique calculation within a project. For example, 2 identical boilers at a single site would be one measure with a quantity of 2, while 2 different boilers would be two separate measures
Project ID	Unique Identifier - project can include multiple measures at one site and at one time; typically, projects affect a single account
Account ID	Unique Identifier - billing account
Site ID	Unique Identifier - unique to a facility or group of facilities at a location
Customer ID	Unique Identifier - customer may have multiple sites, multiple accounts
Annual gross savings	Gross savings per year for natural gas, electricity, and water (where applicable)
Annual net savings	Net savings per year for natural gas, electricity, and water (where applicable)
Cumulative gross gas savings	Gross savings over the lifetime of the measure for natural gas, electricity, and water (where applicable)
Cumulative net gas savings	Net savings over the lifetime of the measure for natural gas, electricity, and water (where applicable)
Estimated useful life	Lifetime of the measure
Incentive amount	Amount of financial incentive paid (may be multiple fields if more than one party received a financial incentive)
Incentive type	Participant Rebate, Grant, Vendor Rebate/Spiff, participant loan
Program Year	The program year in which the measure impacts are claimed
Program	The program under which the measure impacts are claimed
Market segment	Business type or rate class for C&I (both in separate fields are best) 4-way single/multi-family by low income/market rate for residential
Measure	Measure name, specific to and identifiable in the TRM
Applied factors	Factors such as the net-to-gross (NTG) or removal rates used for the program /measure in calculating net savings for the filing

For prescriptive measures, the next step is to confirm the inputs and assumptions used in the savings estimates versus those required by the technical resource manual (TRM) or agreed-on prescriptive savings documentation applicable to the 2019 program year. This step is best completed on a measure level dataset, where each row in the tracking data conforms to a single measure defined in the TRM. The information required for this task depends on the measures covered by the TRM and implemented by the programs. For the verification, the EC needs a tracking database which includes all of the site-specific inputs required to estimate savings using the TRM. An example of the type of information required in the database for this process is shown in Data Request Table 3. This list is not comprehensive; please provide all necessary fields for calculating the prescriptive measure savings.

Data Request Table 3: Example of the type of information required to verify prescriptive savings

Example Database Field	Verification Purpose
Measure description	Connects the tracking measure to the TRM measure to determine the per-unit savings.
Quantity	Identifies the number of units installed to produce the total measure savings.
New or existing installation	Connects the tracking measure to the appropriate savings value in the TRM.
Measure TRM	TRM descriptor used as basis for gross and net savings calculations
Measure Capacity	Capacity value necessary for determining savings (e.g. MBH for high efficiency boilers)
Details of efficient equipment	Connects the tracking measure to the appropriate savings value in the TRM.
Base equipment	Connects the tracking measure to the appropriate savings value in the TRM.

Please provide tracking data for the programs identified in Data Request Table 1 which includes the fields listed in Data Request Tables 2 and 3, in addition to any similar or relevant fields that will aid in the verification.

Data Recommendations


In previous Natural Gas Demand Side Management Annual Verification Reports, the EC provided summary and program specific recommendations. Most relevant to this request are those regarding data, including:

- Deliver tracking data in a single flat file.
- Include site-level information for all measures installed through the program.

In addition, the EC again emphasizes the importance of **anonymized** records.

Other Data Requested

The EC team is requesting that the utility provide program spending, rates by class, and avoided costs. It is requested that this information is provided within the attached workbook (EC 2019 Data Request 1 – Spend, Rates, Avoided Costs.xlsx). Please note the format requested for Spend; this format is intentional as the level of detail is required for a variety of calculations including annual Cost Effectiveness calculations.



In addition to tabs for annual Spends, the EC requests submission of 2019 rates and avoided costs tables, to be included in respective tabs for each legacy utility.

Notice for future requests

After receiving and reviewing the data and documentation requested in this memo, the EC will follow up with a second documentation request for a sample of program participants in some programs. The final details will be established after the EC reviews the tracking data requested in this memo.

Second Documentation Request

A second, follow-up request was sent via email. This request consisted of an excel file listing the sample of program participants selected for detailed desk review, taken from the data received following the first request.

Appendix F Resource Acquisition Scorecards

This appendix describes the detailed process used to verify the metrics for the Resource Acquisition Scorecard programs for Enbridge (Table 11-9) and Union (Table 11-10). The programs addressed in this appendix are:

- Residential Home Retrofit – Home Energy Conservation – Enbridge
- Residential Home Retrofit – Home Reno Rebate – Union
- Residential Adaptive Thermostats – Enbridge
- Residential Adaptive Thermostats – Union
- Commercial & Industrial – Prescriptive – Enbridge
- Commercial & Industrial – Prescriptive – Union
- Commercial & Industrial – Direct Install – Enbridge
- Commercial & Industrial – Direct Install – Union
- Commercial & Industrial – Custom – Enbridge
- Commercial & Industrial – Custom – Union
- Comprehensive Energy Management – Enbridge
- Run-it-Right – Enbridge

Table 11-9. Enbridge 2019 Resource Acquisition scorecard*³⁰

Programs	Metrics	Verified Achievement		Metric Target			Weight
		Program-level Achievement	Metric-level Achievement	Lower Band	Target	Upper Band	
Home Energy Conservation	Large Volume Customer - CCM	N/A	502,499,656	326,798,345	435,731,127	653,596,690	40.00%
Residential Adaptive Thermostats		N/A					
Commercial & Industrial Custom		439,093,958					
Commercial & Industrial Direct Install		42,896,376					
Commercial & Industrial Prescriptive		18,898,183					
Comprehensive Energy Management		-					
Run-it-Right		1,611,139					
Home Energy Conservation	Small Volume Customer - CCM	220,374,038	369,469,773	223,954,472	298,605,963	447,908,944	40.00%
Residential Adaptive Thermostats		35,203,822					
Commercial & Industrial Custom		11,491,401					
Commercial & Industrial Direct Install		72,538,571					
Commercial & Industrial Prescriptive		29,861,941					
Comprehensive Energy Management		-					
Run-it-Right	N/A						
Home Energy Conservation	Participants	16,480	16,480	8,704	11,606	17,409	20.00%

*Not all values may compute exactly due to rounding.

³⁰ Ontario Energy Board Decision and Order, EB-2015-0029/EB-2015-0049, January 20, 2016, Schedule C

Table 11-10. Union 2019 Resource Acquisition scorecard*³¹

Programs	Metrics	Verified Achievement		Metric Target			Weight
		Program-level Achievement	Metric-level Achievement	Lower Band	Target	Upper Band	
Home Reno Rebate	CCM	154,742,128	935,593,811	598,939,485	798,585,979	1,197,878,969	75.00%
Residential Adaptive Thermostats		8,416,434					
Commercial & Industrial Custom		542,374,593					
Commercial & Industrial Direct Install		72,789,855					
Commercial & Industrial Prescriptive		157,270,801					
Home Reno Rebate	Homes Built	10,958	10,958	6,231	8,308	12,462	25.00%

*Not all values may compute exactly due to rounding.

³¹ Ibid.

Residential Home Retrofit - Home Energy Conservation – Enbridge

Overview

Table 11-11 shows the tracked and verified scorecard achievements for the 2019 Enbridge Home Energy Conservation (HEC) Program, with the metrics of CCM savings and participants (homes). As a result of this review, the EC verifies 220,374,038 CCM (101.25% of tracked) and 16,480 participants (99.96% of tracked). Each metric is discussed separately in this section, starting with the participants metric. Table 11-11 contains the following variables:

- Tracked: Metric value from original Tracking File sent by Enbridge upon first data request
- Verified: Metric value verified from review of Tracking File, Project Files, and other relevant documents identified in the Documentation section
- Ratio: Ratio of verified to tracked achievement. A value of 100.00% indicates that verified values match tracked values

Table 11-11. Enbridge Resource Acquisition achievement: Home Energy Conservation metrics*

Metric	Achievement		Ratio
	Tracked	Verified	
Large Volume Customer - CCM	-	-	-
Small Volume Customer - CCM	217,653,370	220,374,038	101.25%
Participants (Homes)	16,486	16,480	99.96%

*Not all values may compute exactly due to rounding.

Documentation

The EC used the documentation shown in Table 11-12 to verify the metrics for the Home Energy Conservation program.

Table 11-12. Documentation used to verify the Home Energy Conservation program

Report Language	Description or Citation
Enbridge-Provided Documentation	
Tracking File	Excel spreadsheet tracking metrics for all 2019 Enbridge DSM programs
Project Files	Various documents for each requested participant, supporting program metrics
Documents Used by EC	
OEB Decision	OEB Decision and Order, EB-2015-0029/EB-2015-0049, January 20, 2016 and OEB Revised Decision and Order, EB-2015-0029/EB-2015-0049, February 24, 2016
Enbridge Plan	Enbridge Gas Multi-Year DSM Plan (2015-2020), EB-2015-0049

Participant Selection

Enbridge provided the Tracking File listing 16,486 individual participants in the HEC program. To certify the scorecard metrics, the EC randomly selected 30 participants for review, requested additional documentation, confirmed receipt of the correct files, and reviewed documents to verify participation and eligibility.

Received Files

The typical file folder had the following information:

- Photographs of pre- and post-installation conditions
- Participation form with personally identifiable information redacted

- Invoice information (PDF scans or photo of receipts)
- HOT2000 Model input or "Simulation" Files (.HSE)
- HOT2000 Model Output Files (.TSV)

Participants Metric

Table 11-13 shows the tracked and verified scorecard achievements for the 2019 Enbridge HEC program with the metric of participant homes.

Table 11-13. Enbridge Resource Acquisition achievement: HEC Program participants metric*

Metric	Achievement		Ratio
	Tracked	Verified	
Participants (Homes)	16,486	16,480	99.96%

*Not all values may compute exactly due to rounding.

Verify Participation and Eligibility

The Resource Acquisition Scorecard identifies one metric for the program as "Residential Deep Savings Participants (Homes)". To determine the definition of "participants," the EC looked first to the OEB Decision, which identified approval of the Enbridge Home Energy Conservation program.³² The EC next looked to Enbridge's plan, which identified the following criteria:^{33 34}

1. Be a residential homeowner in the EGD franchise area
2. Have a valid Enbridge Gas account in good standing
3. Use an approved Certified Energy Evaluator ("CEE")
4. Install at least two measures
5. Complete a pre- and post-energy audit
6. Achieve an average of at least 15% gas savings across all participants³⁵

The EC evaluated the sampled participant files against the criteria above and determined:

- **Criterion 1:** Enbridge appropriately redacted Personally Identifiable Information (PII) in all of the project files, including customer name and address. However, each file contained an Enbridge account number, providing confirmation that the records were for Enbridge customers and thus within the service territory.
- **Criterion 2:** Each file contained an Enbridge account number, providing confirmation that the records were for Enbridge customers in good standing at the time of the project.
- **Criterion 3:** Each of the sampled 30 files contained a participant form. Each form was signed by the owner/participant (redacted) and the Energy Auditor, confirming customer enrollment in the program and involvement of an auditor. However, while the documentation confirmed that an auditor was involved, it does not signal that the auditor was an approved Certified Energy Evaluator.³⁶ Therefore, we did not use this requirement as a qualification for project eligibility for this round of evaluation.
- **Criterion 4:** The tracking data for all 16,486 records (including the 30 sampled) indicated that at least two measure types were installed at each location, with 17 homes receiving as many as seven.

³² Ontario Energy Board Decision and Order, EB-2015-0029/EB-2015-0049, January 20, 2016, Page 13

³³ Enbridge's Proposed 2015-2020 DSM Plan, EB-2015-0049, Exhibit B, Tab 2, Schedule 2, Page 19 of 55

³⁴ Enbridge's Proposed 2015-2020 DSM Plan, EB-2015-0049, Exhibit B, Tab 2, Schedule 1, Page 25 of 100

³⁵ Enbridge's plan is internally inconsistent on this point. In some areas, each house must achieve at least 15% savings. In others, the program must achieve 15% average across all homes. The EAC has chosen to use the second (average) criteria for evaluation.

³⁶ In future evaluation cycles, the EC recommends tracking certifications for all energy evaluators and/or auditors submitting records. NRCAN requires certification for all auditors permitted to use EnerGuide mode, however the EC is unable to verify this without supporting documentation or records.

- **Criterion 5:** Each project contained pre- and post- project photos. As mentioned for criterion #4, photo documentation was not comprehensive for all measures, but did partially exist for each sampled project, confirming inspections did occur. In combination with submitted modelling files, the EC found that all projects satisfied this requirement.
- **Criterion 6:** As decided by the EAC in 2016, the EC uses the same criterion applied to the equivalent Union program, which is a 15% *average* savings across all homes. Tracking data, corroborated by HOT2000 model files, showed an average of 22.3% for the 30 sample projects reviewed. Additionally, the Tracking File showed average natural gas savings of 16.4% across all participants. Therefore, the EC verified all 16,486 homes meeting this criterion.

In addition to these six criteria, the EAC identified one additional criterion for homes that installed air sealing.

- **Criterion 7:** For air sealing to qualify as a measure, the EAC determined that a reduction of at least 10% of cubic feet per minute of air leakage (as measured by a documented blower-door test) must occur. Tracking data for most projects that claimed air sealing as an installed measure identified a reduction of 10% or more, but 100 homes had a reduction that was less than 10%. Therefore, the air sealing measure did not qualify for these 100 homes. Of these 100 homes, 94 had at least two measures in addition to air sealing and thus still met Criterion 4. However, 6 homes only had one additional measure installed, and no longer met Criterion 4. This left 16,480 verified participating homes out of the original 16,486.

Table 11-14 shows the measure types installed by the verified participants in the program, broken out by the number of total measure types installed per customer. The most common measure type was a furnace upgrade, with 14,508 total installations. A Furnace Upgrade was most common in homes with only two measures; of the 10,483 homes with only two measures, 9,018 (86%) installed a new furnace.

Table 11-14. Count of individual measure types among verified projects and types per home*

Measure Type	Number of Measure Types by Customer						Total	% of Total Homes
	Two	Three	Four	Five	Six	Seven		
Furnace upgraded	9,018	4,228	945	231	69	17	14,508	88%
Air Sealing	7,914	3,971	977	245	73	17	13,197	80%
Attic upgraded	1,503	2,036	662	181	69	17	4,468	27%
Basement upgraded	1,457	1,076	432	177	73	17	3,232	20%
Water Heater upgraded	576	1,348	529	144	44	17	2,658	16%
Windows	424	945	571	224	73	17	2,254	14%
Wall upgraded	68	110	102	79	61	17	437	3%
Total Measure Types	20,960	13,714	4,218	1,281	462	119	40,754	N/A
Total Homes	10,483	4,595	1,057	257	77	17	16,486	N/A

*Not all values may compute exactly due to rounding.

Verification Result

As a result of this review, the EC verifies that 16,480 homes satisfy the requirements of participation (99.96% of tracked).

CCM Savings Metric

Table 11-15 shows the tracked and verified scorecard achievements for the 2019 Enbridge HEC program with the metric of CCM savings.

Table 11-15. Enbridge Resource Acquisition scorecard achievements: HEC Program CCM metric*

Metric	Achievement		Ratio
	Tracked	Verified	
Large Volume Customer - CCM	-	-	-
Small Volume Customer - CCM	217,653,370	220,374,038	101.25%
TOTAL	217,653,370	220,374,038	101.25%

*Not all values may compute exactly due to rounding.

Verify Tracked Savings

In calculating Net Cumulative Cubic Meters (CCM) savings, the EC first utilized Enbridge tracking data to identify the savings for each of the tracked projects. The EC confirmed that the measure life and free ridership multipliers were correctly applied and reviewed the documentation for the sample of 30 program participants to identify whether the gross energy savings in the project files matched the gross energy savings in the tracking data. If any of the 30 projects did not match, an average savings-weighted realization rate was calculated and applied to the tracking savings to produce verified savings.

Calculate Realization Rate

The EC used a multi-step process to verify tracked energy savings for the 30 sampled homes, shown in Figure 11-3 for the 2019 HEC verification. The process was necessary because the simulation mode (EnerGuide or Expert³⁷) used by program delivery agents is not available to non-certified professionals. While the EC can attempt to run the Expert simulations in General mode, the runs may produce error warnings or result in a savings differential between the Expert result and General result. Therefore, this multi-step process was developed to verify savings:

- EC requested simulation (HSE) and output (TSV) files from the program
- Where possible, the simulation file was re-run and the results used to verify the tracking savings. If different simulation versions or modes were used, the savings could be slightly different; therefore, simulation savings were considered "verified" if they were within 2% of the tracking savings; in this case, the tracked savings value was accepted as the verified savings.
- If a simulation file was not provided, the file inputs were incompatible with General mode and would not run, the file ran but produced an error due to version or mode differences, or the file produced a difference in savings greater than 2%, the output file was used to verify the tracking savings. As with the simulation file, the EC accepted tracking savings values within 2% of the output file value as the verified savings.
- If the EC was unable to verify the tracking savings against the output file, the EC requested additional documentation from the program (utility) to explain the discrepancy. This documentation explained the adjustments used to calculate approved furnace baselines for accurate reported savings values.

³⁷ "Expert" is the mode listed in the output files. This mode is also labelled as "EnerGuide" in simulation files. The EC uses both terms.

- If no additional documentation or explanation was available, the EC compared the output file values to the project documentation to determine whether they were consistent. If they were not consistent, the output file value was used as the verified value.

Figure 11-3. Overview of Gross Savings Verification for 2019 HEC Verification

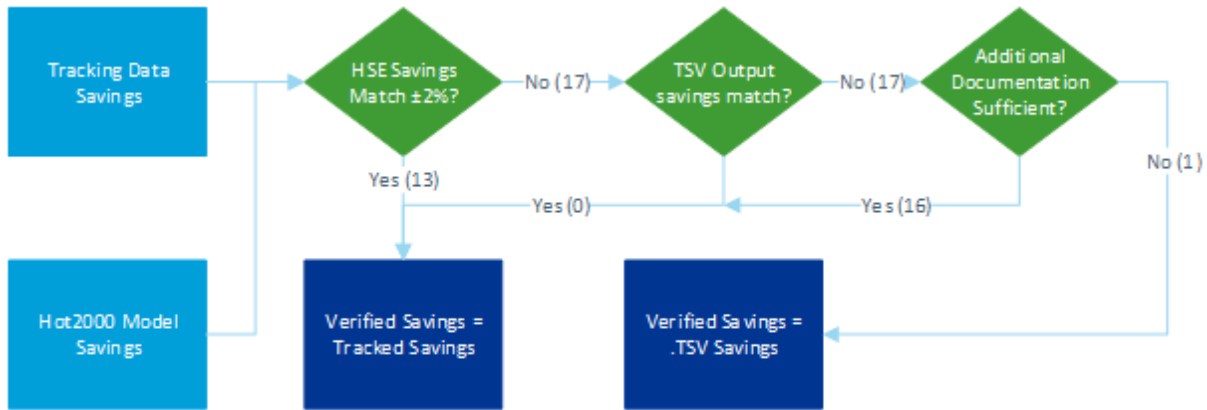


Table 11-16 shows how many customers were verified in each evaluation step.

Table 11-16. Overview of gross savings verification

Evaluation Step	# Verified
Simulation re-run (HSE) and compared to tracking, verified if $\pm 2\%$	13
Output files for (TSV) compared to tracking, verified if $\pm 2\%$	0
Additional Explanation request	16
Comparison to output file values	1
Total Verified	30

The gross savings realization rate (RR) is 101.25%, shown in Table 11-17.

Table 11-17. Enbridge HEC Realization Rate*

Numbers of Houses	Realization Rate	90% Confidence Interval			
		Absolute Precision	Lower Bound	Upper Bound	Relative Precision
30	101.25%	1.16%	100.09%	102.41%	1.86%

*Not all values may compute exactly due to rounding.

Verification Result

As a result of this review, the EC confirms total savings of 220,374,038 CCM for Enbridge's Home Energy Conservation CCM savings metric (101.25% of tracked).

Residential Home Retrofit - Home Reno Rebate – Union

Overview

Table 11-18 shows the tracked and verified scorecard achievements for the 2019 Union Home Reno Rebate (HRR) program, with the metrics of CCM savings and homes built. As a result of this review, the EC verifies 154,742,128 CCM (100.00% of tracked) and 10,958 participants (100.00% of tracked). Each metric is discussed separately in this section, starting with the participants metric. Table 11-18 contains the following variables:

- Tracked: Metric value from original Tracking File sent by Enbridge upon first data request
- Verified: Metric value verified from review of Tracking File, Project Files, and other relevant documents identified in the Documentation section
- Ratio: Ratio of verified to tracked achievement. A value of 100.00% indicates that verified values match tracked values

Table 11-18. Union Resource Acquisition achievement: Home Reno Rebate metrics*

Metric	Achievement		Ratio
	Tracked	Verified	
CCM	154,742,128	154,742,128	100.00%
Homes Built	10,958	10,958	100.00%

*Not all values may compute exactly due to rounding.

Documentation

The EC used the documentation shown in Table 11-19 to verify the metrics for the Home Reno Rebate program.

Table 11-19. Documentation used to verify the Home Reno Rebate program

Report Language	Description or Citation
Enbridge-Provided Documentation	
Tracking File	Excel spreadsheet tracking metrics for all 2019 Union DSM programs
Project Files	Various documents for each requested participant, supporting program metrics
Documents Used by EC	
OEB Decision	OEB Decision and Order, EB-2015-0029/EB-2015-0049, January 20, 2016 and OEB Revised Decision and Order, EB-2015-0029/EB-2015-0049, February 24, 2016
Union Plan	Union's 2015-2020 DSM Plan, EB-2015-0029

Participant Selection

Union provided the Tracking File listing 10,958 individual participants in the HRR program. To certify the scorecard metric, the EC randomly selected 60 participants for review, requested additional documentation, confirmed receipt of the correct files, and reviewed documents to verify participation and eligibility.

Received Files

The typical file folder had the following information:

- Photographs of pre- and post-installation conditions
- Participation form with personally identifiable information redacted
- Invoice information (PDF scans or photo of receipts)

- HOT2000 Model simulation or “Simulation” Files (.HSE)
- HOT2000 Model Output Files (.TSV)

Participants Metric

Table 11-20 shows the tracked and verified scorecard achievements for the 2019 Union HRR program with the metric of participant homes.

Table 11-20. Union Resource Acquisition achievement: HRR Program participants metric*

Metric	Achievement		Ratio
	Tracked	Verified	
Participants (Homes)	10,958	10,958	100.00%

*Not all values may compute exactly due to rounding.

Verify Participation and Eligibility

The Resource Acquisition Scorecard identifies one metric for the program as “Home Reno Rebate Participants (Homes)”. To determine the definition of “participants,” the EC looked first to the OEB Decision, which approved the Union HRR program³⁸. The EC looked next to Union’s plan, which identified the following criteria:³⁹

Homes that count as a participant towards the Home Reno Rebate (“HRR”) Participant (Homes) metric must meet the following two requirements:

- 1. A homeowner must complete at least two eligible renovations as outlined at Exhibit A, Tab 3, Appendix A, Section 1.0, Table 1.*
- 2. The aggregate of all of the homes counted towards the metric must achieve, on average, at least a 15% reduction in annual natural gas use as determined through comparing a pre and post energy assessment.*

The EC evaluated the sampled participant files against the criteria above and determined:

- **Criterion 1:** The EC confirmed that the project files documented at least two eligible measures for all homes, not only those sampled. Upon review, all participants met this requirement. Table 11-21 shows the measure types and number of measures in the homes that met this requirement.
- **Criterion 2:** Of the 60 homes randomly sampled, tracking files allowed the EC to calculate average savings of 19.07%. The EC further calculated from tracking data that the population of homes satisfied the 15% requirement.

Table 11-21 shows the measure types installed by the program, broken out by the number of total measure types installed per customer. The most common measure type was air sealing, with 9,049 total measures performed. Furnace Upgrade was most common in homes with only two measures; of the 6,485 homes with only two measures, 5,593 (86%) installed a furnace upgrade.

³⁸ Ontario Energy Board Decision and Order, EB-2015-0029/EB-2015-0049, January 20, 2016, Page 13

³⁹ Union’s Proposed 2015-2020 DSM Plan, EB-2015-0029, Exhibit A, Tab 3, Page 24 of 73

Table 11-21. Count of individual measure types among verified projects and types per home*

Measure Type	Number of Measure Types by Customer						Total	% of Total Homes
	Two	Three	Four	Five	Six	Seven		
Air Sealing	4,982	2,588	939	380	147	13	9,049	83%
Furnace upgraded	5,593	2,290	691	264	142	13	8,993	82%
Attic upgraded	687	1,057	629	341	141	13	2,868	26%
Basement upgraded	867	938	537	294	144	13	2,793	25%
Windows	429	1,150	705	349	140	13	2,786	25%
Water Heater upgraded	293	433	212	109	49	13	1,109	10%
Wall upgraded	61	241	285	238	139	13	977	9%
Boiler Upgraded	58	27	22	5	4	-	116	1%
Total Measure Types	12,970	8,724	4,020	1,980	906	91	28,691	N/A
Total Homes	6,485	2,908	1,005	396	151	13	10,958	N/A

*Not all values may compute exactly due to rounding.

Verification Result

As a result of this review, the EC verifies that all 10,958 homes (100.00%) satisfy the requirements for participation.

CCM Savings Metric

Table 11-22 shows the tracked and verified scorecard achievements for the 2019 Union HRR program with the metric of CCM.

Table 11-22. Union Resource Acquisition scorecard achievements: HRR Program savings metric*

Metric	Achievement		Ratio
	Tracked	Verified	
CCM	154,742,128	154,742,128	100.00%

*Not all values may compute exactly due to rounding.

Verify Tracked Savings

In calculating Net Cumulative Cubic Meters (CCM) savings, the EC first utilized Union Tracking Data to identify the savings for each of the tracked projects, confirming that the measure life and free ridership multipliers were correctly applied. Union Tracking data includes all projects as individual records within the tracking data, allowing for a simple summing of tracked savings. The EC reviewed the documentation for the sample of 60 program participants to identify whether the gross energy savings in the project files matched the gross energy savings in the tracking data. If any of the 60 projects did not match, an average savings-weighted realization rate was calculated and applied to the tracking savings to produce verified savings.

Calculate Realization Rate

The EC used a multi-step process to verify tracked energy savings for the sampled homes, shown in Figure 11-4. for the 2019 HRR verification. The process was necessary because the simulation mode (EnerGuide or Expert⁴⁰) used by program delivery agents is not available to non-certified professionals. While the EC can attempt to run the Expert simulations in General mode, the runs may produce error warnings or result in a

⁴⁰ "Expert" is the mode listed in the output files. This mode is also labelled as "EnerGuide" in simulation files. The EC uses both terms.

savings differential between the Expert result and General result. Therefore, this multi-step process was developed to verify savings:

- EC requested simulation (HSE) and output (TSV) files from the program
- Where possible, the simulation file was re-run and the results used to verify the tracking savings. If different simulation versions or modes were used, the savings could be slightly different; therefore, simulation savings were considered “verified” if they were within 2% of the tracking savings; in this case, the tracked savings value was accepted as the verified savings.
- If a simulation file was not provided, the file inputs were incompatible with General mode and would not run, the file ran but produced an error due to version or mode differences, or the file produced a difference in savings greater than 2%, the output file was used to verify the tracking savings. As with the simulation file, the EC accepted tracking savings values within 2% of the output file value as the verified savings.
- If the EC was unable to verify the tracking savings against the output file, the EC requested additional documentation from the program (utility) to explain the discrepancy. This documentation explained the adjustments used to calculate approved furnace baselines for accurate reported savings values.
- If no additional documentation or explanation was available, the EC would have compared the output file values to the project documentation to determine whether they were consistent. This verification step was not necessary for this program in this round of evaluation.

Figure 11-4. Overview of gross savings verification for 2019 HRR verification

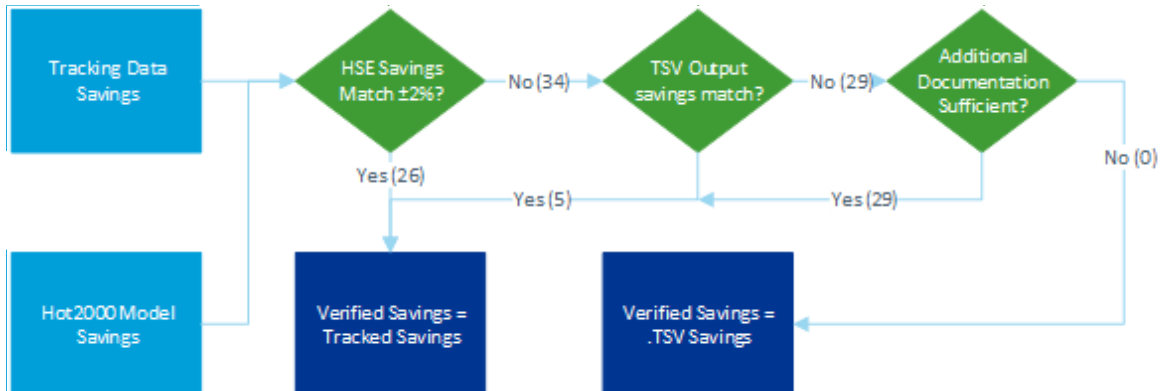


Table 11-23 shows how many customers were verified in each evaluation step.

Table 11-23. Overview of gross savings verification

Evaluation Step	# Verified
Simulation re-run (HSE) and compared to tracking, verified if $\pm 2\%$	26
Output files for (TSV) compared to tracking, verified if $\pm 2\%$	5
Additional Explanation request	29
Comparison to output file values	0
Total Verified	60

The EC produced verified savings for all 60 homes in the sample. The gross savings realization rate (RR) is 100.00%, shown in Table 11-24.

Table 11-24. Union HRR realization rate*

Numbers of Houses	Realization Rate	90% Confidence Interval			
		Absolute Precision	Lower Bound	Upper Bound	Relative Precision
60	100.00%	0.00%	100.00%	100.00%	0.00%

*Not all values may compute exactly due to rounding.

Verification Result

As a result of this review, the EC confirms the total savings of 154,742,128 CCM for Union’s Home Reno Rebate CCM savings metric (100.00% of tracked).

Residential Adaptive Thermostats - Enbridge

Overview

Table 11-25 shows the tracked and verified scorecard achievements for the 2019 Enbridge Residential Adaptive Thermostat Program, with the metric of CCM savings. As a result of this review, the EC verifies 35,203,822 CCM (100.00% of tracked). Table 11-25 contains the following variables:

- Tracked: Metric value from original Tracking File sent by Enbridge upon first data request
- Verified: Metric value verified from review of Tracking File, Project Files, and other relevant documents identified in the Documentation section
- Ratio: Ratio of verified to tracked achievement. A value of 100.00% indicates that verified values match tracked values

Table 11-25. Enbridge Resource Acquisition achievement: Residential Adaptive Thermostats CCM metric*

Metric	Achievement		Ratio
	Tracked	Verified	
Large Volume Customer - CCM	-	-	-
Small Volume Customer - CCM	35,203,822	35,203,822	100.00%
TOTAL	35,203,822	35,203,822	100.00%

*Not all values may compute exactly due to rounding.

Documentation

The EC used the documentation shown in Table 11-26 to verify the metrics for the Residential Adaptive Thermostat program.


Table 11-26. Documentation used to verify the Residential Adaptive Thermostats program

Report Language	Description or Citation
Enbridge-Provided Documentation	
Tracking File	Excel spreadsheet tracking metrics for all 2019 Enbridge DSM programs
Documents Used by EC	
OEB Decision	OEB Decision and Order, EB-2015-0029/EB-2015-0049, January 20, 2016 and OEB Revised Decision and Order, EB-2015-0029/EB-2015-0049, February 24, 2016
Enbridge Plan	Enbridge Gas Multi-Year DSM Plan (2015-2020), EB-2015-0049
TRM 3.0	Natural Gas Demand Side Management Technical Resource Manual, Version 3.0
Adaptive Thermostat Ecobee Ping Report	Adaptive Ecobee Final Pings Redacted, February 26, 2020

Verify Cumulative Natural Gas Savings

The EC reviewed natural gas savings for prescriptive measures from the Tracking File, using the procedures identified in Appendix N. In calculating gas savings, the EC used:

- Tracking File data, which reported 15,077 units
- TRM 3.0
- Adaptive Thermostat Ecobee Ping Report, which reported 78.4% installation rate



The EC certified the tracked savings, for a savings ratio of 100.00%.⁴¹

Verification Result

As a result of this review, the EC confirms the savings of 35,203,822 CCM (100.00% of tracked) for Enbridge's Residential Adaptive Thermostat small volume customer CCM metric.

⁴¹ The savings ratio is 100% because the program used the same 78.4% installation rate as the EC, so the EC verifies 100% of the savings reported by the program.

Residential Adaptive Thermostats - Union

Overview

Table 11-27 shows the tracked and verified scorecard achievements for the 2019 Union Residential Adaptive Thermostat Program, with the metric of CCM savings. As a result of this review, the EC verifies 8,416,434 CCM (100.00% of tracked). Table 11-27 contains the following variables:

- Tracked: Metric value from original Tracking File sent by Enbridge upon first data request
- Verified: Metric value verified from review of Tracking File, Project Files, and other relevant documents identified in the Documentation section
- Ratio: Ratio of verified to tracked achievement. A value of 100.00% indicates that verified values match tracked values

Table 11-27. Union Resource Acquisition achievement: Residential Adaptive Thermostats CCM metric*

Metric	Achievement		Ratio
	Tracked	Verified	
CCM	8,416,434	8,416,434	100.00%

*Not all values may compute exactly due to rounding.

Documentation

The EC used the documentation shown in Table 11-28 to verify the metrics for the Residential Adaptive Thermostat program.


Table 11-28. Documentation used to verify the Residential Adaptive Thermostats program

Report Language	Description or Citation
Enbridge-Provided Documentation	
Tracking File	Excel spreadsheet tracking metrics for all 2019 Union DSM programs
Documents Used by EC	
OEB Decision	OEB Decision and Order, EB-2015-0029/EB-2015-0049, January 20, 2016, OEB Revised Decision and Order, EB-2015-0029/EB-2015-0049, February 24, 2016, and OEB Mid-Term Review, EB-2017-0127/EB-2017-0128
Union Plan	Union's 2015-2020 DSM Plan, EB-2015-0029
TRM 3.0	Natural Gas Demand Side Management Technical Resource Manual, Version 3.0
Adaptive Thermostat Ecobee Ping Report	Adaptive Ecobee Final Pings Redacted, February 26, 2020

Verify Cumulative Natural Gas Savings

The EC reviewed natural gas savings for prescriptive measures from the Tracking File, using the procedures identified in Appendix N. In calculating gas savings, the EC used:

- Tracking File data, which reported 3,805 units
- TRM 3.0
- Adaptive Thermostat Ecobee Ping Report, which reported 80.2% installation rate



The EC certified the tracked savings, for a savings ratio of 100.00%.⁴²

Verification Result

As a result of this review, the EC confirms the savings of 8,416,434 CCM (100.00% of tracked) for Union's Residential Adaptive Thermostat CCM metric.

⁴² The savings ratio is 100% because the program used the same 80.2% installation rate as the EC, so the EC verifies 100% of the savings reported by the program.

Commercial & Industrial - Prescriptive – Enbridge

Overview

Table 11-29 shows the tracked and verified scorecard achievements for the 2019 Enbridge Commercial & Industrial Prescriptive program, with the metric of CCM savings. As a result of this review, the EC verifies total savings of 48,760,124 CCM for large and small volume customers (108.24% of tracked). Table 11-29 contains the following variables:

- Tracked: Metric value from original Tracking File sent by Enbridge upon first data request
- Verified: Metric value verified from review of Tracking File, Project Files, and other relevant documents identified in the Documents section.
- Savings Ratio: Ratio of verified to tracked savings. A value of 100.00% indicates that verified values match tracked values.

Table 11-29. Enbridge Resource Acquisition achievement: C&I Prescriptive CCM metric*

Metric	Achievement		Ratio
	Tracked	Verified	
Large Volume Customer - CCM	18,341,286	18,898,183	103.04%
Small Volume Customer - CCM	26,708,218	29,861,941	111.81%
TOTAL	45,049,504	48,760,124	108.24%

*Not all values may compute exactly due to rounding.

Documentation

The EC used the documentation shown in Table 11-30 to verify the metrics for the C&I Prescriptive program.

Table 11-30. Documentation used to verify the C&I Prescriptive program

Report Language	Description or Citation
Enbridge-Provided Documentation	
Tracking File	Excel spreadsheet tracking metrics for all 2019 Enbridge DSM programs
Documents Used by EC	
OEB Decision	OEB Decision and Order, EB-2015-0029/EB-2015-0049, January 20, 2016 and OEB Revised Decision and Order, EB-2015-0029/EB-2015-0049, February 24, 2016
Enbridge Plan	Enbridge Gas Multi-Year DSM Plan (2015-2020), EB-2015-0049
TRM 3.0	Natural Gas Demand Side Management Technical Resource Manual, Version 3.0
High Efficiency Boiler Document	Excel spreadsheet detailing gas savings for boilers based on size
Showerhead Verification Among Rental Buildings	Showerhead Verification Among Rental Buildings, Ipsos Research, 2012 ⁴³

Verify Cumulative Natural Gas Savings

In calculating net CCM, the EC reviewed natural gas savings for prescriptive measures from the Tracking File, using the procedures identified in Appendix N. Table 11-31 and Table 11-32 show the results of the analysis.

⁴³ Showerhead Verification Among Rental Buildings, Ipsos Research for Enbridge Gas, March 29, 2012

Table 11-31. Enbridge Resource Acquisition achievement by measure group: small volume customers*

Measure Group	Installed Measures	Tracked Achievement (CCM)	Verified Achievement (CCM)	Savings Ratio
Air Curtain	14	2,638,687	2,638,687	100.00%
Boiler	30	3,084,269	6,224,460	201.81%
Broiler	1	32,131	32,131	100.00%
Demand Control Kitchen Ventilation	45	4,650,114	4,650,114	100.00%
Demand Control Ventilation	369	13,367,389	13,385,384	100.13%
Destratification Fan	16	570,875	570,875	100.00%
Dishwasher	2	8,706	8,706	100.00%
Energy Recovery Ventilation	4	223,108	223,108	100.00%
Fryer	90	1,216,512	1,216,512	100.00%
Furnace	11	48,019	48,123	100.22%
Heat Recovery Ventilation	2	41,709	41,709	100.00%
Infrared Heater	39	723,299	723,299	100.00%
Showerhead	107	29,468	24,900	84.50%
Water Heater	7	73,934	73,934	100.00%
Total	737	26,708,218	29,861,941	111.81%

*Not all values may compute exactly due to rounding.

Table 11-32. Enbridge Resource Acquisition achievement by measure group: large volume customers*

Measure Group	Installed Measures	Tracked Achievement (CCM)	Verified Achievement (CCM)	Savings Ratio
Air Curtain	15	2,901,656	2,901,656	100.00%
Boiler	18	3,285,535	3,852,085	117.24%
Cooker	2	170,669	170,669	100.00%
Demand Control Kitchen Ventilation	16	2,607,347	2,607,347	100.00%
Demand Control Ventilation	42	1,169,752	1,171,327	100.13%
Destratification Fan	15	555,539	555,539	100.00%
Dishwasher	1	822	822	100.00%
Energy Recovery Ventilation	6	2,821,467	2,821,467	100.00%
Fryer	30	405,504	405,504	100.00%
Heat Recovery Ventilation	2	419,695	419,695	100.00%
Infrared Heater	7	97,363	97,363	100.00%
Make-Up Air Unit	2	417,240	417,240	100.00%
Ozone Washer Extractor	11	3,403,058	3,403,058	100.00%
Showerhead	263	72,430	61,204	84.50%
Water Heater	2	13,210	13,210	100.00%
Total	432	18,341,286	18,898,183	103.04%

*Not all values may compute exactly due to rounding.



Verification Result

As a result of this review, the EC confirms the savings of 29,861,941 CCM for small volume customers (111.81% of tracked) and 18,898,183 CCM for large volume customers (103.04% of tracked) for Enbridge's C&I Prescriptive Program.

Commercial & Industrial - Prescriptive – Union

Overview

Table 11-33 shows the tracked and verified scorecard achievements for the 2019 Union Commercial & Industrial Prescriptive program, with the metric of CCM savings. As a result of this review, the EC verifies 157,270,801 CCM (115.49% of tracked). Table 11-33 contains the following variables:

- Tracked: Metric value from original Tracking File sent by Enbridge upon first data request
- Verified: Metric value verified from review of Tracking File, Project Files, and other relevant documents identified in the Documentation section
- Ratio: Ratio of verified to tracked achievement. A value of 100.00% indicates that verified values match tracked values

Table 11-33. Union Resource Acquisition achievement: C&I Prescriptive CCM metric*

Metric	Achievement		Ratio
	Tracked	Verified	
CCM	136,177,444	157,270,801	115.49%

*Not all values may compute exactly due to rounding.

Documentation

The EC used the documentation shown in Table 11-34 to verify the metrics for the C&I Prescriptive program.

Table 11-34. Documentation used to verify the C&I Prescriptive program

Report Language	Description or Citation
Enbridge-Provided Documentation	
Tracking File	Excel spreadsheet tracking metrics for all 2019 Union DSM programs
Documents Used by EC	
OEB Decision	OEB Decision and Order, EB-2015-0029/EB-2015-0049, January 20, 2016 and OEB Revised Decision and Order, EB-2015-0029/EB-2015-0049, February 24, 2016
Union Plan	Union's 2015-2020 DSM Plan, EB-2015-0029
TRM 3.0	Natural Gas Demand Side Management Technical Resource Manual, Version 3.0
Condensing Boilers Document	PDF file substantiating gas savings from boilers based on size

Verify Cumulative Natural Gas Savings

In calculating net CCM, the EC reviewed natural gas savings for prescriptive measures from the Tracking File, using the procedures identified in Appendix N. Table 11-35 shows the results of the analysis.

Table 11-35. Union Resource Acquisition Achievement by measure group*

Measure Group	Installed Measures	Tracked Achievement (CCM)	Verified Achievement (CCM)	Savings Ratio
Air Curtain	76	12,519,181	12,519,181	100.00%
Boiler	515	79,218,288	100,364,672	126.69%
Broiler	1	24,106	24,106	100.00%
Cooker	4	341,338	341,338	100.00%
Demand Control Kitchen Ventilation	45	5,015,701	5,015,701	100.00%
Demand Control Ventilation	297	7,354,010	7,354,010	100.00%
Destratification Fan	15	393,228	393,228	100.00%
Dishwasher	4	18,522	18,522	100.00%
Energy Recovery Ventilation	619	11,783,830	11,730,802	99.55%
Fryer	74	1,000,243	1,000,243	100.00%
Furnace	96	393,504	393,504	100.00%
Heat Recovery Ventilation	222	6,142,206	6,142,206	100.00%
Infrared Heater	371	6,186,064	6,186,064	100.00%
Make-Up Air Unit	15	3,354,809	3,354,809	100.00%
Ozone Washer Extractor	5	1,090,213	1,090,213	100.00%
Unit Heater	8	195,647	195,647	100.00%
Water Heater	113	1,146,554	1,146,555	100.00%
Total	2,480	136,177,444	157,270,801	115.49%

*Not all values may compute exactly due to rounding.

Verification Result

As a result of this review, the EC confirms the savings of 157,270,801 CCM savings (115.49% of tracked) for Union's C&I Prescriptive Program.

Commercial & Industrial – Direct Install – Enbridge

Overview

Table 11-36 shows the tracked and verified scorecard achievements for the 2019 Enbridge Commercial & Industrial Direct Install Program, with the metric of CCM savings. As a result of this review, the EC verifies total savings of 115,434,947 CCM for large and small volume customers (100.00% of tracked). Table 11-36 contains the following variables:

- Tracked: Metric value from original Tracking File sent by Enbridge upon first data request
- Verified: Metric value verified from review of Tracking File, Project Files, and other relevant documents identified in the Documentation section
- Ratio: Ratio of verified to tracked achievement. A value of 100.00% indicates that verified values match tracked values

Table 11-36. Enbridge Resource Acquisition achievement: C&I Direct Install CCM metric*

Metric	Achievement		Ratio
	Tracked	Verified	
Large Volume Customer - CCM	42,896,376	42,896,376	100.00%
Small Volume Customer - CCM	72,538,571	72,538,571	100.00%
TOTAL	115,434,947	115,434,947	100.00%

*Not all values may compute exactly due to rounding.

Documentation

The EC used the documentation shown in Table 11-37 to verify the metrics for the C&I Direct Install program.

Table 11-37. Documentation used to verify the C&I Direct Install program

Report Language	Description or Citation
Enbridge-Provided Documentation	
Tracking File	Excel spreadsheet tracking metrics for all 2019 Enbridge DSM programs
Documents Used by EC	
OEB Decision	OEB Decision and Order, EB-2015-0029/EB-2015-0049, January 20, 2016 and OEB Revised Decision and Order, EB-2015-0029/EB-2015-0049, February 24, 2016
Enbridge Plan	Enbridge Gas Multi-Year DSM Plan (2015-2020), EB-2015-0049
TRM 3.0	Natural Gas Demand Side Management Technical Resource Manual, Version 3.0

Verify Cumulative Natural Gas Savings

In calculating net CCM, the EC reviewed natural gas savings for prescriptive measures from the Tracking File, using the procedures identified in Appendix N. Two measures were installed, with 218 individual installations with large volume customers and 381 with small volume customers. The EC verified the tracked savings which resulted in a savings ratio of 100.00%.

Table 11-38. Enbridge C&I Direct Installation measure groups: large volume customers

Measure Group	Installed Measures	Tracked Achievement (CCM)	Verified Achievement (CCM)	Savings Ratio
Air Curtain	127	27,619,706	27,619,706	100.00%
Demand Control Kitchen Ventilation	91	15,276,670	15,276,670	100.00%
TOTAL	218	42,896,376	42,896,376	100.00%

Table 11-39. Enbridge C&I Direct Installation measure groups: small volume customers

Measure Group	Installed Measures	Tracked Achievement (CCM)	Verified Achievement (CCM)	Savings Ratio
Air Curtain	365	69,731,007	69,731,007	100.00%
Demand Control Kitchen Ventilation	16	2,807,564	2,807,564	100.00%
TOTAL	381	72,538,571	72,538,571	100.00%

Verification Result

As a result of this review, the EC confirms the savings of 42,896,376 CCM for large volume customers (100.00% of tracked) and 72,538,571 CCM for small volume customers (100.00% of tracked) for Enbridge's C&I Direct Install Program.

Commercial & Industrial – Direct Install – Union

Table 11-40 shows the tracked and verified scorecard achievements for the 2019 Union Commercial & Industrial Direct Install Program, with the metric of CCM savings. As a result of this review, the EC verifies total savings of 72,789,855 CCM (100.00% of tracked). Table 11-40 contains the following variables:

- Tracked: Metric value from original Tracking File sent by Enbridge upon first data request
- Verified: Metric value verified from review of Tracking File, Project Files, and other relevant documents identified in the Documentation section
- Ratio: Ratio of verified to tracked achievement. A value of 100.00% indicates that verified values match tracked values

Table 11-40. Union Resource Acquisition achievement: C&I Direct Install CCM metric*

Metric	Achievement		Ratio
	Tracked	Verified	
CCM	72,789,855	72,789,855	100.00%

*Not all values may compute exactly due to rounding.

Documentation

The EC used the documentation shown in Table 11-41 to verify the metrics for the C&I Direct Install program.

Table 11-41. Documentation used to verify the C&I Direct Install program

Report Language	Description or Citation
Enbridge-Provided Documentation	
Tracking File	Excel spreadsheet tracking metrics for all 2019 Union DSM programs
Documents Used by EC	
OEB Decision	OEB Decision and Order, EB-2015-0029/EB-2015-0049, January 20, 2016 and OEB Revised Decision and Order, EB-2015-0029/EB-2015-0049, February 24, 2016
Union Plan	Union's 2015-2020 DSM Plan, EB-2015-0029
TRM 3.0	Natural Gas Demand Side Management Technical Resource Manual, Version 3.0

Verify Cumulative Natural Gas Savings

In calculating net CCM, the EC reviewed natural gas savings for prescriptive measures from the Tracking File, using the procedures identified in Appendix N. One measure was installed, with 300 individual installations. The EC verified the tracked savings which resulted in a savings ratio of 100.00%.

Table 11-42. Union C&I Direct Installation measure groups

Measure Group	Installed Measures	Tracked Achievement (CCM)	Verified Achievement (CCM)	Savings Ratio
Air Curtain	300	72,789,855	72,789,855	100.00%

Verification Result

As a result of this review, the EC confirms the savings of 72,789,855 (100.00% of tracked) for Union's C&I Direct Install Program.

Commercial & Industrial - Custom – Enbridge

Overview

Table 11-43 shows the tracked and verified scorecard achievements for the 2019 Enbridge Commercial & Industrial Custom program, with the metric of CCM savings. As a result of this review, the EC verifies total savings of 450,585,359 CCM (111.30% of tracked). Table 11-43 contains the following variables:

- Tracked: Metric value from original Tracking File sent by Enbridge upon first data request
- Verified: Metric value verified from review of Tracking File, Project Files, and other relevant documents identified in the Documentation section
- Ratio: Ratio of verified to tracked achievement. A value of 100.00% indicates that verified values match tracked values

Table 11-43. Enbridge Resource Acquisition achievement: C&I Custom CCM metric*

Metric	Achievement		Ratio
	Tracked	Verified	
Large Volume Customer - CCM	393,850,734	439,093,958	111.49%
Small Volume Customer - CCM	11,003,051	11,491,401	104.44%
TOTAL	404,853,785	450,585,359	111.30%

*Not all values may compute exactly due to rounding.

Table 11-44 includes these variables:

- Tracking Gross Savings: Gross cumulative tracking savings for all customers in the Enbridge C&I Custom program. This is the amount of savings before any adjustments (including free ridership and spillover) are applied.
- RR: Gross realization rate from the 2017-2018 CSPV report.
- Att: Attribution ratio (the complement of free ridership) from the 2018 NTG report.
- Spillover: Spillover ratio from the 2013-2014 Spillover Study.
- Adj: Adjustment Ratio, the product of the RR and the sum of the Att ratio and Spillover ratio

Equation 1: Adjustment Ratio

$$\text{Adjustment Ratio} = RR * (\text{Att} + \text{Spillover})$$

- Verified Net Savings: Cumulative gross savings multiplied by the Adjustment Ratio

Equation 2: Verified Net Savings

$$\text{Verified Net Savings} = \text{Adjustment Ratio} * (\text{Cumulative Gross})$$

Table 11-44. Adjustment factors applied to Enbridge C&I Custom Program cumulative gross savings*

Attribution Group	Tracking Gross Savings (CCM)	RR (%)	Att (%)	Spillover (%)	Adj (%)	Verified Net Savings (CCM)
Commercial - Other	41,212,451	94.99%	25.65%	1.36%	25.66%	10,573,796
Commercial - Ventilation	24,487,552	94.99%	14.12%	1.36%	14.70%	3,600,760
Commercial - Boilers	73,189,279	94.99%	42.37%	1.36%	41.54%	30,402,188
Multi-Residential - Heating	87,432,905	121.09%	57.67%	8.24%	79.81%	69,780,568
Multi-Residential - Other	43,916,115	121.09%	69.73%	8.24%	94.41%	41,462,905
Industrial	510,961,272	110.79%	50.62%	1.45%	57.69%	294,765,142
TOTAL	781,199,574				57.68%	450,585,359

*Not all values may compute exactly due to rounding.

Documentation

The EC used the documentation shown in Table 11-45 to verify the metrics for the C&I Custom program.

Table 11-45. Documentation used to verify the C&I Custom program

Report Language	Description or Citation
Enbridge-Provided Documentation	
Tracking File	Excel spreadsheet tracking metrics for all 2019 Enbridge DSM programs
Documents Used by EC	
OEB Decision	OEB Decision and Order, EB-2015-0029/EB-2015-0049, January 20, 2016 and OEB Revised Decision and Order, EB-2015-0029/EB-2015-0049, February 24, 2016
Enbridge Plan	Enbridge Gas Multi-Year DSM Plan (2015-2020), EB-2015-0049
2017-2018 CPSV Report	2018 Natural Gas Demand Side Management Custom Savings Verification ^{44,45}
2018 NTG Report	2018 Natural Gas Demand Side Management Free-ridership Evaluation ⁴⁶
2013-2014 Spillover Study	CPSV Participant Spillover Results ⁴⁷

Verify Savings

Adjustment Values – Realization Rate

The 2017-2018 CPSV Report conveyed gross realization rate by sector, as shown in Table 11-46. The EC used the same sectors to apply the relevant rates at the measure level.

Table 11-46. Verified gross savings rates for the Enbridge Custom C&I program

Sector	RR (%)
Commercial	94.99%
Low Income & Multi Residential	121.09%
Industrial	110.79%

⁴⁴ 2017-2018 Natural Gas Demand Side Management Custom Savings Verification, DNV GL for the Ontario Energy Board, December 26, 2019

⁴⁵ Due to complications from the COVID-19 pandemic, the EC was unable to complete a planned study verifying the custom project savings (CPSV) during the 2019 program year. Instead, the EC used the same adjustment factors resulting from custom projects implemented in the 2017 and 2018 program years, adjusted for the mix of projects installed in 2019.

⁴⁶ 2018 Natural Gas Demand Side Management Free-ridership Evaluation, DNV GL for the Ontario Energy Board, December 27, 2019

⁴⁷ CPSV Participant Spillover Results, DNV GL for the Ontario Energy Board, May 23, 2018

Adjustment Values – Attribution Ratios

The 2018 NTG Report conveyed attribution ratios using a combination of sector and measure group, as shown in Table 11-47.

Table 11-47. Attribution ratios for the Enbridge Custom C&I program

Attribution Group	Att (%)
Commercial - Other	25.65%
Commercial - Ventilation	14.12%
Commercial - Boilers	42.37%
Multi-Residential - Heating	57.67%
Multi-Residential - Other	69.73%
Industrial	50.62%

Adjustment Values – Spillover Ratios

The 2013-2014 Spillover Study conveyed spillover ratios at the sector level, as shown in Table 11-48. The EC used the same sectors to apply the relevant rates at the measure level.

Table 11-48. Spillover ratios for the Enbridge Custom C&I program

Sector	Spillover (%)
Custom Commercial	1.36%
Multi-Residential	8.24%
Custom Industrial	1.45%

Verify Cumulative Natural Gas Savings

The program-level adjustment factors shown in Table 11-44 were built up from a measure-level application of the RR, Att, and Spillover ratios. Each measure was assigned a RR or Spillover ratio based on its sector, and an Att ratio based on the combination of sector and measure group. The EC calculated the measure-level net savings using Equation 1 and Equation 2, then summed the measure-level savings to produce program-level savings. The EC calculated the program-level adjustment ratio by dividing the program-level net savings by the program-level gross savings.

Verification Result

As a result of this review, the EC confirms the savings of 450,585,359 CCM (111.30% of tracked) for Enbridge's C&I Custom Program.

Commercial & Industrial - Custom – Union

Overview

Table 11-49 shows the tracked and verified scorecard achievements for the 2019 Union Commercial & Industrial Custom program, with the metric of CCM savings. As a result of this review, the EC verifies total savings of 542,374,593 CCM (91.11% of tracked). Table 11-49 contains the following variables:

- Tracked: Metric value from original Tracking File sent by Enbridge upon first data request
- Verified: Metric value verified from review of Tracking File, Project Files, and other relevant documents identified in the Documentation section
- Ratio: Ratio of verified to tracked achievement. A value of 100.00% indicates that verified values match tracked values

Table 11-49. Union Resource Acquisition achievement: C&I Custom CCM metric*

Metric	Achievement		Ratio
	Tracked	Verified	
CCM	595,312,464	542,374,593	91.11%

*Not all values may compute exactly due to rounding.

Table 11-50 includes these variables:

- Tracking Gross Savings: Gross cumulative tracking savings for all customers in the Enbridge C&I Custom program. This is the amount of savings before any adjustments (including free ridership and spillover) are applied.
- RR: Gross realization rate from the 2017-2018 CSPV report
- Att: Attribution ratio (the complement of free ridership) from the 2018 NTG Report
- Spillover: Spillover ratio from 2013-2014 Spillover Study
- Adj: Adjustment Ratio, the product of the RR and the sum of the Att ratio and Spillover ratio

Equation 3: Adjustment Ratio

$$\text{Adjustment Ratio} = \text{RR} * (\text{Att} + \text{Spillover})$$

- Verified Net Savings: Cumulative gross savings multiplied by the Adjustment Ratio

Equation 4: Verified Net Savings

$$\text{Verified Net Savings} = \text{Adjustment Ratio} * (\text{Cumulative Gross})$$

Table 11-50. Adjustment factors applied to Union C&I Custom Program cumulative gross savings*

Attribution Group	Tracking Gross Savings (CCM)	RR (%)	Att (%)	Spillover (%)	Adj (%)	Verified Net Savings (CCM)
Agricultural	687,401,965	91.17%	50.16%	0.89%	46.54%	319,932,582
Commercial and Multi-Family	158,117,888	90.57%	28.62%	0.00%	25.92%	40,985,950
Industrial - Steam or Hot Water System	142,724,717	91.17%	4.11%	0.89%	4.56%	6,506,106
Industrial - HVAC	164,964,153	91.17%	39.88%	0.89%	37.17%	61,317,191
Industrial - Steam or Hot Water System	417,269,266	91.17%	28.98%	0.89%	27.23%	113,632,765
TOTAL	1,570,477,989				34.54%	542,374,593

*Not all values may compute exactly due to rounding.

Documentation

The EC used the documentation shown in Table 11-51 to verify the metrics for the C&I Custom program.

Table 11-51. Documentation used to verify the C&I Custom program

Report Language	Description or Citation
Enbridge-Provided Documentation	
Tracking File	Excel spreadsheet tracking metrics for all 2019 Union DSM programs
Documents Used by EC	
OEB Decision	OEB Decision and Order, EB-2015-0029/EB-2015-0049, January 20, 2016 and OEB Revised Decision and Order, EB-2015-0029/EB-2015-0049, February 24, 2016
Union Plan	Union's 2015-2020 DSM Plan, EB-2015-0029
2017-2018 CPSV Report	2018 Natural Gas Demand Side Management Custom Savings Verification ^{48,49}
2018 NTG Report	2018 Natural Gas Demand Side Management Free-ridership Evaluation ⁵⁰
2013-2014 Spillover Study	CPSV Participant Spillover Results ⁵¹

Verify Savings

Adjustment Values – Realization Rate

The 2017-2018 CPSV Report conveyed gross realization rate by sector, as shown in Table 11-52. The EC used the same sectors to apply the relevant rates at the measure level.

Table 11-52. Verified gross savings rates for the Union Custom C&I program

Sector	RR (%)
Agricultural & Industrial	91.17%
Commercial and Multi-Family	90.57%

Adjustment Values – Attribution Ratios

The 2018 NTG Report conveyed attribution ratios using a combination of sector and measure group, as shown in Table 11-53.

Table 11-53. Attribution ratios for the Union Custom C&I program

Attribution Group	Att (%)
Agricultural	50.16%
Commercial and Multi-Family	28.62%
Industrial - Steam or Hot Water System	4.11%
Industrial - HVAC	39.88%
Industrial - Steam or Hot Water System	28.98%

⁴⁸ 2017-2018 Natural Gas Demand Side Management Custom Savings Verification, DNV GL for the Ontario Energy Board, December 26, 2019

⁴⁹ Due to complications from the COVID-19 pandemic, the EC was unable to complete a planned study verifying the custom project savings (CPSV) during the 2019 program year. Instead, the EC used the same adjustment factors resulting from custom projects implemented in the 2017 and 2018 program years, adjusted for the mix of projects installed in 2019.

⁵⁰ 2018 Natural Gas Demand Side Management Free-ridership Evaluation, DNV GL for the Ontario Energy Board, December 27, 2019

⁵¹ CPSV Participant Spillover Results, DNV GL for the Ontario Energy Board, May 23, 2018

Adjustment Values – Spillover Ratios

The 2013-2014 Spillover Study conveyed spillover ratios at the sector level, as shown in Table 11-54. The EC used the same sectors to apply the relevant rates at the measure level.

Table 11-54. Spillover ratios for the Union Custom C&I program

Sector	Spillover (%)
Industrial	0.89%
Commercial and Multi-Family	0.00%

Verify Cumulative Natural Gas Savings

The program-level adjustment factors shown in Table 11-50 were built up from a measure-level application of the RR, Att, and Spillover ratios. Each measure was assigned a RR or Spillover ratio based on its sector, and an Att ratio based on the combination of sector and measure group. The EC calculated the measure-level net savings using Equation 3 and Equation 4, then summed the measure-level savings to produce program-level savings. The EC calculated the program-level adjustment ratio by dividing the program-level net savings by the program-level gross savings.

Verification Result

As a result of this review, the EC verifies total savings of 542,374,593 CCM (91.11% of tracked) for Union’s C&I Custom Program.



Comprehensive Energy Management – Enbridge

No activity was reported for this program in 2019 under the Resource Acquisition Scorecard.

Run-it-Right – Enbridge

Overview

Table 11-55 shows the tracked and verified scorecard achievements for the 2019 Enbridge Run-it-Right (RIR) Program, with the metric of CCM savings. The RIR Program has two metrics under separate scorecards, CCM Savings (Resource Acquisition) and Participants (Market Transformation). CCM Savings are discussed here, while the Participants metric is discussed in Appendix J. As a result of this review, the EC verifies total savings of 1,611,139 CCM (100.00% of tracked) for large volume customers of the 2019 Run-it-Right program. Table 11-55 contains the following variables:

- Tracked: Metric value from original Tracking File sent by Enbridge upon first data request
- Verified: Metric value verified from review of Tracking File, Project Files, and other relevant documents identified in the Documentation section
- Ratio: Ratio of verified to tracked achievement. A value of 100.00% indicates that verified values match tracked values

Table 11-55. Enbridge Resource Acquisition achievement: Run-it-Right CCM metric*

Metric	Achievement		Ratio
	Tracked	Verified	
Large Volume Customer - CCM	1,611,139	1,611,139	100.00%
Small Volume Customer - CCM	-	-	-
TOTAL	1,611,139	1,611,139	100.00%

*Not all values may compute exactly due to rounding.

Table 11-56 includes the following variables:

- Tracking Gross Savings Tracking: Gross cumulative tracking savings for all customers in the Enbridge 2019 Run-it-Right program.
- RR: Gross realization rate based on engineering reviews.
- Att: Attribution ratio (the complement of free ridership) from the 2015 CPSV report.
- Spillover: Spillover ratio from 2013-2014 Spillover Study.
- Adj: Adjustment Ratio, the product of the RR and the sum of the Att ratio and Spillover ratio

Equation 5: Adjustment Ratio

$$\text{Adjustment Ratio} = \text{RR} * (\text{Att} + \text{Spillover})$$

- Verified Net Savings: Cumulative gross savings multiplied by the Adjustment Ratio

Equation 6: Verified Net Savings

$$\text{Verified Net Savings} = \text{Adjustment Ratio} * (\text{Cumulative Gross})$$

Table 11-56. Adjustment Factors Applied to Run-it-Right Program cumulative gross savings*

Measure Type	Tracking Gross Savings (CCM)	RR (%)	Att (%)	Spillover (%)	Adj* (%)	Verified Net Savings (CCM)
Large Volume Customers CCM	3,218,415	100.00%	50.06%	0.00%	50.06%	1,611,139

*Not all values may compute exactly due to rounding.

Documentation

The EC used the documentation shown in Table 11-57 to verify the metrics for the Run-it-Right program.

Table 11-57. Documentation used to verify the Run-it-Right program

Report Language	Description or Citation
Enbridge-Provided Documentation	
Tracking File	Excel spreadsheet tracking metrics for all 2019 Enbridge DSM programs
Project Files	PDF document for each requested participant, supporting program metrics
Documents Used by EC	
OEB Decision	OEB Decision and Order, EB-2015-0029/EB-2015-0049, January 20, 2016 and OEB Revised Decision and Order, EB-2015-0029/EB-2015-0049, February 24, 2016
Enbridge Plan	Enbridge Gas Multi-Year DSM Plan (2015-2020), EB-2015-0049
2015 CPSV Report	2015 Natural Gas Demand Side Management Custom Savings Verification and Free-ridership Evaluation ⁵²
2013-2014 Spillover Study	CPSV Participant Spillover Results ⁵³

Participant Selection

Enbridge first provided the Tracking File listing RIR participants with anonymized Program, Customer, and Site IDs, listing 49 individual participants. The EC randomly selected 10 participants, requesting full documentation by Project ID.

Methodology Review

The program methodology did not change for the 2019 program year. For the certification, a senior engineer reviewed the calculation methods for each selected site. The following conclusion from the 2015 certification⁵⁴ remains valid:

The methodology used by the RIR program to estimate savings is appropriate for the application. No significant concerns were identified by the team; however, the RIR tool does not allow observation of all of the calculations performed.

Verify Gross Savings

For 2019, evaluation engineers reviewed the supporting documentation provided in the Project Files (pdf) for the sample of sites to identify the answers to the following questions:

- Is the building type correctly identified?
- How many months were used in the baseline, improvement, and reference periods?
- What type of model was used?
- What independent variables were used?
- What R-squared values were used for the baseline and reference models?
- What are the estimated savings during the reference period?
- Were capital project savings deducted?
- What percentage of consumption do the savings represent?
- What is driving the positive or negative savings claimed?

⁵² 2016 Natural Gas Demand Side Management Custom Savings Verification, DNV GL for the Ontario Energy Board, June 31, 2018

⁵³ CPSV Participant Spillover Results, DNV GL for the Ontario Energy Board, May 23, 2018

⁵⁴ 2015 Natural Gas Demand Side Management Annual Verification, DNV GL for the Ontario Energy Board, December 20, 2018, Appendix F

- Should a new baseline model be created?

The EC senior engineer used these questions (above) to review the calculations completed, the consumption pattern at the facility, and the baseline model. The EC senior engineer then asked three primary questions to assess the risk of savings accuracy as Low, Normal, or High. Three key questions were:

- Based on experience, is the baseline model specification reasonable?
- Based on experience, is the baseline time period definition reasonable?
- What is the assessed level of risk for achieving savings?

The baseline model specifications and time period definitions were reasonable for all projects examined. Overall, the savings claimed are reasonable, especially because both positive and negative savings are included in the program Tracking File and Project Files.

The EC assigned eight sites as low-risk, one normal-risk, and one high-risk. Based on our experience, this distribution is more favorable compared to similar programs. The one-high-risk participant had less than 12 months of baseline data used in their model, introducing risk by allowing for the possibility of not accounting for all seasonal weather variation throughout the year.

Across the participants, all savings claims were supported by actions taken at the facilities. Clear changes in consumption patterns occurred. The EC's review supports the savings claim for all sites.

Adjustment Values – Attribution and Spillover Ratios

The 2015 CPSV Report conveyed a single attribution ratio for the Run-it-Right program of 50.06%. The 2013-2014 Spillover study did not find any spillover savings for the program.⁵⁵ The two ratios (attribution and spillover) were combined with the RR to produce a program-level adjustment factor of 50.06%.

Verification Result

As a result of this review, the EC confirms the savings of 1,611,139 CCM (100.00% of tracked) for large volume customers of the Run-it-Right program.

⁵⁵ Neither the attribution ratio nor the spillover value have been updated in more recent iterations of these reports.

Appendix G Low Income Scorecards

This appendix describes the detailed process used to verify the metrics for the Low Income Scorecard programs for Enbridge (Table 11-58) and Union (Table 11-59). The programs addressed in this appendix are:

- Winter Retrofit - Furnace End-of-Life – Union
- Winter Retrofit - Home Winterproofing – Enbridge
- Winter Retrofit - Home Weatherization – Union
- Winter Retrofit - Indigenous Program – Union
- Low Income New Construction – Enbridge
- Low Income Multi-Residential – Affordable Housing Program – Enbridge
- Low Income Multi-Residential – Multifamily Program (Social Assisted) – Union
- Low Income Multi-Residential – Multifamily Program (Market Rate) – Union

Table 11-58. Enbridge 2019 Low Income scorecard*⁵⁶

Programs	Metrics	Verified Achievement		Metric Target			Weight
		Program-level Achievement	Metric-level Achievement	Lower Band	Target	Upper Band	
Home Winterproofing	CCM	27,618,723	27,618,723	15,454,405	20,605,874	30,908,811	45.00%
Low Income Multi-Residential	CCM	88,957,000	88,957,000	76,908,576	102,544,768	153,817,153	45.00%
Low Income New Construction	Applications	11	11	8	11	16	10.00%

*Not all values may compute exactly due to rounding.

Table 11-59. Union 2019 Low Income scorecard*⁵⁷

Programs	Metrics	Verified Achievement		Metric Target			Weight
		Program-level Achievement	Metric-level Achievement	Lower Band	Target	Upper Band	
Home Weatherization	CCM	51,145,673	51,732,240	32,841,561	43,788,748	65,683,123	60.00%
Furnace End-of-Life		106,596					
Indigenous		479,971					
Multi-Family Social & Assisted	CCM	22,803,826	22,803,826	17,349,279	23,132,372	34,698,558	35.00%
Multi-Family Market Rate	CCM	4,774,193	4,774,193	5,835,560	7,780,746	11,671,119	5.00%

*Not all values may compute exactly due to rounding.

⁵⁶ Ontario Energy Board Decision and Order, EB-2015-0029/EB-2015-0049, FINAL REVISED February 24, 2016, Schedule C

⁵⁷ Ibid

Winter Retrofit - Furnace End-of-Life Program – Union

Overview

Table 11-60 shows the tracked and verified scorecard achievements for the 2019 Union Furnace End-of-Life program, with the metric of CCM savings. As a result of this review, the EC verifies 106,596 CCM (100.00% of tracked). Table 11-60 contains the following variables:

- Tracked: Metric value from original Tracking File sent by Enbridge upon first data request
- Verified: Metric value verified from review of Tracking File, Project Files, and other relevant documents identified in the Documentation section
- Ratio: Ratio of verified to tracked achievement. A value of 100.00% indicates that verified values match tracked values

Table 11-60. Union Low Income achievement: Furnace End-of-Life CCM metric*

Metric	Achievement		Ratio
	Tracked	Verified	
CCM	106,596	106,596	100.00%

*Not all values may compute exactly due to rounding.

Documentation

Table 11-61. Documentation used to verify the Furnace End-of-Life program

Report Language	Description or Citation
Enbridge-Provided Documentation	
Tracking File	Excel spreadsheet tracking metrics for all 2019 Union DSM programs
Documents Used by EC	
OEB Decision	OEB Decision and Order, EB-2015-0029/EB-2015-0049, January 20, 2016 and OEB Revised Decision and Order, EB-2015-0029/EB-2015-0049, February 24, 2016
Union Plan	Union's 2015-2020 DSM Plan, EB-2015-0029
TRM 3.0	Natural Gas Demand Side Management Technical Resource Manual, Version 3.0

Verify Cumulative Natural Gas Savings

In calculating net CCM, the EC reviewed natural gas savings for prescriptive measures from the Tracking File, using the procedures identified in Appendix N. The EC verified the tracked savings which resulted in a savings ratio of 100.00%. One hundred eleven high efficiency units were installed as part of the program.

Verification Result

As a result of this review, the EC confirms savings of 106,596 CCM (100.00% of tracked) for Union's Furnace End-of-Life Program.

Winter Retrofit – Home Winterproofing – Enbridge

Overview

Table 11-62 shows the tracked and verified scorecard achievements for the 2019 Enbridge Home Winterproofing program, with the metric of CCM savings. As a result of this review, the EC verifies 27,618,723 CCM (98.10% of tracked). Table 11-62 contains the following variables:

- Tracked: Metric value from original Tracking File sent by Enbridge upon first data request
- Verified: Metric value verified from review of Tracking File, Project Files, and other relevant documents identified in the Documentation section
- Ratio: Ratio of verified to tracked achievement. A value of 100.00% indicates that verified values match tracked values

Table 11-62. Enbridge Low Income achievements: Home Winterproofing CCM metrics*

Metric	Achievement		Ratio
	Tracked	Verified	
CCM - Prescriptive	5,002,490	4,928,912	98.53%
CCM - Whole Home	23,150,507	22,689,811	98.01%
TOTAL	28,152,997	27,618,723	98.10%

*Not all values may compute exactly due to rounding.

Documentation

The EC used the documentation shown in Table 11-63 to verify the metrics for the Home Winterproofing program.

Table 11-63. Documentation used to verify the Home Winterproofing program

Report Language	Description or Citation
Enbridge-Provided Documentation	
Tracking File	Excel spreadsheet tracking metrics for all 2019 Enbridge DSM programs
Project Files	Various documents for each requested participant, supporting program metrics
Documents Used by EC	
OEB Decision	OEB Decision and Order, EB-2015-0029/EB-2015-0049, January 20, 2016 and OEB Revised Decision and Order, EB-2015-0029/EB-2015-0049, February 24, 2016
Enbridge Plan	Enbridge Gas Multi-Year DSM Plan (2015-2020), EB-2015-0049
TRM 3.0	Natural Gas Demand Side Management Technical Resource Manual, Version 3.0
TAPS Report	TAPS Verification Program 2012 Year End Research Report, Quadra Research. April 2013 ⁵⁸

Simulation-based Savings

Participant Selection

Enbridge provided the tracking file listing 1,425 individual participant homes in the Winterproofing program. To certify the scorecard metric, the EC randomly selected 30 participants for review, requested additional

⁵⁸ TAPS Verification Program 2012 Year End Research Report, Study CR-604, Quadra Research, April 3, 2013

documentation, confirmed receipt of the correct files, and reviewed documents to verify participation and eligibility.

Received Files

The typical file folder had the following information:

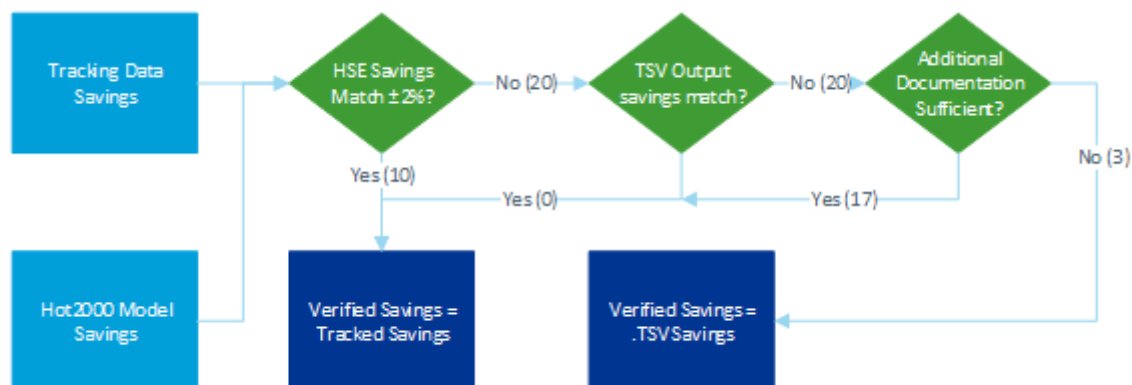
- Photographs of pre- and post-installation conditions
- Invoice information (PDF scans or photo of receipts)
- HOT2000 Model simulation Files (.HSE)
- HOT2000 Model Output Files (.TSV)

Calculate Realization Rate

The EC used a multi-step process to verify tracked energy savings for the 30 sampled homes, shown in Figure 11-5 for the 2019 Winterproofing verification. The process was necessary because the simulation mode (EnerGuide or Expert⁵⁹) used by program delivery agents is not available to non-certified professionals. While the EC can attempt to run the Expert simulations in General mode, the runs may produce error warnings or result in a savings differential between the Expert result and General result. Therefore, this multi-step process was developed to verify savings:

- EC requested simulation (HSE) and output (TSV) files from the program
- Where possible, the simulation file was re-run and the results used to verify the tracking savings. If different simulation versions or modes were used, the savings could be slightly different; therefore, simulation savings were considered “verified” if they were within 2% of the tracking savings; in this case, the tracked savings value was accepted as the verified savings.
- If a simulation file was not provided, the file inputs were incompatible with General mode and would not run, the file ran but produced an error due to version or mode differences, or the file produced a difference in savings greater than 2%, the output file was used to verify the tracking savings. As with the simulation file, the EC accepted tracking savings values within 2% of the output file value as the verified savings.
- If no additional documentation or explanation was available, the EC compared the output file values to the project documentation TSV summary to determine whether they were consistent. If they were not consistent, the output file value was used as the verified value.

Figure 11-5. Overview of gross simulation savings verification for 2019 Winterproofing



⁵⁹ “Expert” is the mode listed in the output files. This mode is also labelled as “EnerGuide” in simulation files. The EC uses both terms.

Table 11-64 shows how many customers were verified in each evaluation step.

Table 11-64. Overview of gross simulation savings verification

Evaluation Step	# Verified
Simulation re-run (HSE) and compared to tracking, verified if $\pm 2\%$	10
Output files for (TSV) compared to tracking, verified if $\pm 2\%$	0
Additional Explanation request	17
Comparison to output file values	3
Total Verified	30

The gross savings realization rate is 98.01%, shown in Table 11-65.

Table 11-65. Enbridge Home Winterproofing realization rate*

Numbers of Houses	Realization Rate	90% Confidence Interval			
		Absolute Precision	Lower Bound	Upper Bound	Relative Precision
30	98.01%	1.50%	96.51%	99.52%	2.57%

*Not all values may compute exactly due to rounding.

Prescriptive Savings

In calculating net CCM, the EC reviewed natural gas savings for prescriptive measures from the Tracking File, using the procedures identified in Appendix N. The EC made some minor changes to the tracked savings which resulted in a savings ratio of 98.53%, as shown in Table 11-66.

Table 11-66. Enbridge scorecard achievements (cumulative savings) by measure group*

Measure Group	Installed Measures	Tracked Achievement (CCM)	Verified Achievement (CCM)	Savings Ratio
Aerator	940	80,903	23,315	28.82%
Showerhead	461	130,002	114,012	87.70%
Thermostat	1687	4,791,585	4,791,585	100.00%
TOTAL	3,088	5,002,490	4,928,912	98.53%

*Not all values may compute exactly due to rounding.

Verification Result

As a result of this review, the EC confirms the savings of 27,618,723 CCM (98.10% of tracked) for Enbridge's Home Winterproofing program.

Winter Retrofit – Home Weatherization – Union

Overview

Table 11-67 shows the tracked and verified scorecard achievements for the 2019 Union Home Weatherization Program, with the metric of CCM savings. As a result of this review, the EC verifies 51,145,673 CCM (94.84% of tracked). Table 11-67 includes the following variables:

- Tracked: Metric value from original Tracking File sent by Enbridge upon first data request
- Verified: Metric value verified from review of Tracking File, Project Files, and other relevant documents identified in the Documentation section
- Ratio: Ratio of verified to tracked achievement. A value of 100.00% indicates that verified values match tracked values

Table 11-67. Union Low Income achievements: Home Weatherization CCM metrics*

Metric	Achievement		Ratio
	Tracked	Verified	
CCM - Prescriptive	5,052,286	4,952,937	98.03%
CCM - Whole Home	48,876,031	46,192,737	94.51%
TOTAL	53,928,316	51,145,673	94.84%

*Not all values may compute exactly due to rounding.

Documentation

The EC used the documentation shown in Table 11-68 to verify the metrics for the Home Weatherization program.

Table 11-68. Documentation used to verify the Home Weatherization program

Report Language	Description or Citation
Enbridge-Provided Documentation	
Tracking File	Excel spreadsheet tracking metrics for all 2019 Union DSM programs
Project Files	Various documents for each requested participant, supporting program metrics
Documents Used by EC	
OEB Decision	OEB Decision and Order, EB-2015-0029/EB-2015-0049, January 20, 2016 and OEB Revised Decision and Order, EB-2015-0029/EB-2015-0049, February 24, 2016
Union Plan	Union's 2015-2020 DSM Plan, EB-2015-0029
TRM 3.0	Natural Gas Demand Side Management Technical Resource Manual, Version 3.0
Low Income Kits Verification Study	Final Report Following an Audit of the Union Gas ESK - Helping Homes Conserve – HHC – Program, Beslin Communication Group, March 15, 2013

Simulation-based Savings

Participant Selection

Union provided the tracking file, listing 4,134 individual participant homes in the Home Winterproofing program. To certify the scorecard metric, the EC identified individual sites within Private and Social Housing and randomly selected 60 participants for review, requested additional documentation, confirmed receipt of the correct files, and reviewed documents to verify participation and eligibility.

Received Files

The typical file folder had the following information:

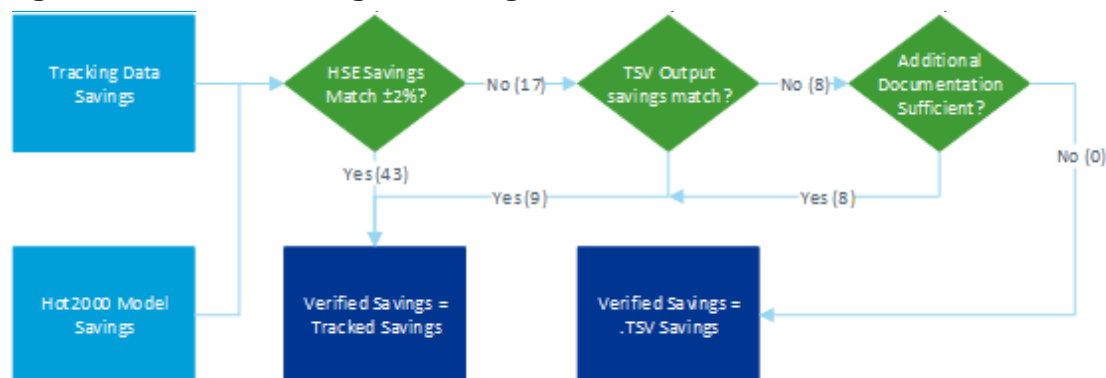
- Photographs of pre- and post-installation conditions
- Invoice information (PDF scans or photo of receipts)
- HOT2000 Model simulation Files (.HSE)
- HOT2000 Model Output Files (.TSV)

Calculate Realization Rate

The EC used a multi-step process to verify tracked energy savings for the 60 sampled homes, shown in Figure 11-6. for the Home Weatherization program. The process was necessary because the simulation mode (EnerGuide or Expert⁶⁰) used by program delivery agents is not available to non-certified professionals. While the EC can attempt to run the Expert simulations in General mode, the runs may produce error warnings or result in a savings differential between the Expert result and General result. Therefore, this multi-step process was developed to verify savings:

- EC requested simulation (HSE) and output (TSV) files from the program
- Where possible, the simulation file was re-run and the results used to verify the tracking savings. If different simulation versions or modes were used, the savings could be slightly different; therefore, simulation savings were considered “verified” if they were within 2% of the tracking savings; in this case, the tracked savings value was accepted as the verified savings.
- If a simulation file was not provided, the file inputs were incompatible with General mode and would not run, the file ran but produced an error due to version or mode differences, or the file produced a difference in savings greater than 2%, the output file was used to verify the tracking savings. As with the simulation file, the EC accepted tracking savings values within 2% of the output file value as the verified savings.
- If the EC was unable to verify the tracking savings against the output file, the EC requested additional documentation from the program (utility) to explain the discrepancy.
- If no additional documentation or explanation was available, the EC would have compared output file values to project documentation to determine if the calculated model values were consistent with documentation. This verification step was not necessary for this program in this round of evaluation.

Figure 11-6. Overview of gross savings verification for 2019 Home Weatherization program



⁶⁰ “Expert” is the mode listed in the output files. This mode is also labelled as “EnerGuide” in simulation files. The EC uses both terms.

Table 11-69 shows how many customers were verified in each evaluation step. Savings for 52 homes were verified with comparison of tracking data against either simulation (HSE) or output (TSV) files. The files from 8 homes required additional explanation to verify.

Table 11-69. Overview of gross simulation savings verification

Evaluation Step	# Verified
Simulation re-run (HSE) and compared to tracking, verified if $\pm 2\%$	43
Output files for (TSV) compared to tracking, verified if $\pm 2\%$	9
Additional Explanation request	8
Comparison to output file values	0
Total Verified	60

The gross savings realization rate (RR) is 94.51%, shown in Table 11-70.

Table 11-70. Union Home Weatherization realization rate*

Numbers of Houses	Realization Rate	90% Confidence Interval			
		Absolute Precision	Lower Bound	Upper Bound	Relative Precision
60	94.51%	3.19%	91.32%	97.70%	5.87%

*Not all values may compute exactly due to rounding.

Prescriptive Savings

In calculating net CCM, the EC reviewed natural gas savings for prescriptive measures from the Tracking File, using the procedures identified in Appendix N. The EC certified the tracked savings which resulted in a savings ratio of 98.03%, as shown in Table 11-71.

Table 11-71. Union scorecard achievements by measure group*

Measure Group	Installed Measures	Tracked Achievement (CCM)	Verified Achievement (CCM)	Savings Ratio
Faucet Aerator	1640	146,004	121,088	82.94%
Pipe Insulation	982	348,235	327,054	93.92%
Showerhead	949	264,942	211,689	79.90%
Thermostat	1578	4,293,105	4,293,105	100.00%
TOTAL	5,149	5,052,286	4,952,937	98.03%

*Not all values may compute exactly due to rounding.

Verification Result

As a result of this review, the EC confirms the savings of 51,145,673 CCM (94.84% of tracked) for Union's Home Weatherization program.

Winter Retrofit – Indigenous Program – Union

Overview

Table 11-72 shows the tracked and verified scorecard achievements for the 2019 Union Indigenous Program, with the metric of CCM savings. As a result of this review, the EC verifies 479,971 CCM (93.32% of tracked). Table 11-72 includes the following variables:

- Tracked: Metric value from original Tracking File sent by Enbridge upon first data request
- Verified: Metric value verified from review of Tracking File, Project Files, and other relevant documents identified in the Documentation section
- Ratio: Ratio of verified to tracked achievement. A value of 100.00% indicates that verified values match tracked values

Table 11-72. Union Low Income achievements: Indigenous CCM metrics*

Metric	Achievement		Ratio
	Tracked	Verified	
CCM - Prescriptive	33,126	33,128	100.01%
CCM - Whole Home	481,200	446,842	92.86%
TOTAL	514,326	479,971	93.32%

*Not all values may compute exactly due to rounding.

Documentation

The EC used the documentation shown in Table 11-73 to verify the metrics for the Indigenous program.

Table 11-73. Documentation used to verify the Indigenous program

Report Language	Description or Citation
Enbridge-Provided Documentation	
Tracking File	Excel spreadsheet tracking metrics for all 2019 Union DSM programs
Project Files	Various documents for each requested participant, supporting program metrics
Documents Used by EC	
OEB Decision	OEB Decision and Order, EB-2015-0029/EB-2015-0049, January 20, 2016 and OEB Revised Decision and Order, EB-2015-0029/EB-2015-0049, February 24, 2016
Union Plan	Union's 2015-2020 DSM Plan, EB-2015-0029
TRM 3.0	Natural Gas Demand Side Management Technical Resource Manual, Version 3.0

Simulation-based Savings

Participant Selection

Union provided the tracking file listing 54 individual participants in the Indigenous program. The EC requested documentation for a census of participants for review, requested additional documentation, confirmed receipt of the correct files, and reviewed documents to verify participation and eligibility.

Received Files

The typical file folder had the following information:

- Photographs of pre- and post-installation conditions
- Invoice information (PDF scans or photo of receipts)
- HOT2000 Model simulation Files (PDF)

- HOT2000 Model Output Files (.TSV)

Calculate Realization Rate

The EC used a multi-step process to verify tracked energy savings for the 54 homes, shown in Figure 11-7. for the Indigenous program. The process was necessary because the simulation mode (EnerGuide or Expert⁶¹) used by program delivery agents is not available to non-certified professionals. While the EC can attempt to run the Expert simulations in General mode, the runs may produce error warnings or result in a savings differential between the Expert result and General result. Therefore, this multi-step process was developed to verify savings:

- EC requested simulation (HSE) and output (TSV) files from the program
- Where possible, the simulation file was re-run and the results used to verify the tracking savings. If different simulation versions or modes were used, the savings could be slightly different; therefore, simulation savings were considered “verified” if they were within 2% of the tracking savings; in this case, the tracked savings value was accepted as the verified savings.
- If a simulation file was not provided, the file inputs were incompatible with General mode and would not run, the file ran but produced an error due to version or mode differences, or the file produced a difference in savings greater than 2%, the output file was used to verify the tracking savings. As with the simulation file, the EC accepted tracking savings values within 2% of the output file value as the verified savings.
- If the EC was unable to verify the tracking savings against the output file, the EC requested additional documentation from the program (utility) to explain the discrepancy.
- If no additional documentation or explanation was available, the EC compared output file values to project documentation to determine if the calculated model values were consistent with documentation.

Figure 11-7. Overview of gross savings verification for 2019 Indigenous program

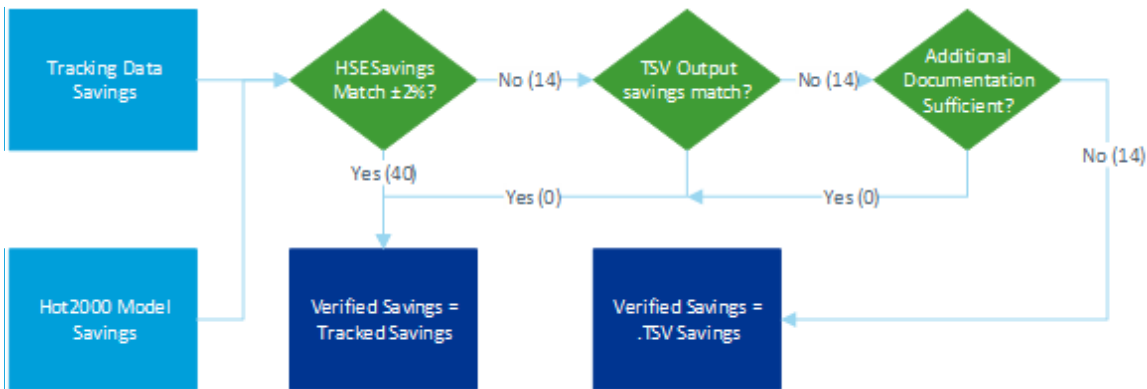


Table 11-74 shows how many customers were verified in each evaluation step. Savings for 40 homes were verified with comparison of tracking data against either simulation (HSE) or output (TSV) files. Fourteen homes did not match their HSE or TSV files. Therefore, the output from their respective records was accepted as the verified result.

⁶¹ “Expert” is the mode listed in the output files. This mode is also labelled as “EnerGuide” in simulation files. The EC uses both terms.

Table 11-74. Overview of gross simulation savings verification

Evaluation Step	# Verified
Simulation re-run (HSE) and compared to tracking, verified if $\pm 2\%$	40
Output files for (TSV) compared to tracking, verified if $\pm 2\%$	0
Additional Explanation request	0
Comparison to output file values	14
Total Verified	54

The gross savings realization rate (RR) is 92.86%, shown in Table 11-75.

Table 11-75. Union Home Indigenous realization rate*

Numbers of Houses	Realization Rate	90% Confidence Interval			
		Absolute Precision	Lower Bound	Upper Bound	Relative Precision
54	92.86%	2.89%	89.97%	95.75%	5.52%

*Not all values may compute exactly due to rounding.

Prescriptive Savings

In calculating net CCM, the EC reviewed natural gas savings for prescriptive measures from the Tracking File, using the procedures identified in Appendix N. The EC certified the tracked savings which resulted in a savings ratio of 100.01%, as shown in Table 11-76.

Table 11-76. Union scorecard achievements by measure group*

Measure Group	Installed Measures	Tracked Achievement (CCM)	Verified Achievement (CCM)	Savings Ratio
Faucet Aerator	86	7,646	7,646	100.00%
Pipe Insulation	38	13,475	13,478	100.02%
Showerhead	43	12,005	12,005	100.00%
TOTAL	167	33,126	33,128	100.01%

*Not all values may compute exactly due to rounding.

Verification Result

As a result of this review, the EC confirms savings of 479,971 CCM (93.32% of tracked) for Union's Indigenous program.

Low Income New Construction – Enbridge

Overview

Table 11-77 shows the tracked and verified scorecard achievements for the 2019 Enbridge Low Income New Construction Program, with the metric of participants. As a result of this review, the EC verifies 11 participants (100.00% of tracked). Table 11-77 contains the following variables:

- Tracked: Metric value from original Tracking File sent by Enbridge upon first data request
- Verified: Metric value verified from review of Tracking File, Project Files, and other relevant documents identified in the Documentation section
- Ratio: Ratio of verified to tracked achievement. A value of 100.00% indicates that verified values match tracked values

Table 11-77. Enbridge Low Income achievement: New Construction participants metric*

Metric	Achievement		Ratio
	Tracked	Verified	
Participants	11	11	100.00%

*Not all values may compute exactly due to rounding.

Documentation

The EC used the documentation shown in Table 11-78 to verify the metrics for the Low Income New Construction (LINC) program.

Table 11-78. Documentation used to verify the Low Income New Construction program

Report Language	Description or Citation
Enbridge-Provided Documentation	
Tracking File	Excel spreadsheet tracking metrics for all 2019 Enbridge DSM programs
Project Files	PDF document for each requested participant, supporting program metrics
Documents Used by EC	
OEB Decision	OEB Decision and Order, EB-2015-0029/EB-2015-0049, January 20, 2016 and OEB Revised Decision and Order, EB-2015-0029/EB-2015-0049, February 24, 2016
Enbridge Plan	Enbridge Gas Multi-Year DSM Plan (2015-2020), EB-2015-0049

Participant Selection

Enbridge first provided the Tracking file listing Program Year, Project Code (unique ID), Participant Status, Application Date, Charrette Date, and DCP Report Receipt. The spreadsheet listed eleven individual participants. The EC requested full documentation for all participants.

Received Files

Enbridge provided the EC with document folders identified by LINC Project number and containing project PDF documents. The EC first confirmed the folders received matched the IDs requested from the Tracking file. Project Files were properly redacted with name, address, and other information unavailable, as requested. The EC confirmed that documents for all participants had been received.

Verify Participation

The metric for the program is participants. To determine the definition of participant, the EC looked first to the OEB Decision, which identified a participant as someone who submits a Project Application.⁶²

The OEB Decision also includes the Enbridge proposed metric of "New Construction Program Participants."⁶³ This label differs slightly from "Number of Project Applications," and implies a second or additional definition for the metric. To identify if a record with a submitted a project application qualifies as a participant, the EC also reviewed the program description:⁶⁴

"Enbridge's proposed low-income new construction program will provide home builders with workshops, energy efficiency modeling tools, design options, energy efficiency education and financial incentives related to new affordable housing new construction developments."

From this, the EC determined that to demonstrate *participation*, Project Files should also provide documentation for *any* of the following:

- Workshop participation
- Energy efficiency modeling tools
- Design options
- Energy efficiency education
- Financial incentives

The EC evaluated the sampled participant files against the criteria above and determined that all eleven projects qualify as participants.

Verify Eligibility

The OEB Decision does not provide a clear definition for participant eligibility, instead pointing to approval of Enbridge's Plan. From the Plan, the EC found the following eligibility requirements:

- Submitted project application
- New affordable housing qualified by a municipal, provincial and/or federal housing program.
- Application identifies the project is specifically directed to affordable building developments, either single family (Part 9) or multi-residential (Part 3)

These criteria were based on an examination of the 2016-2020 offer descriptions and Enbridge's Plan (Table 11-79).

⁶² Ontario Energy Board Decision and Order, EB-2015-0029/EB-2015-0049, January 20, 2016, p. 64-65, 67, 78, and Schedule C

⁶³ Ontario Energy Board Decision and Order, EB-2015-0029/EB-2015-0049, January 20, 2016, Schedule B

⁶⁴ Ibid, p. 30

Table 11-79. Eligibility requirements documentation

Document	Relevant Contents
2016-2020 OFFER DESCRIPTIONS ⁶⁵	<i>"The offer is specifically directed to residential and multi-residential affordable building developments and efforts will focus on working with and through municipal governments, private and non-profit local housing corporations."</i>
EVALUATION PLAN ⁶⁶	<ul style="list-style-type: none"> ▪ <i>Developers and builders of new "affordable housing" as qualified by a municipal, provincial and/or federal housing program.</i> ▪ <i>Developers and builders of both single (sic) family Part 9 houses and multi-residential Part 3 buildings are eligible to participate.</i>
DRAFT 2019 Report ⁶⁷	<p><i>Eligibility criteria consists of the following:</i></p> <ul style="list-style-type: none"> ▪ <i>New construction project must be located within the EGD rate zone; and,</i> ▪ <i>The project proponent must have been recognized as a builder or provider of affordable housing by a municipal, provincial, and/or federal body, by virtue of receiving financial assistance, in the present or at any time in the past, from a government program aimed at affordable housing.</i>

To confirm eligibility, the EC looked for documentation that indicates the development or project is specifically directed to affordable building developments, either single family (Part 9) or multi-residential (Part 3). Project Files did contain identification of projects as Part 3 or Part 9 projects. Additionally, project files for all participants indicated that each development qualified as affordable housing.

Verification Result

As a result of this review, the EC confirms that all projects meet the definition and eligibility requirements, resulting in a scorecard achievement of 11 participants (100.00% of tracked) for Enbridge's Low Income New Construction program.

⁶⁵ Enbridge's Proposed 2015-2020 DSM Plan, EB-2015-0049, Exhibit B, Tab 2, Schedule 1, page 45 of 100

⁶⁶ Enbridge's Proposed 2015-2020 DSM Plan, EB-2015-0049, Exhibit B, Tab 2, Schedule 2, page 31 of 55

⁶⁷ Enbridge Gas Inc. DRAFT 2019 Demand Side Management Annual Report, May 29, 2020, page 95

Low Income Multi-Residential – Affordable Housing Program – Enbridge

Overview

Table 11-80 shows the tracked and verified scorecard achievements for the 2019 Enbridge Affordable Housing Program, with the metric of CCM savings. As a result of this review, the EC verifies 88,957,000 CCM for all program measures (120.32% of tracked). Table 11-80 contains the following variables:

- Tracked: Metric value from original Tracking File sent by Enbridge upon first data request
- Verified: Metric value verified from review of Tracking File, Project Files, and other relevant documents identified in the Documentation section
- Ratio: Ratio of verified to tracked achievement. A value of 100.00% indicates that verified values match tracked values

Table 11-80. Enbridge Low Income achievements: Low Income Multi-Residential CCM metrics*

Metric	Achievement		Ratio
	Tracked	Verified	
Prescriptive CCM	3,552,229	3,728,729	104.97%
Custom CCM	70,384,236	85,228,271	121.09%
TOTAL	73,936,465	88,957,000	120.32%

*Not all values may compute exactly due to rounding.

Documentation

The EC used the documentation shown in Table 11-81 to verify the metrics for the Affordable Housing program.

Table 11-81. Documentation used to verify the Low Income Multi-Residential Program

Report Language	Description or Citation
Enbridge-Provided Documentation	
Tracking File	Excel spreadsheet tracking metrics for all 2019 Enbridge DSM programs
Documents Used by EC	
OEB Decision	OEB Decision and Order, EB-2015-0029/EB-2015-0049, January 20, 2016 and OEB Revised Decision and Order, EB-2015-0029/EB-2015-0049, February 24, 2016
Enbridge Plan	Enbridge Gas Multi-Year DSM Plan (2015-2020), EB-2015-0049
TRM 3.0	Natural Gas Demand Side Management Technical Resource Manual, Version 3.0
Multi-Residential Low-Income Showerhead Verification	Multi-Residential Low-Income Showerhead Verification, Ipsos Research ⁶⁸
2017-2018 CPSV Report	2018 Natural Gas Demand Side Management Custom Savings Verification ⁶⁹

⁶⁸ Multi-Residential Low-Income Showerhead Verification, Ipsos Research, March 28, 2013

⁶⁹ 2017-2018 Natural Gas Demand Side Management Custom Savings Verification, DNV GL for the Ontario Energy Board, December 26, 2019

Verify Prescriptive Savings

In calculating net CCM, the EC reviewed natural gas savings for prescriptive measures from the Tracking File, using the procedures identified in Appendix N. The EC made some minor changes to the tracked savings which resulted in a savings ratio of 104.97%, as shown in Table 11-82.

Table 11-82. Enbridge - prescriptive measures - scorecard achievements by measure group*

Measure Group	Installed Measures	Tracked Achievement (CCM)	Verified Achievement (CCM)	Savings Ratio
Boiler	4	957,750	1,134,250	118.43%
Make-Up Air Unit	7	2,566,669	2,566,669	100.00%
Water Heater	3	27,810	27,810	100.00%
TOTAL	14	3,552,229	3,728,729	104.97%

*Not all values may compute exactly due to rounding.

Verify Custom Savings

The EC identified the custom savings totals from Enbridge Tracking Files shown in Table 11-83. The EC applied a realization rate from the 2017-2018 CPSV report for Multi-Residential of 121.09%.

Table 11-83. Enbridge - custom measures - scorecard achievements*

Measure Group	Installed Measures	Tracked Achievement (CCM)	Verified Achievement (CCM)	Savings Ratio
Air Handling Unit	1	983,160	1,190,508	121.09%
Boiler - Hydronic Condensing - Space Heating	24	20,528,855	24,858,390	121.09%
Boiler - Hydronic Condensing - Ventilation	1	105,325	127,538	121.09%
Boiler - Hydronic Condensing - Water Heating	18	5,946,125	7,200,163	121.09%
Boiler - Hydronic High Efficiency - Space Heating	19	13,915,050	16,849,734	121.09%
Boiler - Hydronic High Efficiency - Water Heating	7	2,275,250	2,755,100	121.09%
Controls - Operational Improvement	12	13,969,455	16,915,613	121.09%
Controls - Space Heating	5	1,056,555	1,279,382	121.09%
Controls - Ventilation	21	4,213,710	5,102,381	121.09%
Controls - Water Heating	4	164,325	198,981	121.09%
Heat Recovery Ventilation	1	1,138,886	1,379,077	121.09%
Make-Up Air Unit	3	2,164,800	2,621,356	121.09%
Reflective Panel	11	3,575,730	4,329,851	121.09%
Tank Type Water Heater	2	347,010	420,194	121.09%
TOTAL	129	70,384,236	85,228,271	121.09%

*Not all values may compute exactly due to rounding.

Verification Result

As a result of this review, the EC confirms the total savings of 88,957,000 CCM (120.32% of tracked) for Enbridge's Affordable Housing Program.

Low Income Multi-Residential – Multifamily Program (SA) – Union Overview

Table 11-84 shows the tracked and verified scorecard achievements for the 2019 Union Multifamily (Social and Assisted) Program, with the metric of CCM savings. As a result of this review, the EC verifies 22,803,826 CCM (104.82% of tracked). Table 11-84 contains the following variables:

- Tracked: Metric value from original Tracking File sent by Enbridge upon first data request
- Verified: Metric value verified from review of Tracking File, Project Files, and other relevant documents identified in the Documentation section
- Ratio: Ratio of verified to tracked achievement. A value of 100.00% indicates that verified values match tracked values

Table 11-84. Union Low Income achievements: Multifamily Program (SA) CCM metrics*

Metric	Achievement		Ratio
	Tracked	Verified	
CCM - Prescriptive	15,339,807	16,993,680	110.78%
CCM - Custom	6,415,089	5,810,146	90.57%
TOTAL	21,754,896	22,803,826	104.82%

*Not all values may compute exactly due to rounding.

Documentation

The EC used the documentation shown in Table 11-85 to verify the metrics for the Multifamily (Social and Assisted) program.

Table 11-85. Documentation used to verify the Multifamily (Social and Assisted) program

Report Language	Description or Citation
Enbridge-Provided Documentation	
Tracking File	Excel spreadsheet tracking metrics for all 2019 Union DSM programs
Documents Used by EC	
OEB Decision	OEB Decision and Order, EB-2015-0029/EB-2015-0049, January 20, 2016 and OEB Revised Decision and Order, EB-2015-0029/EB-2015-0049, February 24, 2016
Union Plan	Union's 2015-2020 DSM Plan, EB-2015-0029
TRM 3.0	Natural Gas Demand Side Management Technical Resource Manual, Version 3.0
2017-2018 CPSV Report	2018 Natural Gas Demand Side Management Custom Savings Verification ⁷⁰

Verify Prescriptive Savings

In calculating net CCM, the EC reviewed natural gas savings for prescriptive measures from the Tracking File, using the procedures identified in Appendix N. The EC certified the tracked savings which resulted in a savings ratio of 110.78%, as shown in Table 11-86.

⁷⁰ 2017-2018 Natural Gas Demand Side Management Custom Savings Verification, DNV GL for the Ontario Energy Board, December 26, 2019

Table 11-86. Union - prescriptive measures - scorecard achievements by measure group*

Measure Group	Installed Measures	Tracked Achievement (CCM)	Verified Achievement (CCM)	Savings Ratio
Boiler	49	6,515,317	8,169,190	125.38%
Energy Recovery Ventilation	42	495,721	495,721	100.00%
Furnace	112	97,316	97,316	100.00%
Heat Recovery Ventilation	9	36,465	36,465	100.00%
Make-Up Air Unit	26	8,046,677	8,046,677	100.00%
Water Heater	10	148,311	148,311	100.00%
TOTAL	248	15,339,807	16,993,680	110.78%

*Not all values may compute exactly due to rounding.

Verify Custom Savings

The EC identified the custom savings totals from Union Tracking. The EC applied a realization rate (gross savings adjustment) of 90.57%, attribution of 95.00%, and zero spillover, identifying net cumulative savings of 5,810,146 CCM (90.57% of tracked).

Verification Result

As a result of this review, the EC confirms total savings of 22,803,826 CCM (104.82% of tracked) for Union's Multifamily (Social and Assisted) Program.

Low Income Multi-Residential – Multifamily Program (MR) – Union Overview

Table 11-87 shows the tracked and verified scorecard achievements for the 2019 Union Multifamily (Market Rate) Program, with the metric of CCM savings. As a result of this review, the EC verifies 4,774,193 CCM for all program measures (113.75% of tracked). Table 11-87 contains the following variables:

- Tracked: Metric value from original Tracking File sent by Enbridge upon first data request
- Verified: Metric value verified from review of Tracking File, Project Files, and other relevant documents identified in the Documentation section
- Ratio: Ratio of verified to tracked achievement. A value of 100.00% indicates that verified values match tracked values

Table 11-87. Union Low Income achievements: Multifamily (MR) Program CCM metrics*

Metric	Achievement		Ratio
	Tracked	Verified	
CCM - Prescriptive	4,197,162	4,774,193	113.75%
CCM - Custom	-	-	-
TOTAL	4,197,162	4,774,193	113.75%

*Not all values may compute exactly due to rounding.

Documentation

The EC used the documentation shown in Table 11-88 to verify the metrics for the Multifamily (Market Rate) program.

Table 11-88. Documentation used to verify the Multifamily (Market Rate) program

Report Language	Description or Citation
Enbridge-Provided Documentation	
Tracking File	Excel spreadsheet tracking metrics for all 2019 Union DSM programs
Documents Used by EC	
OEB Decision	OEB Decision and Order, EB-2015-0029/EB-2015-0049, January 20, 2016 and OEB Revised Decision and Order, EB-2015-0029/EB-2015-0049, February 24, 2016
Union Plan	Union's 2015-2020 DSM Plan, EB-2015-0029
TRM 3.0	Natural Gas Demand Side Management Technical Resource Manual, Version 3.0

Verify Prescriptive Savings

In calculating net CCM, the EC reviewed natural gas savings for prescriptive measures from the Tracking File, using the procedures identified in Appendix N. The EC certified the tracked savings which resulted in a savings ratio of 113.75%, as shown in Table 11-89.

Table 11-89. Union – prescriptive measures – scorecard achievements by measure group*

Measure Group	Installed Measures	Tracked Achievement (CCM)	Verified Achievement (CCM)	Savings Ratio
Condensing Boiler - Space Heating	50	4,029,635	4,606,666	114.32%
Condensing Boiler - Water Heating	15	167,527	167,527	100.00%
TOTAL	65	4,197,162	4,774,193	113.75%

*Not all values may compute exactly due to rounding.

Verify Custom Savings

Union reported no custom projects under the Low Income Multifamily (Market Rate) Program in 2019.

Verification Result

As a result of this review, the EC confirms total savings of 4,774,193 CCM (113.75% of tracked) for Union’s Multifamily (Market Rate) Program.

Appendix H Large Volume Scorecards

This appendix describes the detailed process used to verify the metrics for the Large Volume Scorecard programs for Union, shown in Table 11-90. The program addressed in this appendix is the Large Volume program.

Table 11-90. Union 2019 Large Volume (Rate T2/Rate 100) program scorecard*

Programs	Metrics	Verified Achievement		Metric Target			Weight
		Program-level Achievement	Metric-level Achievement	Lower Band	Target	Upper Band	
Large Volume	CCM	72,370,192	72,370,192	103,250,094	137,666,792	206,500,188	100.00%

*Not all values may compute exactly due to rounding.

Overview

Table 11-91 shows the tracked and verified scorecard achievements for the 2019 Union Large Volume program, with the metric of CCM savings. As a result of this review, the EC verifies 72,370,192 CCM for all program measures (90.46% of tracked). Table 11-91 contains the following variables:

- Tracked: Metric value from original Tracking File sent by Enbridge upon first data request
- Verified: Metric value verified from review of Tracking File, Project Files, and other relevant documents identified in the Documentation section
- Ratio: Ratio of verified to tracked achievement. A value of 100.00% indicates that verified values match tracked values

Table 11-91. Union Large Volume achievement: Large Volume CCM metrics*

Metric	Achievement		Ratio
	Tracked	Verified	
CCM - Prescriptive	-	-	-
CCM - Custom	80,002,423	72,370,192	90.46%
Total	80,002,423	72,370,192	90.46%

*Not all values may compute exactly due to rounding.

Table 11-92 includes these variables:

- Tracking Gross Savings: Gross cumulative tracking savings for all customers in the Union Large Volume program.
- RR: Gross realization rate from the 2017-2018 CSPV report.
- Att: Attribution ratio (the complement of free ridership) from the 2018 NTG report.
- Spillover: Spillover ratio from 2013-2014 Spillover Study.
- Adj: Adjustment Ratio, the product of the RR and the sum of the Att ratio and Spillover ratio

Equation 7: Adjustment Ratio

$$\text{Adjustment Ratio} = \text{RR} * (\text{Att} + \text{Spillover})$$

- Verified Net Savings: Cumulative gross savings multiplied by the Adjustment Ratio

Equation 8: Verified Net Savings

$$\text{Verified Net Savings} = \text{Adjustment Ratio} * (\text{Cumulative Gross})$$

Table 11-92. Adjustment factors applied to Large Volume Program cumulative gross savings*

Measure Type	Tracking Gross Savings (CCM)	RR (%)	Att (%)	Spillover (%)	Adj* (%)	Verified Net Savings (CCM)
Prescriptive	-	-	-	-	-	-
Custom	522,550,116	90.46%	14.49%	0.82%	13.85%	72,370,192
TOTAL	522,550,116				13.85%	72,370,192

*Not all values may compute exactly due to rounding.

Documentation

The EC used the documentation shown in Table 11-93 to verify the metrics for the Large Volume program.

Table 11-93. Documentation used to verify the Large Volume program

Report Language	Description or Citation
Enbridge-Provided Documentation	
Tracking File	Excel spreadsheet tracking metrics for all 2019 Union DSM programs
Documents Used by EC	
OEB Decision	OEB Decision and Order, EB-2015-0029/EB-2015-0049, January 20, 2016 and OEB Revised Decision and Order, EB-2015-0029/EB-2015-0049, February 24, 2016
Union Plan	Union's 2015-2020 DSM Plan, EB-2015-0029
Union's Draft 2019 Report	Union Gas 2019 Demand Side Management Draft Annual Report ⁷¹
2017-2018 CPSV Report	2018 Natural Gas Demand Side Management Custom Savings Verification ⁷²
2018 NTG Report	2018 Natural Gas Demand Side Management Free-ridership Evaluation ⁷³
2013-2014 Spillover Study	CPSV Participant Spillover Results ⁷⁴

Custom Savings

The EC identified 47 tracked custom measures with tracked cumulative gross savings of 522,550,116 CCM. These projects are grouped by measure in Table 11-94.

Table 11-94. Union - custom measures – verified cumulative gross savings by measure group*

Measure Group	Installed Measures	Tracking Gross Savings (CCM)
Furnace or Dryer	12	173,448,325
Greenhouse - Envelope or Infiltration	1	3,252,120
HVAC	3	13,839,520
Productivity Improvement	2	14,243,520
Steam or Hot Water System	29	317,766,631
TOTAL	47	522,550,116

*Not all values may compute exactly due to rounding.

⁷¹ While the EC recognizes and understands that the draft report will be updated and finalized, the final was not available at the time of this evaluation, thus the draft is cited for reference.

⁷² 2017-2018 Natural Gas Demand Side Management Custom Savings Verification, DNV GL for the Ontario Energy Board, December 26, 2019

⁷³ 2018 Natural Gas Demand Side Management Free-ridership Evaluation, DNV GL for the Ontario Energy Board, December 27, 2019

⁷⁴ CPSV Participant Spillover Results, DNV GL for the Ontario Energy Board, May 23, 2018

Adjustment Values – RR

The 2017-2018 CPSV Report conveyed one gross realization rate for the program, 90.46%.

Adjustment Values – Att Ratios

The 2017-2018 CPSV Report conveyed one attribution ratio for the program, 14.49%.

Adjustment Values – Spillover Ratios

The 2013-2014 Spillover Study conveyed one spillover ratios for the program, 0.82%.

Verify Cumulative Natural Gas Savings

The EC calculated the measure-level net savings using Equation 7 and Equation 8, then summed the measure-level savings to produce program-level savings. The EC calculated the program-level adjustment ratio by dividing the program-level net savings by the program-level gross savings.

Table 11-95. 2018 Large Volume measure groups adjustment values and cumulative net savings*

Measure Type	Tracking Gross Savings (CCM)	RR (%)	Att (%)	Spillover (%)	Adj* (%)	Verified Net Savings (CCM)
Custom	522,550,116	90.46%	14.49%	0.82%	13.85%	72,370,192

*Not all values may compute exactly due to rounding.

†Adjustment value displayed is truncated (2 digit) average based on sum of all individual adjustments by measure. Individual adjustment factors (RR, ATT, Spillover) are utilized for calculations at the 2 digit level, as displayed.

Verification Result

As a result of this review, the EC confirms total savings of 72,370,192 CCM (90.46% of net tracked) for Union's Large Volume (Rate T2/Rate 100) Program.

Appendix I Market Transformation Scorecards

This appendix describes the detailed process used to verify the metrics for the Market Transformation Scorecard programs for Enbridge (Table 11-96) and Union (Table 11-97). The programs addressed in this appendix are:

- Commercial New Construction – Commercial Savings by Design – Enbridge
- Commercial New Construction – Union
- Residential New Construction – Residential Savings by Design – Enbridge
- Residential New Construction – Optimum Home Program – Union
- School Energy Competition – Enbridge

Table 11-96. Enbridge 2019 market transformation scorecard^{75*} †

Programs	Metrics	Verified Achievement		Metric Target			Weight
		Program-level Achievement	Metric-level Achievement	Lower Band	Target	Upper Band	
School Energy Competition	Schools	32	32	24	32	47	10.00%
Run-it-Right	Participants	84	84	27	36	54	20.00%
Comprehensive Energy Management	Participants	7	7	12	16	24	20.00%
Residential Savings by Design	Builders	39	39	23	30	45	10.00%
Residential Savings by Design	Homes Built	2,989	2,989	1,902	2,536	3,804	15.00%
Commercial Savings by Design	New Developments	35	35	23	30	45	25.00%

*Not all values may compute exactly due to rounding.

†Programs in grey text are not similar to Union programs under the Market Transformation Scorecard, and not discussed in this Appendix. For these programs please refer to Appendix J.

Table 11-97. Union 2019 market transformation scorecard^{*76}

Programs	Metrics	Verified Achievement		Metric Target			Weight
		Program-level Achievement	Metric-level Achievement	Lower Band	Target	Upper Band	
Optimum Home	Builders	4	4	3	4	6	10.00%
Optimum Home	Homes Built	95.45%	95.45%	68.00%	90.00%	100.00%	10.00%
Optimum Home	Percentage of Homes Built	28.55%	28.55%	3.25%	4.34%	6.50%	30.00%
Commercial New Construction	New Developments	22	22	15	20	30	50.00%

*Not all values may compute exactly due to rounding.

⁷⁵ Ontario Energy Board Decision and Order, EB-2015-0029/EB-2015-0049, January 20, 2016, Schedule C

⁷⁶ Ibid

Commercial New Construction – Commercial Savings by Design – Enbridge

Overview

Table 11-98 shows the tracked and verified scorecard achievements for the 2019 Enbridge Commercial Savings by Design (SBD) Program, with the metric of New Developments. As a result of this review, the EC verifies 35 New Developments (100.00% of tracked). Table 11-98 contains the following variables:

- Tracked: Metric value from original Tracking File sent by Enbridge upon first data request
- Verified: Metric value verified from review of Tracking File, Project Files, and other relevant documents identified in the Documentation section
- Ratio: Ratio of verified to tracked achievement. A value of 100.00% indicates that verified values match tracked values

Table 11-98. Enbridge Market Transformation achievement: Commercial Savings by Design developments metric*

Metric	Achievement		Ratio
	Tracked	Verified	
New Developments	35	35	100.00%

*Not all values may compute exactly due to rounding.

Documentation

The EC used the documentation shown in Table 11-99 to verify the metrics for the Commercial Savings by Design program.

Table 11-99. Documentation used to verify the Commercial Savings by Design program

Report Language	Description or Citation
Enbridge-Provided Documentation	
Tracking File	Excel spreadsheet tracking metrics for all 2019 Enbridge DSM programs
Project Files	PDF documents
Documents Used by EC	
OEB Decision	OEB Decision and Order, EB-2015-0029/EB-2015-0049, January 20, 2016 and OEB Revised Decision and Order, EB-2015-0029/EB-2015-0049, February 24, 2016
Enbridge Plan	Enbridge Gas Multi-Year DSM Plan (2015-2020), EB-2015-0049

Participant Selection

Enbridge provided the Tracking File listing Project Code (unique ID), program year, commitment date, IDP date, and a variable indicating if the "Final IDP Report Received". As tracking data indicated that all 35 listed participants were equally qualified, the EC randomly selected 10 records from the full list for document review. The EC requested all supporting documentation, including documentation that supports eligibility and participation criteria.

Received Files

The EC received three types of documents in response to this request:

- Commitment form
- Terms and Conditions

- IDP report

The EC first confirmed that the documentation received matched the IDs requested. Enbridge redacted name, address, and other identifying information. The EC confirmed that the signature dates on the commitment form matched the commitment date in the tracking file, and that the date on the IDP report matched the date recorded in the IDP date field of the tracking file.

Verify Participation

To determine the definition of New Developments, the EC looked first to the OEB Decision, which approved the Enbridge ESC Plan:⁷⁷

Decisions

The OEB approves Enbridge's Commercial Savings by Design program. This program is similar to Enbridge's Residential Savings by Design, with the difference being the target market is commercial and industrial buildings as opposed to residential new construction. For the same reasons as the Residential Savings by Design program, the OEB finds that this program is consistent with guiding principles of the DSM Framework and drives integrated conservation savings prior to building construction.

Relevant criteria for "new development" are described in Enbridge's Plan "Budgets, Metrics and Targets,"⁷⁸ paragraph 46:

- *For the purpose of assessing the "new developments enrolled" metric for SBD Commercial:*
 - Only builders and developers who have "enrolled" in the program and completed the IDP process are eligible to be counted towards the target.*
 - "Enrolment" is defined as a signed MOU with a builder or developer containing a commitment to participate in the Enbridge Commercial Savings by Design offer for a 5-year period which will include undertaking an IDP adhering to an Enbridge approved IDP process (such as IEA Task 23 or the iiSBE developed IDP Tool) which also includes the requisite energy model, demonstrating how to achieve at least 15% total energy savings relative to the yet to be completed 2017 Ontario Building Code. The builder must also commit to constructing buildings or a building to the IDP standard within 5 years.*
 - The metric in the Commercial Savings by Design scorecard is based on the number of projects to which a developer commits, i.e., the same developer with different clients and different kinds of projects may be counted multiple times. A minimum 50,000 square feet requirement applies to each project. A project is defined as either a single building or multiples of the same building by the same company that add up to 50,000 square feet.*

From these definitions, the EC observed the following criteria:

- Only projects from enrolled builders/developers count towards the metric. Enrollment is defined as:
 - A builder or developer committed to the CSBD offer for five years via an MOU
 - And undertaking the Enbridge approved IDP process for each development, which requires:
 - Energy model
 - Demonstration of how to achieve 15% energy savings over 2017 building code
 - And a project which is a single building or multiples of the same building which sum to at least 50,000 ft²

The EC noted that the IDPs submitted for the 10 developments cited an average savings of 30% improvement against the 2017 OBC code, with a range of 16.1% to 52.6% in savings. IDP forms for all but

⁷⁷ Ontario Energy Board Decision and Order, EB-2015-0029/EB-2015-0049, January 20, 2016, Page 39

⁷⁸ Enbridge's Proposed 2015-2020 DSM Plan, EB-2015-0049, Exhibit B, Tab 1, Schedule 4, 37 of 41

one development showed that they were greater than 50,000 ft². However, a supporting letter from the developer was included in the project files, which confirmed that the development would in fact exceed 50,000 ft². The average square footage was 181,469 ft² and a range of 50,000 ft² to 358,977 ft².

Table 11-100. Enbridge Commercial Savings by Design participation criteria, project satisfaction, and explanation

Identified Criteria	Satisfied?	Explanation
Only projects from enrolled builders/developers count towards the metric	Yes	Following criteria meet definition for enrolment
Enrolment is defined as builder or developer committed to the CSBD offer for five years	Yes	Terms and Conditions establishes that project must be completed within 5 years
Undertaking Enbridge approved IDP process for each development	Yes	IDP Reports included in documentation
IDP includes energy model	Yes	IDP Reports identifies eQuest v3.64 ⁷⁹
Sufficient energy savings achieved	Yes	See below
- IDP demonstrates how to achieve 15% energy savings over 2017 building code	N/A	All IDP reports states savings 15% over 2017 OBC
Project must be at least 50,000 ft ²	Yes	Applications and IDP Reports included in documentation
Project is a single building or multiples of same building which sum to at least 50,000 ft ²	Yes	Projects of one or multiple buildings all greater than 50,000 ft ²

As a result, the EC confirms that the submitted projects met the criteria for participation as a New Development for the Enbridge Commercial Savings by Design program.

Verify Eligibility

Enbridge’s Plan, approved by the OEB, further identifies eligibility criteria. As stated in Enbridge’s Plan:⁸⁰

The SBD Commercial offer is direct-to-builder/developer delivered by an internal sales team. Eligibility criteria include the following:

- *Commercial, multi-residential or industrial buildings covered under the Ontario Building Code Part 3;*
- *A minimum threshold of 50,000 square feet per project (including aggregate multi-location projects);*
- *Building(s) must be within Enbridge’s franchise area, or for aggregate projects 75% of the project square footage must be in the franchise area;*
- *Building(s) must be in the design phase or earlier in the process;*
- *Building construction must be completed within five years of signing the agreement, and commissioning must be completed no more than one year after that; and,*
- *Builders will be eligible to participate in the offer multiple times for different projects*

These defined eligibility requirements overlap with the criteria Enbridge laid out for assessing enrolments. The EC used the Commitment Forms and IDP Reports to determine if the projects met these criteria.

⁷⁹ ASHRAE 90.1-2010 section 11 as modified by Supplementary Standard SB-10 Division 3, Chapter 2 for generating reference and baseline models

⁸⁰ Enbridge’s Proposed 2015-2020 DSM Plan, EB-2015-0049, Exhibit B, Tab 2, Schedule 1, 61 of 100

Table 11-101. Enbridge Commercial Savings by Design eligibility criteria, project satisfaction, and explanation

Identified Criteria	Satisfied?	Explanation
Commercial, multi-residential or industrial buildings	Yes	IDP Reports
50,000 ft ² minimum project size	Yes	Commitment Form
Within Enbridge territory	Yes	Application terms and conditions
Design phase or earlier	Yes	IDPs performed to prior to construction.
Construction within 5 years	N/A	Eligibility for fuller program participation, not applicable for new enrollment.
Commissioning within 1 year of construction	N/A	

After reviewing these stated eligibility criteria and Project Files, the EC confirms the 10 sampled projects meet the eligibility criteria.

Verification Result

As a result of this review:

- The EC confirms proper documentation for the requested projects
- Project files for the submitted projects meet all requirements for a participant
- Project files for the submitted projects meet further criteria for eligibility

As a result of this review, the EC confirms the scorecard metric of 35 new developments (100.00% of tracked) for the Enbridge Commercial Savings by Design program.

Commercial New Construction – Union

Overview

Table 11-102 shows the tracked and verified scorecard achievements for the 2019 Union Commercial New Construction Program (also referred to as the Commercial Savings by Design Program), with the metric of New Developments. As a result of this review, the EC verifies 22 New Developments enrolled by participating builders (100.00% of tracked). Table 11-102 contains the following variables:

- Tracked: Metric value from original Tracking File sent by Enbridge upon first data request
- Verified: Metric value verified from review of Tracking File, Project Files, and other relevant documents identified in the Documentation section
- Ratio: Ratio of verified to tracked achievement. A value of 100.00% indicates that verified values match tracked values

Table 11-102. Union Market Transformation achievement: Commercial New Construction developments metric*

Metric	Achievement		Ratio
	Tracked	Verified	
New Developments	22	22	100.00%

*Not all values may compute exactly due to rounding.

Documentation

The EC used the documentation shown in Table 11-103 to verify the metrics for the Commercial New Construction program.

Table 11-103. Documentation used to verify the Commercial New Construction program

Report Language	Description or Citation
Enbridge-Provided Documentation	
Tracking File	Excel spreadsheet tracking metrics for all 2019 Union DSM programs
Project Files	Various documents for each requested participant, supporting program metrics
Documents Used by EC	
OEB Decision	OEB Decision and Order, EB-2015-0029/EB-2015-0049, January 20, 2016 and OEB Revised Decision and Order, EB-2015-0029/EB-2015-0049, February 24, 2016
Union Plan	Union's 2015-2020 DSM Plan, EB-2015-0029

Participant Selection

Union provided the Tracking File listing Project Code (unique ID), program year, application date, Visioning Date and IDP date. The spreadsheet identified 22 participants, all with 2019 dates. As tracking data indicated that all the 22 listed participants were equally qualified, the EC requested all supporting documentation for a census, including documentation that supports eligibility and participation criteria.

Received Files

The EC received four types of documents in response to this request:

- Commitment form
- Terms and Conditions
- IDP report

- Supporting Letter

The EC first confirmed that the documents received matched the IDs requested. Union redacted name, address, and other identifying information. The EC confirmed that the signature dates on the commitment form matched the commitment date in the tracking file, and that the date on the IDP report matched the date recorded in the IDP date field of the tracking file.

Verify Participation

To determine the definition of New Developments, the EC looked first to the OEB Decision, which approved Union's Plan:⁸¹

Decisions

The OEB approves Enbridge's Commercial Savings by Design program. This program is similar to Enbridge's Residential Savings by Design, with the difference being the target market is commercial and industrial buildings as opposed to residential new construction. For the same reasons as the Residential Savings by Design program, the OEB finds that this program is consistent with guiding principles of the DSM Framework and drives integrated conservation savings prior to building construction.

The OEB directs Union to establish a similar program targeting commercial and industrial buildings in its service area. The OEB finds commercial and industrial customers would expect consistency in the market, especially for province-wide chains, franchises and companies.

Relevant criteria for "new development" are described in Union's Draft report "8.1.2 Commercial/Industrial Savings by Design ("CSBD") Offering:"⁸²

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.*

From these definitions, the EC observed the following criteria:

- Only projects from enrolled builders/developers count towards the metric. Enrolment is defined as:
 - A builder or developer committed to the program offer for five years via an MOU
 - And undertaking the Union approved IDP process for each development, which requires:
 - Energy model
 - Demonstration of how to achieve 15% energy savings over 2017 building code
 - A project is a building or multiples of same building which sum to at least 50,000 ft²

The EC noted that the IDPs submitted for all 22 participants cited an average savings of 30% improvement against the 2017 OBC code, with a range of 15.2% to 57.0% in savings. Upon initial review, IDPs for 19 of the 22 developments showed at least 50,000 ft² with an average of 114,023 ft² and a range of 29,342 ft² to 365,466 ft². Therefore, three developments initially did not qualify on the basis of being smaller than 50,000 ft². However, Union provided the EC with supporting letters from the builders of the remaining three developments confirming the developments would in fact exceed 50,000 ft².

⁸¹ Ontario Energy Board Decision and Order, EB-2015-0029/EB-2015-0049, January 20, 2016, Page 39

⁸² Union's Draft 2018 Demand Side Management Evaluation Report, Page 93

Table 11-104. Union Commercial New Construction participation criteria, project satisfaction, and explanation

Identified Criteria	Satisfied?	Explanation
Only projects from enrolled builders/developers count towards the metric	Yes	Following criteria meet definition for enrolment
Enrolment is defined as builder or developer committed to the CSBD offer for five years:	Yes	Terms and Conditions establishes that project must be completed within 5 years
Undertaking IDP process for each development	Yes	IDP Reports included in documentation
IDP includes energy model	Yes	IDP Reports identify eQuest v3.64 ⁸³
Sufficient energy savings achieved	Yes	See below
- IDP demonstrates how to achieve 15% energy savings over 2017 code	N/A	All IDP reports state savings 15% over 2017 OBC
Project must be at least 50,000 ft ²	Yes	Commitment Forms and supporting letters
Project is a single building or multiples of same building which sum to at least 50,000 ft ²	Yes	Projects of one or multiple buildings all greater than 50,000 ft ²

As a result, the EC confirms that all 22 submitted projects met the criteria for participation as a New Development for the Union Commercial New Construction program.

Verify Eligibility

Since Union’s plan was submitted before the Decision and Order that instructed Union to create a similar program to Enbridge’s, the earlier referenced draft report served as the primary reference for eligibility. The EC used the Commitment Forms and IDP Reports to determine if the projects met these criteria.

Table 11-105. Union Commercial New Construction eligibility criteria, project satisfaction, and explanation

Identified Criteria	Satisfied?	Explanation
Commercial, multi-residential or industrial buildings	Yes	IDP Reports
50,000 ft ² minimum project size	Yes	Commitment Form
Design phase or earlier	Yes	IDPs performed to prior to construction.
Construction within 5 years	N/A	Eligibility for fuller program participation, not applicable for new enrollment.
Commissioning within 1 year of construction	N/A	

After reviewing these stated eligibility criteria and Project Files, the EC confirms that all 22 projects meet the eligibility criteria.

Verification Result

As a result of this review:

- The EC confirms proper documentation for the requested projects
- Project files for all 22 of the submitted projects meet all requirements for a participant
- Project files for all 22 of those projects meet further criteria for eligibility

The EC verifies the achievement of 22 projects (100.00% of tracked) for the Union Commercial New Construction program.

⁸³ ASHRAE 90.1-2010 section 11 as modified by Supplementary Standard SB-10 Division 3, Chapter 2 for generating reference and baseline models

Residential New Construction – Residential Savings by Design – Enbridge

Overview

Table 11-106 shows the tracked and verified scorecard achievements for the 2019 Enbridge Residential Savings by Design (SBD) Program, with the metrics of enrolled builders and number of homes built. As a result of this review, the EC verifies 39 builders (100.00% of tracked) and 2,989 homes built (100.00% of tracked). Each metric is discussed separately in this section, starting with the builder’s metric. Table 11-106 contains the following variables:

- Tracked: Metric value from original Tracking File sent by Enbridge upon first data request
- Verified: Metric value verified from review of Tracking File, Project Files, and other relevant documents identified in the Documentation section
- Ratio: Ratio of verified to tracked achievement. A value of 100.00% indicates that verified values match tracked values

Table 11-106. Enbridge Market Transformation achievement: Residential Savings by Design metrics*

Program	Metric	Achievement		Ratio
		Tracked	Verified	
Residential Savings by Design	Builders	39	39	100.00%
	Homes Built	2,989	2,989	100.00%

*Not all values may compute exactly due to rounding.

Documentation

The EC used the documentation shown in Table 11-107 to verify the metrics for the Residential Savings by Design program.

Table 11-107. Documentation used to verify the Residential Savings by Design program

Report Language	Description or Citation
Enbridge-Provided Documentation	
Tracking File	Excel spreadsheet tracking metrics for all 2019 Enbridge DSM programs
Project Files	Files documenting participation and eligibility for selected builder/project
Confirmation Emails	PDF copies of email correspondence with builders verifying aspects of their housing developments
Documents Used by EC	
OEB Decision	OEB Decision and Order, EB-2015-0029/EB-2015-0049, January 20, 2016 and OEB Revised Decision and Order, EB-2015-0029/EB-2015-0049, February 24, 2016
Enbridge Plan	Enbridge Gas Multi-Year DSM Plan (2015-2020), EB-2015-0049

Builders Metric

Participant Selection

Enbridge first provided the Tracking File listing Project Code (unique ID), Signed Commitment (date), Enrolment Year, IDP date, and a variable indicating whether the “Final IDP Report Received”. The spreadsheet identified 39 builders, all with 2019 IDP dates and ‘Yes’ populated for both the threshold and report received variables. As tracking data indicated that all the 39 listed builders were equally qualified, the

EC randomly selected five from the full list for document review. The EC requested all supporting documentation, including documentation that supports eligibility and participation criteria.

Received Files

Enbridge provided two files to support each project:

- "Project Application"
- "IDP Report"

Enbridge also provided copies of email correspondence between representatives from Enbridge and some builders that, upon first review, appeared to not meet the requirements for participation.

Verify Participation

To determine the definition of Enrolled Builders, the EC looked first to the OEB Decision, which approved the Enbridge ESC Plan⁸⁴ stating: "*The OEB approves Enbridge's Residential Savings by Design program as proposed.*" For further detail on criteria, the EC looked to Enbridge's Plan which identified:⁸⁵

"For the purpose of assessing whether a builder is "enrolled" in SBD Residential:

i. The builder must have signed a Memorandum of Understanding ("MOU") containing a commitment to participate in the Residential SBD program for a 3-year period

ii. The builder must have completed a program-approved Integrated Design Process ("IDP"), such as IEA Task 23 or the iiSBE developed IDP tool, including requisite energy modeling for homes the builder plans to construct in a new development. Homes to be completed in 2016 must demonstrate at least 25% total energy savings relative to the 2012 Ontario Building Code. Homes to be completed in 2018 and beyond must demonstrate total energy savings of at least 15% relative to the yet to be developed 2018 Ontario Building Code.

iii. Builders will be permitted to enroll in Enbridge's Residential SBD offer more than once to avoid lost opportunities. In order to increase the scale of energy efficiency amongst participating builders, repeat builders will be offered progressively smaller incentives per home, but shall be permitted to collect these reduced incentives for a larger number of units.

iv. In order for a builder's development to qualify as significant enough in size to participate in Enbridge's SBD Residential offer, the development must include no less than 50 homes."

The EC evaluated the sampled participant files against the criteria above and determined:

- Requirement i:
 - Section 2c. of the Enbridge-provided Terms & Conditions included in the application contains the following: "...Applicant must design and construct the residential homes...by no later than three (3) calendar years from the date of the IDP."
 - This identifies an agreement to complete a project within three years but does not indicate the commitment of a builder to participate in the Residential SBD program for three years.
- Requirement ii:
 - Section 2c. of the Enbridge-provided Terms & Conditions includes the following: "In order to apply for the Program and be eligible for financial incentives, the Applicant must design and construct the residential homes...in Enbridge franchise areas which meet or exceed the Target Energy Performance", which is established in Section 1.ii as exceeding "the 2017 Ontario Building Code's ("OBC") energy performance requirements by at least 15% or greater."

⁸⁴ Ontario Energy Board Decision and Order, EB-2015-0029/EB-2015-0049, January 20, 2016, Page 34

⁸⁵ Enbridge's Proposed 2015-2020 DSM Plan, EB-2015-0049, Exhibit B, Tab 1, Schedule 4, Page 35-36 of 41

- The five submitted IDP Reports identified at least 15% energy savings above 2017 OBC using the HOT2000 simulation program.
- Requirement iii:
 - The EC does not find that this requirement is applicable to validating participation, only that it permits further participation.
- Requirement iv:
 - The Project Applications of three of the initial five builders identified the total development size of 50 homes or more, satisfying the requirement for no less than 50. Two applications indicated that the development would include fewer than 50 homes, which did not meet the requirement.

Initial Verification

The initial verification review determined that three of the five randomly-selected homes met the participation and eligibility criteria.

Second Verification

The program application states that the applicant must complete the components of the program within three years of the application date (see above). As a result, the EC determined that the three builders that passed the initial verification could meet the 50 homes threshold by confirming that at least 50 homes will be constructed in the development by the end of 2020.

Enbridge provided DNV GL copies of email correspondence with the two builders that did not pass the initial verification, both of which confirmed at least 50 homes would be constructed within three years.

Verification Result

As a result, the EC confirms:

- Builders do not have MOUs identifying agreement to participate “in the Residential SBD program for three years,” only that projects would be completed before three years are over
- All selected builders meet the participation criteria for IDP submission with sufficient savings
- All submitted builders meet the participation criteria for project size

As a result of this review, the EC confirms the scorecard metric of 39 enrolled builders (100.00% of tracked) for the Enbridge Residential Savings by Design program.

Homes Built Metric

Participant Selection

Enbridge first provided the Tracking File listing Project Code and House ID (unique ID) for program homes. The spreadsheet identified 1,098 program-rebated homes, separate from the 1,891 additional homes built to program requirements but not receiving program rebates. The EC randomly selected five homes from the 1,098 program-rebated homes for document review. The EC requested all supporting documentation, including documentation that supports eligibility and participation criteria.

Received Files

Enbridge provided the following files to support the sampled homes:

- "IDP Workshop Summary" – PDF document outlining qualification documentation
- "ES Report" – PDF of ENERGY STAR for New Homes Report, BOP 12
- "HOT2000 screenshot" – JPG showing the Total Annual Fuel Consumption in megajoules (MJ) of the sampled house
- "Savings Summary" – Excel file which outlines the calculations that were made summarizing the HOT2000 calculation of energy savings and indicates the NRCan credits

In addition to these documents to support program homes, Enbridge also confirmed that supporting letters were received for additional non-rebated homes, verifying that they were built to the same IDP standard as program homes.

Verify Participation

To determine the definition criteria for Homes Built, the EC looked first to the OEB Decision, which approved the Enbridge ESC Plan stating⁸⁶ *"The OEB approves Enbridge's Residential Savings by Design program as proposed."* For further detail on criteria, the EC looked to Enbridge's Plan which identified:⁸⁷

For the purpose of assessing the "homes built" metric for SBD Residential:


- i. A home must be completed by a participating builder who has completed the IDP process for the development.*
- ii. A home which, as constructed, has features consistent with the builder's IDP and that make it 25% more efficient than a new home built to the 2012 Ontario Building Code if constructed in 2016, and 15% more efficient than a new home built to the yet to be completed 2018 Ontario Building Code.*
- iii. Builders may apply the outcomes of the IDP to additional developments if the outcomes are applicable. The homes built in additional developments may be counted as homes built. However, the maximum number of homes for which a builder may receive incentives shall not increase.*
- iv. All homes constructed to the standard in a builder's development shall count towards the "homes built" metric even if rebates were not paid for all of them. Non-rebated units will be verified by a confirmation letter from the builder acknowledging that the homes were built to the IDP standard. Enbridge rebated units will be verified using the blower door test.*

From this definition and submitted documentation, the EC determined participation for the randomly-selected homes:

- Requirement i:
 - The EC did not evaluate whether the homes selected were completed by participating builders who had completed the IDP process for this development. Evaluation of the builders was done through verifying the Enrolled Builders metric (see above). The EC assumed that this portion of the requirements was met because the previous section confirmed builder participation.
- Requirement ii:
 - The Summary documentation as well as the Savings Summary worksheets and the HOT2000 screenshots for all five randomly selected homes demonstrated modelled as-built energy consumption 15% or greater above 2017 OBC.

⁸⁶ Ontario Energy Board Decision and Order, EB-2015-0029/EB-2015-0049, January 20, 2016, Page 34

⁸⁷ Enbridge's Proposed 2015-2020 DSM Plan, EB-2015-0049, Exhibit B, Tab 1, Schedule 4, Page 36-37 of 41

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- Requirement iii:
 - The EC does not find that this requirement is applicable to validating participation, only that it permits further participation.
 - Requirement iv:
 - Enbridge confirmed that supporting letters were received for all developments that included additional homes beyond those incented. The EC finds that this satisfies the requirement for non-rebated units.

The EC finds that all five randomly-selected homes meet the eligibility and efficiency qualifications.

Verification Result

As a result of this review, the EC confirms 1,098 rebated program homes and 1,891 non-rebated homes, and thus the scorecard metric of 2,989 Homes Built (100.00% of tracked) for the Enbridge Residential Savings by Design program.

Residential New Construction – Optimum Home Program – Union

Overview

Table 11-108 shows the tracked and verified scorecard achievements for the 2019 Union Optimum Home Program, with the metrics of enrolled builders, prototype homes built, and percentage of homes built (>15% above OBC 2017) by participating builders. As a result of this review, the EC verifies 4 builders (100.00% of tracked), 95.45% of prototype homes built (100.00% of tracked), and 28.55% of homes built (100.00% of tracked). Each metric is discussed separately in this section, starting with the Builders metric. Table 11-108 contains the following variables:

- Tracked: Metric value from original Tracking File sent by Enbridge upon first data request
- Verified: Metric value verified from review of Tracking File, Project Files, and other relevant documents identified in the Documentation section
- Ratio: Ratio of verified to tracked achievement. A value of 100.00% indicates that verified values match tracked values

Table 11-108. Union Market Transformation achievement: Optimum Home metrics*

Program	Metric	Achievement		Ratio
		Tracked	Verified	
Optimum Home	Builders	4	4	100.00%
	Prototype Homes Built	95.45%	95.45%	100.00%
	Percentage of Homes Built	28.55%	28.55%	100.00%

*Not all values may compute exactly due to rounding.

Documentation

The EC used the documentation shown in Table 11-109 to verify the metrics for the Optimum Home program.

Table 11-109. Documentation used to verify the Optimum Home program

Report Language	Description or Citation
Enbridge-Provided Documentation	
Tracking File	Excel spreadsheet tracking metrics for all 2019 Union DSM programs
2019 Optimum Homes	Excel spreadsheet listing all participating homes
Top Builder Reports	Excel spreadsheet listing builders in each region by housing starts
Project Files	Various documents for each requested participant, supporting program metrics
Documents Used by EC	
OEB Decision	OEB Decision and Order, EB-2015-0029/EB-2015-0049, January 20, 2016 and OEB Revised Decision and Order, EB-2015-0029/EB-2015-0049, February 24, 2016
Union Plan	Union's 2015-2020 DSM Plan, EB-2015-0029
Union's Draft 2017 Report	Union Gas 2017 Demand Side Management Draft Annual Report ⁸⁸

⁸⁸ While the EC recognizes and understands that the draft report will be updated and finalized, the final was not available at the time of this evaluation, thus the draft is cited for reference.

Participating Builders Metric

Participant Selection

Union first provided the Tracking File listing Builder (unique ID) for enrolled builders. The spreadsheet identified 22 total builders in 2019, 4 of which enrolled in 2019 and 18 of which enrolled in previous years and remained enrolled. The EC requested full documentation for a census of “new” builders (those enrolled in 2019), including documentation that supports eligibility and participation criteria.

Received Files

Union provided two types of files to support the eligibility of each participating builder:

- One “Builder Agreement” (program application) for each builder
- A spreadsheet listing the builders in each region by total housing starts in 2018

Verify Participation

Union relaunched the Optimum Home program in 2017 in response to the introduction of the new Ontario Building Code (OBC). To determine the definition of Participating Builders under this relaunched program, the EC looked to the Union 2017 Draft Annual Report. The draft report stated that participation in a given year required each builder to sign a participation contract for the Optimum Home offering in that year.

The EC confirmed that participation agreements were provided by Union for each of the 4 builders, and they were all signed in calendar year 2019.

Verify Eligibility

To determine eligibility under this relaunched program, the EC looked to the Union 2017 Draft Annual Report. The draft report stated: “Eligible builders are the top ten builders in each region based on number of housing starts in Union’s franchise area in the prior calendar year.” The report also listed the seven regions as Halton, Hamilton, London, Waterloo, Windsor, Kingston, and North.

The EC examined the Enbridge-provided spreadsheet and confirmed that all 4 builders were a “top 10” builder in one of the seven regions based on housing starts in 2018.

Verification Result

As a result of this review, the EC confirms 4 newly-enrolled builders (100.00% of tracked) for the Union Optimum Home program.

Prototype Homes Built Metric

Participant Selection

In response to the EC’s second data request, Union provided a file listing each enrolled builder and the file number of their prototype home built. The spreadsheet identified that 6 enrolled builders had constructed prototype homes since the previous Annual Verification. The EC requested full documentation for all 6 homes built, including documentation that supports the energy performance criteria.

Received Files

Union provided the following files to support each prototype home:

- “ESNH Compliance Report” – PDF of ENERGY STAR for New Homes v17 Compliance Report

- “BOP” – Balance-of-Plant summary completed by third-party consultant verifying building energy performance to ESNH v17

Verify Participation

Union relaunched the Optimum Home program in 2017 in response to the introduction of the new Ontario Building Code (OBC) in 2017. To determine the specifics of the Prototype Homes Built metric under this relaunched program, the EC looked to the Union 2017 Draft Annual Report. The report states:

“The Optimum Home Prototype Homes Built Metric is the percentage of participating builders who construct a prototype home 15% greater than OBC 2017 based on the total number of builders who remain enrolled in the Optimum Home offering.”

The EC deconstructed the metric into the following components:

- Requirement of 15% greater than OBC 2017
 - Union’s 2017 Draft Annual Report makes clear that, while “the performance standard is set against current OBC 2017”, the program is aligned with ENERGY STAR. Therefore, qualifying homes must “achieve ENERGY STAR® for New Homes v17 (“ESNH v17”).” The stated rationale for using the ENERGY STAR standard is that the “ESNH v17 standard is, on average, 20% more energy-efficient than OBC 2017” which is greater than the program metric of 15% above OBC 2017.⁸⁹
 - The EC independently confirmed that ESNH v17 qualifying homes are, on average, 20% more energy efficient than those built to OBC 2017.⁹⁰
 - The EC concurs that using ESNH v17 is consistent with the metric.
- Whether constructed homes meet the energy requirement
 - The metric language makes clear that it is based on “the total number of builders who remain enrolled in the Optimum Home offering,” and thus is cumulative beginning in 2017.
 - The compliance reports and balance-of-plant summaries provided by Union for all 6 prototype homes constructed since the 2018 Annual Verification indicate that the homes met the ESNH v17 threshold for energy performance. Additionally, the 2017 and 2018 Annual Verification reports verified that all 15 prototype homes constructed in those years met the energy performance threshold. Thus, 21 qualifying prototype homes had been constructed at the end of 2019.
- Number of enrolled builders in 2019
 - The metric language makes clear that it is based on “the total number of builders who remain enrolled in the Optimum Home offering,” and thus is cumulative beginning in 2017.
 - The Participating Builders metric (above) verified that 4 builders became enrolled in the Optimum Home offering in 2019. Additionally, the 2018 Annual Verification Report verified that 18 builders had previously enrolled. Thus, 22 builders remained enrolled in the program in 2019.

The EC finds that 21 of the 22 enrolled builders constructed a prototype home at least 15% greater than OBC 2017 by the end of 2019.

Verification Result

As a result of this review:

⁸⁹ Union’s Draft 2017 Demand Side Management Evaluation Report, Page 89

⁹⁰ https://www.enerquality.ca/wp-content/uploads/2017/03/ESNH-Standard-Ver-12.8-and-Ver-17.0-Ontario_Effective-Feb-21-2017.pdf

- The EC confirms that requiring homes built within the program to meet the ESNH v17 standard is consistent with the target of 15% greater energy performance than OBC 2017
- Project files for each of the 6 homes built since the 2018 Annual Verification meet the energy performance criteria in addition to each of the 15 homes built previously
- The EC confirms that 22 builders remained enrolled in the program at the end of 2019

The EC verifies the scorecard metric of 21 of 22 (95.45%) enrolled builders (100.00% of tracked) constructing prototype homes through the Optimum Home program.

Percentage of Homes Built Metric

Participant Selection

Union first provided the Tracking File listing anonymized builders with the year each builder enrolled, the number of total new gas attachments in 2019, the number of program homes, and a percentage of homes built calculation. This file demonstrated the claimed metric achievement, identifying 458 of 1,604 total homes built by 22 builders, as demonstrated in Table 11-110.

Table 11-110. Optimum Home claimed total and program homes built, by builder*⁹¹

Builder	Total Homes Built	Optimum Homes Built	% of Homes Built
Builder 1	35	14	40.0%
Builder 2	103	61	59.2%
Builder 3	22	6	27.3%
Builder 4	579	41	7.1%
Builder 5	74	47	63.5%
Builder 6	69	7	10.1%
Builder 7	59	63	106.8%
Builder 8	0	1	0.0%
Builder 9	43	54	125.6%
Builder 10	77	0	0.0%
Builder 11	145	64	44.1%
Builder 12	14	12	85.7%
Builder 13	18	12	66.7%
Builder 14	0	0	0.0%
Builder 15	20	1	5.0%
Builder 16	21	2	9.5%
Builder 17	98	69	70.4%
Builder 18	117	0	0.0%
Builder 19	41	1	2.4%
Builder 20	1	1	100.0%
Builder 21	44	1	2.3%
Builder 22	24	1	4.2%
Total	1,604	458	28.55%

*Not all values may compute exactly due to rounding.

⁹¹ Builders 7 and 9 in the table appear to have built more Optimum Homes than total homes in 2019. This is because an Optimum Home is considered "built" when an audit is performed, and a non-Optimum home is considered "built" when a gas attachment is put in place.

In addition, Union provided a list of Optimum Homes built in 2019 with individual anonymized listings for the 458 program homes, identifying builder (anonymized), file number, and enrollment type (e.g. ES BOP Version 17). From these, the EC randomly selected five program homes for review and verification.

Union provided the following documentation to support verification of each of the selected program homes:

- Energy Star for New Homes Compliance Report – PDF
- Balance-of-Plant summary verifying building energy performance to ESNH v17t

Verify Participation

This metric includes the percentage of homes built to Optimum Home energy performance standards “by participating builders.” To fully verify the metric, the EC examined the five builders of the randomly-selected homes. The EC confirmed these builders enrolled in the program, satisfying the requirement.

Verify Eligibility

Union relaunched the Optimum Home program in 2017 in response to the introduction of the new Ontario Building Code (OBC) in 2017. To determine the definition of participating homes, the EC looked to the Union 2017 Draft Annual Report. The report makes clear that qualifying homes constructed in 2017 and thereafter must “achieve ENERGY STAR® for New Homes v17 (“ESNH v17”).⁹²

The EC requested documentation for verification of five sites, randomly selected from the 2019 Optimum Homes Built spreadsheet. Files provided by Union confirmed the eligibility of the homes. The ESNH v17 Compliance Report demonstrated both qualifying inspection dates (all 2019) and that the sites met the ESNH v17 energy performance threshold.

As a result, the EC confirms that the submitted projects meet the criteria for eligibility for the Union Optimum Homes program.

Verification Result

As a result of this review:

- The EC confirms proper documentation for the requested sites and builders
- Project files for the randomly selected sites meet energy savings compliance criteria

The EC verifies the scorecard metric of 458 out of 1,604 (28.55%) total participating builder homes (100.00% of tracked) for the Optimum Home program.

⁹² Union’s Draft 2017 Demand Side Management Evaluation Report, Page 89

School Energy Competition – Enbridge

Overview

Table 11-111 shows the tracked and verified scorecard achievements for the 2019 Enbridge School Energy Competition Program, with the metric of Participating Schools. As a result of this review, the EC verifies 32 Participating Schools (100.00% of tracked). Table 11-111 contains the following variables:

- Tracked: Metric value from original Tracking File sent by Enbridge upon first data request
- Verified: Metric value verified from review of Tracking File, Project Files, and other relevant documents identified in the Documentation section
- Ratio: Ratio of verified to tracked achievement. A value of 100.00% indicates that verified values match tracked values

Table 11-111. Enbridge Market Transformation achievement: School Energy Competition Schools metric*

Metric	Achievement		Ratio
	Tracked	Verified	
Participating Schools	32	32	100.00%

*Not all values may compute exactly due to rounding.

Documentation

The EC used the documentation shown in Table 11-112 to verify the metrics for the School Energy Competition program.

Table 11-112. Documentation used to verify the School Energy Competition program

Report Language	Description or Citation
Enbridge-Provided Documentation	
Tracking File	Excel spreadsheet tracking metrics for all 2019 Enbridge DSM programs
Project Files	Various documents for each requested participant, supporting program metrics
Documents Used by EC	
OEB Decision	OEB Decision and Order, EB-2015-0029/EB-2015-0049, January 20, 2016 and OEB Revised Decision and Order, EB-2015-0029/EB-2015-0049, February 24, 2016
Enbridge Plan	Enbridge Gas Multi-Year DSM Plan (2015-2020), EB-2015-0049

Participant Selection

Enbridge first provided the Tracking File listing the Enbridge Account (number) and Project Code (unique ID). The spreadsheet identified 32 participants. The EC requested full documentation for all participants.

Received Files

The EC received two individual files:

- One "Online Registrations" spreadsheet listing schools registered "online" without hardcopy, listing program ID and a timestamp variable.
- One "ESC Activity Tracker" spreadsheet marking participation of all schools in various program elements and offerings

The EC first confirmed the documents received matched the IDs requested. Project Files were redacted as requested with name, address, and other all other location, school, or site-specific information unavailable. The EC confirmed that documents were received that addressed all participants.

Verify Participation

To determine the definition of Participating Schools, the EC looked first to the OEB Decision which approved the Enbridge Plan:⁹³

Decision

The OEB approves Enbridge's School Energy Competition program. The OEB finds this program provides both educational and energy conservation benefits. Further, this program is designed to engage a wide group of participants through a competition, which is innovative. The OEB also finds the involvement of students, potential future customers, to be consistent with the intent of the DSM Framework.

For more specific participation criteria, the EC then looked to Enbridge's Plan which identifies:⁹⁴

"For the purpose of measuring the success of the Company's School Energy Competition, a school will be considered "enrolled" at the time that energy monitoring begins using the Energy Management Information System ("EMIS") provided via the offer. At a high level, monitoring is the third of the four steps which comprise the School Energy Competition."

Further, Enbridge's Plan identifies "Key Offer Evaluation Metrics:⁹⁵"

"A participant is a school that registers, implements, and has access to an EMIS system to log competition activities"

From this, the EC has identified that a "Participating School" is defined as a school that has:

- Registered and 'logged in' to the EMIS system.

School application hardcopy images (PDF) do not provide evidence of having registered with or logged into any information system, including the EMIS system. The Online Registration spreadsheet identifies a list of program IDs and a "timestamp" for each. Neither registration provides evidence that the any of the 14 IDs have logged into the EMIS system. However, during the previous round of evaluation, the EC requested confirmation that ESC Activities as tracked in the spreadsheet represent EMIS registration. In previous evaluations, Enbridge staff responded with confirmation:⁹⁶

"In order to provide the schools with their EMIS data, a website was created that contained a link to a dashboard, which showed each school their EMIS data. Enbridge was then able to track that all participating schools accessed the website."

The ESC Activity Tracker is a program tracking spreadsheet, identifying program elements completed by each school. For each ID, the spreadsheet identifies activities which that ID participated in, summarized in Table 11-113.

⁹³ Ontario Energy Board Decision and Order, EB-2015-0029/EB-2015-0049, January 20, 2016, Page 43

⁹⁴ Enbridge's Proposed 2015-2020 DSM Plan, EB-2015-0049, Exhibit B, Tab 1, Schedule 4, 34 of 41

⁹⁵ Enbridge's Proposed 2015-2020 DSM Plan, EB-2015-0049, Exhibit B, Tab 2, Schedule 2, Page 48 of 55

⁹⁶ Enbridge Employee "RE: Follow up request - LI New Construction and MT School Energy Competition" Message to DNV GL Employee, 2/1/2018, Email

Table 11-113. Enbridge ESC activities and participant counts*

Program Activity	High School	Elementary School	Total Activities
Team to Support & Lead SEC	8	21	29
Natural Gas Education	2	24	26
Access Energy Use	8	9	17
Art Poster Contest	2	13	15
Conduct a Classroom Energy Audit	1	12	13
Conduct a Home Energy Audit	5	7	12
Bonus Activity	2	8	10
Ugly Sweater Day	2	7	9
Programmable or Smart Thermostats	1	7	8

As a result, the EC confirms participation for all 32 schools.

Verify Eligibility

The EC first looked to the OEB Decision to determine specific criteria for participant eligibility, then to Enbridge’s Plan, which identifies:⁹⁷

“Participating schools must be part of a board within one of the publicly funded systems (English/French/Public/Catholic) in Ontario within the Enbridge franchise area.”

None of the Project Files provided confirm that any of the IDs are within one of the publicly funded systems nor do they provide any information that would allow the EC to independently confirm school status through public records. The EC requested confirmation that claimed participants were publicly funded schools, and Enbridge staff confirmed all schools belonged to public school boards.⁹⁸

As a result, the EC confirms eligibility for all 32 schools.

Verification Result

As a result of this review, the EC confirms:

- Participants meet the participation criteria
- Any participants meet the eligibility requirements

The EC verifies the scorecard metric of 32 schools (100.00% of tracked) in the Enbridge School Energy Competition program.

⁹⁷ Enbridge’s Proposed 2015-2020 DSM Plan, EB-2015-0049, Exhibit B, Tab 2, Schedule 2, Page 47 of 55

⁹⁸ In future evaluation cycles, the EC recommends that the utility provide documentation for each required element such as this for all non-savings metrics.

Appendix J Performance Based (Union) and Market Transformation (Enbridge) Scorecards

This appendix describes the detailed process used to verify the metrics for the Performance-Based Scorecard programs for Union (Table 11-115) and the similar programs for Enbridge that are contained under the Market Transformation Scorecard (Table 11-114). As noted in the OEB Decision and Order, the programs listed below are similar and thus included together. The programs addressed in this appendix are:

- Commercial & Industrial Operational Efficiency Improvement – Run-it-Right – Enbridge
- Commercial & Industrial Operational Efficiency Improvement – RunSmart – Union
- Commercial & Industrial Energy Management – Comprehensive Energy Management – Enbridge
- Commercial & Industrial Energy Management – Strategic Energy Management – Union

Table 11-114. Enbridge 2019 market transformation & energy management scorecard*†

Programs	Metrics	Verified Achievement		Metric Target			Weight
		Program-level Achievement	Metric-level Achievement	Lower Band	Target	Upper Band	
School Energy Competition	Schools	32	32	24	32	47	10.00%
Run-it-Right	Participants	84	84	27	36	54	20.00%
Comprehensive Energy Management	Participants	7	7	12	16	24	20.00%
Residential Savings by Design	Builders	39	39	23	30	45	10.00%
Residential Savings by Design	Homes Built	2,989	2,989	1,902	2,536	3,804	15.00%
Commercial Savings by Design	New Developments	35	35	23	30	45	25.00%

*Not all values may compute exactly due to rounding.

†Programs in grey text are not similar to Union programs under the Performance Based Scorecard, and not discussed in this Appendix. For these programs please refer to Appendix I.

Table 11-115. Union 2019 performance-based scorecard*

Programs	Metrics	Verified Achievement		Metric Target			Weight
		Program-level Achievement	Metric-level Achievement	Lower Band	Target	Upper Band	
RunSmart	Participants	58	58	42	56	84	10.00%
	Savings %	0.35%	0.35%	0.53%	0.70%	1.05%	40.00%
Strategic Energy Management	Savings %	0.00%	0.00%	3.56%	4.75%	7.12%	50.00%

*Not all values may compute exactly due to rounding.

Commercial & Industrial Operational Efficiency Improvement – Run-it-Right – Enbridge

Overview

Table 11-116 shows the tracked and verified scorecard achievements for the 2019 Enbridge Run-it-Right (RIR) Program, with the metric of Participants. The RIR Program has two metrics under separate scorecards, CCM Savings (Resource Acquisition) and Participants (Performance Based). Participants are discussed here, while the CCM Savings metric is discussed in Appendix F. As a result of this review, the EC verifies 84 participants (100.00% of tracked). Table 11-116 contains the following variables:

- Tracked: Metric value from original Tracking File sent by Enbridge upon first data request
- Verified: Metric value verified from review of Tracking File, Project Files, and other relevant documents identified in the Documentation section
- Ratio: Ratio of verified to tracked achievement. A value of 100.00% indicates that verified values match tracked values

Table 11-116. Enbridge Market Transformation achievement: Run-it-Right participants metric*

Metric	Achievement		Ratio
	Tracked	Verified	
Participants	84	84	100.00%

*Not all values may compute exactly due to rounding.

Documentation

The EC used the documentation shown in Table 11-117 to verify the metrics for the Run-it-Right program.

Table 11-117. Documentation used to verify the Run-it-Right program

Report Language	Description or Citation
Enbridge-Provided Documentation	
Tracking File	Excel spreadsheet tracking metrics for all 2019 Enbridge DSM programs
Project Files	PDF scans of program participant documentation
Documents Used by EC	
OEB Decision	OEB Decision and Order, EB-2015-0029/EB-2015-0049, January 20, 2016 and OEB Revised Decision and Order, EB-2015-0029/EB-2015-0049, February 24, 2016
Enbridge Plan	Enbridge Gas Multi-Year DSM Plan (2015-2020), EB-2015-0049

Participant Selection

Enbridge first provided the Tracking File listing RIR Project Codes, Account Numbers, and Confirmation Date. The spreadsheet listed 84 individual accounts. The EC requested full documentation for a census of projects.

Received Files

The EC received three PDF documents for each project:

- One program application,
- One Investigation report, and
- Either one implementation time record or work orders for the recommended measures.

The EC also received an Excel file detailing the monitoring start date for each project.

The EC first confirmed the document IDs received matched the IDs requested and that documents for all participants had been received. Project Files were received with name, address, and other information unavailable, as requested.

Verify Participation

Enbridge’s Plan⁹⁹ states that:

Customers shall be deemed a “participant” in Enbridge’s RiR offer for the purpose of the MTEM scorecard once they have entered the monitoring stage of the offer, which is the fourth of four steps inherent to this offer.

Enbridge’s plan further documents the four steps inherent to the offer to be: Register, Investigate, Implement, and Monitor (Figure 11-8.). Combining the definition from Enbridge’s plan with the figure, the EC interprets “participation” to require evidence of completing all four steps, including site energy use or savings monitoring that would be produced by the fourth step.

Figure 11-8. Image of RIR Process Elements from Enbridge Plan¹⁰⁰




Enbridge provided redacted program applications for all 84 sites, satisfying intentional enrollment – the “register” step identified in Figure 11-8.

Enbridge provided investigation reports for all 84 sites. Investigation reports provided estimated savings (analysis) for a site, as well as estimated savings by recommended measure. This document satisfies the second step identified in Figure 11-8.

For all 84 sites, Enbridge provided either an implementation time record document or copies of work orders, either of which documented the execution of recommended work from the investigation reports. The EC considered either of these forms of documentation sufficient to satisfy the third step identified in Figure 11-8. for all projects submitted.

⁹⁹ Enbridge Gas Program Plan: DSM Plan Overview and Guiding Principles, EB-2015-0049, Tab 1, Schedule 4, Page 34 of 41

¹⁰⁰ Enbridge Gas Program Plan: DSM Plan Overview and Guiding Principles, EB-2015-0049, Tab 2, Schedule 1, Page 87 of 100



Enbridge provided an Excel file that listed the starting date for monitoring of all 84 sites after project implementation, satisfying the fourth step identified in Figure 11-8.

Verification Result

As a result of this review, the EC verifies the scorecard metric of 84 participants (100.00% of tracked) for the Enbridge Run-it-Right program.

Commercial & Industrial Operational Efficiency Improvement – RunSmart – Union

Overview

Table 11-118 shows the tracked and verified scorecard achievements for the 2019 Union RunSmart program, with the metrics of participants and percent savings. As a result of this review, the EC verifies 58 participants (98.31% of tracked) and 0.35% savings (100.00% of tracked). Each metric is discussed separately in this section, starting with the participants metric. Table 11-118 contains the following variables:

- Tracked: Metric value from original Tracking File sent by Enbridge upon first data request
- Verified: Metric value verified from review of Tracking File, Project Files, and other relevant documents identified in the Documentation section
- Ratio: Ratio of verified to tracked achievement. A value of 100.00% indicates that verified values match tracked values

Table 11-118. Union 2019 Performance Based achievement: RunSmart metrics*

Program	Metric	Achievement		Ratio
		Tracked	Verified	
RunSmart	Participants	59	58	98.31%
	Savings %	0.35%	0.35%	100.00%

*Not all values may compute exactly due to rounding.

Documentation

The EC used the documentation shown in Table 11-119 to verify the metrics for the RunSmart program.

Table 11-119. Documentation used to verify the RunSmart program

Report Language	Description or Citation
Enbridge-Provided Documentation	
Tracking File	Excel spreadsheet tracking metrics for all 2019 Union DSM programs
Project Files	PDF scans of program participant documentation
Consumption/ Participation Documentation	Excel spreadsheet documenting participant qualifying consumption and prior DSM activity
RETScreen Files	Files detailing participant consumption and predicted consumption
Documents Used by EC	
OEB Decision	OEB Decision and Order, EB-2015-0029/EB-2015-0049, January 20, 2016 and OEB Revised Decision and Order, EB-2015-0029/EB-2015-0049, February 24, 2016
Union Plan	Union’s 2015-2020 DSM Plan, EB-2015-0029
Union’s Draft 2019 Report	Enbridge Gas Inc. DRAFT 2019 Demand Side Management Annual Report ¹⁰¹

¹⁰¹ While the EC recognizes and understands that the draft report will be updated and finalized, the final was not available at the time of this evaluation, thus the draft is cited for reference.

Participants Metric

Participant Selection

Union first provided the Tracking File listing RunSmart participants with anonymized Program, Customer, and Site IDs, listing 59 individual participants. The EC requested full documentation for a census of participants.

Received Files

The EC received PDF documents for each participant, each identified by Participant ID. The EC also received an Excel spreadsheet which included, for each participant, qualifying annual natural gas consumption and whether they had any prior DSM program activity. All files were properly redacted with name, address, and other information unavailable, as requested. The EC confirmed that the Account Numbers, Customer IDs, and Site IDs matched across all documentation.

Verify Participation

Union's Plan defines RunSmart participants¹⁰² as the "number of customers that enter into an agreement with Union and participate in a site walk-through within a program year". The EC confirmed documentation supported participation of all 59 participants by verifying the Project Files contained for each site:

- A technical expert- (consultant) documented walk-through of the company facility
- A completed and signed walk-through checklist submitted for qualification
- All documents had required signatures of the customer, technical expert (consultant), and Union account manager

Verify Eligibility

Union's Plan defined the participant metric as the "number of customers without prior DSM participation history, consuming greater than 50,000 m³ per year of natural gas." The EC broke this definition down into its component parts:

- "Number of customers...consuming greater than 50,000 m³ per year of natural gas"
 - The utility-provided spreadsheet documenting qualifying consumption of each participant indicated that 58 of 59 participants had at least 50,000 m³ per year of natural gas consumption.
 - One participant had no qualifying consumption listed. Upon further investigation, the utility indicated that this participant completed a capital improvement project during the participation period. As a result, the participant's qualifying consumption was no longer valid.
- "Number of customers without prior DSM participation history"
 - Union's 2019 Draft Annual Report further clarifies that "without prior DSM participation history" means customers that have not participated in DSM programs in the previous two years.
 - The utility-provided spreadsheet documenting DSM activity indicated that all 59 participants had no DSM program activity in the previous two years.

The EC confirmed the eligibility of 58 of the 59 participants.

¹⁰² Description of RunSmart Participants from Overview of Union's Proposed 2015-2020 DSM Plan, 2015EB-2015-0029, Exhibit A, Tab 3, Page 33 of 73

Verification Result

As a result of this review, the EC confirms that:

- Participant records were correctly sent to the EC for all 59 participants
- All 59 participants met the participation definition
- 58 participants met the eligibility definition

As a result of this review, the EC verifies 58 participants (98.31% of tracked) for the RunSmart participants metric.

Savings Percent Metric

Participant Selection

Union first provided the Tracking File containing a table listing 41 RunSmart participants from the previous program year with Customer ID, Site ID, Existing Consumption (Baseline), Consumption Predicted from Baseline, and Actual Consumption (during participation). The EC requested documentation supporting the consumption values for a full census of these participants.

Received Files

The EC received RETScreen files and Excel outputs of those RETScreen files for the 41 previous program year participants.

Verify Consumption

The EC examined the provided RETScreen documents to verify each of the consumption values in the Tracking File spreadsheet. The EC confirmed the documentation supported the consumption values for all participants.

Verify Savings Calculation

Union's plan defines savings percent¹⁰³ as "the aggregate percentage of savings achieved by the program participants within a program year."

Union used the following equation, agreed upon with the EAC in previous years, for each individual participant's percentage savings:

$$\text{Participant Savings \%} = \frac{\text{Predicted} - \text{Actual}}{\text{Predicted}}$$


Where:

- "Predicted" = A prediction of consumption during the participation period, based on the customer's baseline (qualifying) consumption and heating degree days during participation
- "Actual" = Consumption during the one-year participation period

Union's tracked calculation then took the individual savings percent values for each participant and used the following equation to arrive at a program-level Savings Percent value:

$$\frac{\sum \text{Participant Savings \%}}{\text{Count of Participants}}$$

¹⁰³ Description of RunSmart Savings Percent from Overview of Union's Proposed 2015-2020 DSM Plan, 2015EB-2015-0029, Exhibit A, Tab 3, Page 35 of 73



The EC agrees and confirms this methodology.

Verification Result

As a result of this review, the EC confirms a Savings Percent value of 0.35% (100.00% of tracked) for the RunSmart Savings Percent metric.

Commercial & Industrial Energy Management – Comprehensive Energy Management – Enbridge

Overview

Table 11-120 shows the tracked and verified scorecard achievements for the 2019 Enbridge Comprehensive Energy Management (CEM) program, with the metric of Participants. As a result of this review, the EC verifies seven participants (100.00% of tracked). Table 11-120 contains the following variables:

- Tracked: Metric value from original Tracking File sent by Enbridge upon first data request
- Verified: Metric value verified from review of Tracking File, Project Files, and other relevant documents identified in the Documentation section
- Ratio: Ratio of verified to tracked achievement. A value of 100.00% indicates that verified values match tracked values

Table 11-120. Enbridge Market Transformation achievement: Comprehensive Energy Management participants metric*

Metric	Achievement		Ratio
	Tracked	Verified	
Participants	7	7	100.00%

*Not all values may compute exactly due to rounding.

Documentation

The EC used the documentation shown in Table 11-121 to verify the metrics for the Comprehensive Energy Management program.

Table 11-121. Documentation used to verify the Comprehensive Energy Management program

Report Language	Description or Citation
Enbridge-Provided Documentation	
Tracking File	Excel spreadsheet tracking metrics for all 2019 Enbridge DSM programs
Project Files	Two PDF documents
Documents Used by EC	
OEB Decision	OEB Decision and Order, EB-2015-0029/EB-2015-0049, January 20, 2016 and OEB Revised Decision and Order, EB-2015-0029/EB-2015-0049, February 24, 2016
Enbridge Plan	Enbridge Gas Multi-Year DSM Plan (2015-2020), EB-2015-0049

Participant Selection

Enbridge provided the Tracking File listing CEM Project Codes, Account Numbers, and Energy Model date. The spreadsheet listed seven individual participants. The EC requested full documentation for all participants.

Received Files

The EC received seven PDF documents, identified by CEM Project number. The EC first confirmed the documents received matched the IDs requested. Project Files were properly redacted with name, address, and other information unavailable, as requested. The EC confirmed that the "Opportunity Code" listed in the Project Files matched Account Numbers listed in the Tracking File, and that documents for all participants had been received.

Verify Participation

Clear and specific criteria for participation in the CEM program were not readily available; rather, that the CEM program is intended to be a multi-year, 'holistic' process with ongoing and multi-year engagement resulting in energy savings. As a result, the EC understands that evidence of initial engagement and a specific agreement to participate are sufficient to verify participants for the purposes of the Market Transformation Scorecard metric of 'participants'.

The provided Project Files demonstrated that each participant applied for participation in the CEM program, signed by an applicant representative and Enbridge Manager. In addition, the applications include declarations that the applicant:

- Acknowledges and confirms that they will commit resources to participate and identify energy efficiency opportunities
- Will create internal energy awareness
- Will share energy data with Enbridge
- Will allow continued communication with Enbridge

The EC confirmed documentation supports participation of all seven participants.

Verify Eligibility

The EC also used the Project File to confirm the eligibility of each participant,^{104,105} namely to verify that customers had annual gas consumption between 340,000 m³ and 5,000,000 m³. Project Files identified previous year gas consumption for the seven customers:

- Four customers with consumption between 340,000 m³ and 5,000,000 m³
- Three customers with consumption greater than 5,000,000 m³

Of the three participants with the largest consumption, one is significantly outside of the range at more than 29 million m³. However, language in other parts of the plan make it clear that the target is large and complex commercial and industrial customers; therefore, DNV GL feels that participants with consumption larger than the stated guideline are reasonably close to the expectations set by the plan, while participants with consumption significantly lower would not be. Since the participant is significantly larger, the EC verifies the eligibility of this participant.

Verification Result

As a result of this review, the EC confirms that:

- Participant records were correctly sent to the EC for the census of 2019 participants
- Documentation confirmed all participants met the participation definition
- Documentation confirmed six of seven participants met the eligibility definition
- Further review by the EC verified the remaining participant

The EC confirms the scorecard metric of 7 participants (100.00% of tracked) for the Enbridge Comprehensive Energy Management Program.

¹⁰⁴ Ontario Energy Board Decision and Order, EB-2015-0029/EB-2015-0049, January 20, 2016, page 47

¹⁰⁵ Enbridge Gas Program Plan: DSM Plan Overview and Guiding Principles, EB-2015-0049, Exhibit B, Tab 2, Schedule 1, Page 53 of 100



Commercial & Industrial Energy Management – Strategic Energy Management – Union

No activity was reported for this program in 2019.

Appendix K Review of Metric Target Calculations

Overview

For 2019 (and through the rest of this framework), targets for metrics that existed in the previous year are defined based on the previous year's (PY) achievement¹⁰⁶ and spend,¹⁰⁷ the current year (CY) budget, and a multiplier.¹⁰⁸ In general, metric targets follow this generic formula:

$$\text{Metric Target} = \frac{\text{PY Achievement}}{\text{PY Spend}} \times \text{CY Budget} \times \text{Multiplier}$$

The exception to the generic formula above is the Union Large Volume Program, which uses the 3 Year cost effectiveness (CE),¹⁰⁹ the current year (CY) budget, and a multiplier of 2% (1.02):

$$\text{Union Large Volume Target} = 3 \text{ Year CE} \times \text{CY Budget} \times 1.02$$

¹⁰⁶ The gas savings values used in calculating targets for 2019 are slightly different than the final savings values reported in the 2018 Annual Verification report. This is because achievements for the target calculations use the more updated set of assumptions in TRM 3.0, compared to the final 2018 achievements which use the assumptions in TRM 2.0.

¹⁰⁷ The program spending used in calculating targets do not include overheads. They are also slightly different than the spending values included in the 2018 Annual Verification report, as some of the program-specific spending in the 2018 reports includes program-specific overheads. Budget values used in calculating targets also exclude overhead costs.

¹⁰⁸ 1.02 or 1.10 depending on the scorecard

¹⁰⁹ Three-year rolling average (2014-2016) Rate T2/T100 cost effectiveness where cost-effectiveness here is defined as "Final verified metric achievement used for MRAMVA purposes divided by final actual program spend for that year."

Calculation Inputs

Table 11-122 and Table 11-123 provide the specific values used to calculate the 2019 metric targets.

Table 11-124 provides annual cost effectiveness (CE) ratios for the previous 3-years of the Union Large Volume Program and the average of those years, rounded to two digits past the decimal. The annual ratio is calculated via the final verified metric achievement divided by final actual program spend for that year. This rounded 3-year average value is what DNV GL used for target calculations.

Table 11-125 and Table 11-126 provide the targets for all 2019 metrics, calculation-based and prescribed.

Table 11-122. Enbridge Metric Target Calculation Inputs – 2019

Scorecard	Metric	2018 Achievement	2018 Spend	2019 Budget	Multiplier
Resource Acquisition	LV RA (CCM)	377,757,871	\$8,600,359	\$9,725,713	1.02
	SV RA (CCM)	297,696,422	\$27,668,137	\$27,208,500	
	HEC Participants	14,413	\$23,256,751	\$18,360,000	
Low Income	LISF (CCM)	15,978,389	\$5,224,730	\$6,605,744	
	LIMR (CCM)	114,168,897	\$4,417,079	\$3,889,562	
	LINC Applications	13	\$1,752,191	\$1,428,000	
Market Transformation	CSBD Developments	31	\$1,234,997	\$1,098,300	1.10
	CEM Participants	5	\$314,425	\$923,100	
	RSBD Builders	35	\$4,257,045	\$3,320,443	
	RSBD Homes	2,956			
	RiR Participants	62	\$608,623	\$322,236	
	SEC Schools	14	\$248,768	\$510,000	

*HEC budget is a subset of, and not a separate line item from, the Resource Acquisition budget.

Table 11-123. Union Metric Target Calculation Inputs – 2019

Scorecard	Metric	2018 Achievement	2018 Spend	2019 Budget	Multiplier	
Resource Acquisition	RA (CCM)	976,013,726	\$38,681,594	\$29,683,000	1.02	
	HRR Participants	16,118	\$24,194,382	\$12,226,000		
Large Volume	LV (CCM)*	42.85* (see additional table)		\$3,150,000		
Low Income	LISF (CCM)	32,053,813	\$7,046,887	\$9,438,000		
	LIMF-SA (CCM)	19,542,032	\$1,985,957	\$2,304,730		
	LIMF-MR (CCM)	6,573,109	\$625,818	\$726,270		
Market Transformation	CNC Developments	18	\$984,548	\$1,000,000		1.10
	OH % Built	3.97%	847,194	\$841,000		
	OH Builders	8				
	OH Homes	83.33%				
Performance Based	RS Participants	44	\$157,074	\$182,000		
	RS Savings %	0.51%	\$145,265			
	SEM Participants	3	\$357,804	\$400,000		
	SEM Savings %	3.86%				

*Union's Large Volume program metric target is based on different inputs; instead of the 2018 CCM achievement, the formula is based off the three-year rolling average (2016-2018) Rate T2/Rate 100 cost effectiveness. This average value (43) is what is listed for the 2018 achievement.

Table 11-124. Union Large Volume Cost Effectiveness* Ratios

Year	CE Ratio*
2016	31.30
2017	59.14
2018	38.10
3-Year Average	42.85

*Final verified metric achievement divided by final actual program spend for that year. Annual CE Ratios and the 3-year average are rounded to 2 digits past the decimal.

Table 11-125. Enbridge Metric Targets – 2019

Scorecard	Metric	2019 Target
Resource Acquisition	LV RA (CCM)	435,731,127
	SV RA (CCM)	298,605,963
	HEC Participants	11,606
Low Income	LISF (CCM)	20,605,874
	LIMR (CCM)	102,544,768
	LINC Applications	11
Market Transformation	CSBD Developments	30
	CEM Participants	16
	RSBD Builders	30
	RSBD Homes	2,536
	RIR Participants	36
	SEC Schools	32

Table 11-126. Union Metric Targets – 2019

Scorecard	Metric	2019 Target
Resource Acquisition	RA (CCM)	798,585,979
	HRR Participants	8,308
Large Volume	LV (CCM)	137,666,792
Low Income	LISF (CCM)	43,788,748
	LIMF-SA (CCM)	23,132,372
	LIMF-MR (CCM)	7,780,746
Market Transformation	CNC Developments	20
	OH % Built	4.34%
	OH Builders	4
	OH Homes	90.00%
Performance Based	RS Participants	56
	RS Savings %	0.70%
	SEM Savings %	4.75%

Appendix L Review of Lost Revenue and DSM Shareholder Incentive Calculations

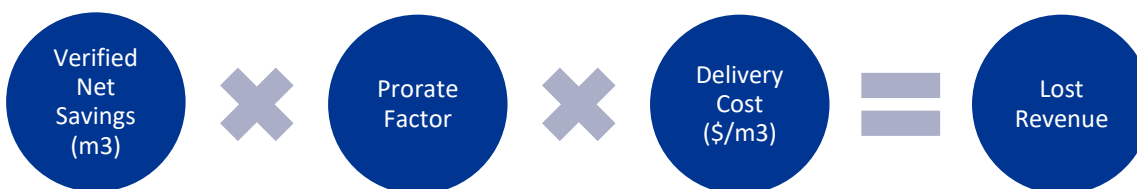
This appendix describes the EC team’s review of the lost revenue and demand side management shareholder incentive calculations.

Lost Revenue Calculations

Figure 11-9. illustrates the basic approach to the lost revenue calculation. It is based on the following factors:

- The verified net natural gas savings (in annual cubic meters) by applicable rate class using the best available information at the time of the verification
- The delivery cost of the natural gas by rate class
- The month in which the measure was installed, represented in the equation below as a prorate factor

Figure 11-9. Lost revenue calculation



Lost revenues are summed across all measures in a rate class. Then the lost revenues for all applicable rate classes are summed to calculate total lost revenues per utility.

The applicable rate classes for Enbridge and Union are shown in Table 11-127. Values specific to these rates for the evaluated year are included in Appendix M.

Table 11-127. Rate classes for lost revenue calculation

Enbridge	Union
Rate 110	M4 Industrial
Rate 115	M5 Industrial
Rate 135	M7 Industrial
Rate 145	T1 Industrial
Rate 170	T2 Industrial
	20 Industrial
	100 Industrial

The methods to compute each of the components shown in Figure 11-9. are described in the following sections.

Lost revenue: Verified Net Savings

The lost revenue calculation first utilizes verified net savings, calculated using best available inputs and assumptions at the time of the verification. For prescriptive program savings, this is currently the January 2020 update to the TRM. This differs from the savings used for the DSM shareholder incentive calculation, which uses the energy savings at the time of program planning.

Lost revenue: Prorate Factor Calculation

The prorate factor is simply the proportion of the annual net savings that will be included in the lost revenue calculation, based on the number of months the gas-saving measure was installed. Table 11-128 shows the prorate factors for each installation month. Prorated savings are calculated by multiplying the measure's annual savings by the ratio for the month it was installed.

Table 11-128. Lost revenue installation month savings ratio*

Month	Ratio (12-Month+1)/12
January	1.0000
February	0.9167
March	0.8333
April	0.7500
May	0.6667
June	0.5833
July	0.5000
August	0.4167
September	0.3333
October	0.2500
November	0.1667
December	0.0833

For example, the calculation assigns 12 months of savings to measures installed in January and one month of savings to measures installed in December.

*Not all values may compute exactly due to rounding.

Lost revenue: Delivery Cost Calculation

Delivery rates are expressed as cost per 1,000 cubic meters. Prorated energy savings are divided by 1,000 to convert savings in cubic meters to savings in thousands of cubic meters, which are then multiplied by the delivery rate for the respective rate class to determine lost revenue by rate class. The delivery rate is not verified as part of this evaluation.

Lost revenue: Summing lost revenue Savings

Lost revenue for each rate class is calculated by summing the lost revenue for all measures within the rate class. Total lost revenue for each utility is calculated by summing the lost revenue across all applicable rate classes:

$$Total\ Lost\ Revenue = \sum_{Rate\ Class}^{Utility} \sum_{Measure}^{Rate\ Class} Lost\ Revenue$$

DSM shareholder incentive calculations

The DSM shareholder incentive calculations are more complex than the lost revenue calculations. DSM shareholder incentive calculations are based on:

- The verified program achievements compared to the target metrics for that scorecard
- The weight placed on each metric within each scorecard

- The maximum incentive achievable for that scorecard

Because all three of these factors vary by utility and scorecard, a simple diagram is not possible. DNV GL independently calculated DSM shareholder incentive values for both utilities. The following sections lay out the calculation methodology, as well as inputs used for each utility.

The EC confirmed the lower band, upper band, target metric, weights, maximum incentives, rate classes, and rates for both utilities with the EAC.

DSM shareholder incentive: verification savings values

Where lost revenue verified net savings uses energy savings values that represent the best available information at the time of the verification, DSM shareholder incentive verified savings are calculated using the savings values leveraged during the program planning process.

DSM shareholder incentive: metric score

DSM shareholder incentive calculations are based on the verified metric achievement identified within each scorecard compared to the target value. For each metric, DNV GL first determines the percent of metric achieved.

$$\% \text{ Metric Achieved} = \frac{\text{achieved metric}}{\text{target metric}}$$

If the achieved metric is less than or equal to the 2019 Target, the Metric Score is then calculated as:

$$\text{Metric Score} = 1 - \frac{0.25 * (\text{target metric} - \text{achieved metric})}{(\text{target metric} - \text{lower band})}$$

If the achieved metric is greater than the 2019 Target, the Metric Score is then calculated as:

$$\text{Metric Score} = 1 + \frac{0.5 * (\text{achieved metric} - \text{target metric})}{(\text{upper band} - \text{target metric})}$$

DSM shareholder incentive: weighted metric score

The weighted metric score is determined by multiplying the metric score by its corresponding weight. Each metric within the scorecard is weighted, with all weights within each scorecard summing to 100.00%. Per the OEB Decision and Order, the OEB approved maximum and minimum achievement limits per metric of 200% and 0%, respectively.¹¹⁰ As a result, all Metric Scores are capped at 200%, thereby limiting the influence of any one metric within the weighted scorecard achievement calculation to twice its weight.

DSM shareholder incentive: weighted scorecard achievement

The weighted metrics within each scorecard are summed to calculate the weighted scorecard achievement:

$$\text{weighted scorecard achievement} = \sum_{\text{Scorecard}} (\text{weight} * \text{Metric Score})$$

¹¹⁰ OEB Decision and Order, EB-2015-0029/EB-2015-0049, January 20, 2016, page 80

DSM shareholder incentive: incentive calculation

The weighted scorecard achievement (WSA) is then used to calculate the Shareholder Incentive for that Scorecard. The appropriate calculation is dependent on the WSA value, as demonstrated in Table 11-129.

Table 11-129. Calculation to determine shareholder incentive

WSA Value	Incentive
<.75	0
.75 ≤ WSA < 1	$(40\% \text{ Max Incentive}) \frac{(WSA - 0.75)}{.25}$
1 ≤ WSA < 1.5	$(40\% \text{ Max Incentive}) + (60\% \text{ Max Incentive}) * \frac{(WSA - 1)}{0.5}$
1.5 ≤ WSA	Max Incentive

The shareholder incentives for each scorecard are summed to calculate each utility's total incentive:

$$Total\ Incentive = \sum_{Utility} Scorecard\ Incentive$$

Example Calculations

Lost revenue

As an example, a widget carries an annual lost revenue verified savings value of 500 m³ (annual, net savings). If that unit was installed in January, 500 m³ (500 x 1.000) would be verified for lost revenue. If that same unit were installed in July, 250 m³ (500 x 0.500) would be verified and if installed in November, 83.33 m³ (500 x .1667). Table 11-130 shows the prorated total savings for all widgets with one installed per month, in 1000 m³.

Table 11-130. Example lost revenue savings total for single rate class with monthly widget installation*

Month	Ratio (12- Month+1)/12	Units Installed	Lost Revenue Net Annual Gas Savings (m ³)	Prorated Energy Savings (m ³)	Lost Revenue Energy Savings (1000 m ³)
January	1.00	1	500	500.00	0.50
February	0.92	1	500	458.33	0.46
March	0.83	1	500	416.67	0.42
April	0.75	1	500	375.00	0.38
May	0.67	1	500	333.33	0.33
June	0.58	1	500	291.67	0.29
July	0.50	1	500	250.00	0.25
August	0.42	1	500	208.33	0.21
September	0.33	1	500	166.67	0.17
October	0.25	1	500	125.00	0.13
November	0.17	1	500	83.33	0.08
December	0.08	1	500	41.67	0.04
Total					3.25

*Not all values may compute exactly due to rounding.

In Table 11-131, the above example savings total is represented by Rate Class II – one widget per month was the sum of all measures performed within customers in that rate class. The verified lost revenue energy savings for the class are multiplied by the rate for that class to determine the lost revenue for that rate class; lost revenue for Rate Class II totalling \$48.75 from energy savings of 3.25 at a rate of \$15.00 per 1,000 m³. All applicable rate class lost revenue are then summed for total lost revenue.

Table 11-131. Example total lost revenue*

Rate Class	Lost Revenue Energy Savings (1000 m ³)	Rate (\$/1000 m ³)	Lost Revenue
I	25.00	\$5.55	\$138.75
II	3.25	\$15.00	\$48.75
III	150.00	\$1.50	\$225.00
IV	100.00	\$4.00	\$400.00
V	5.10	\$25.50	\$130.05
VI	1.26	\$10.00	\$12.60
Total Lost Revenue			\$955.15

*Not all values may compute exactly due to rounding.

DSM shareholder incentive

The first step in calculating the DSM shareholder incentive is to calculate the percent of the target metric that was achieved, which is a simple ratio of the achieved metric divided by the target metric. The second step is to determine the correct formula based on whether the verified achievement for the scorecard metric was at, above, or below the annual target. In the example in Table 11-132, the verified achievement for Scorecard A CCM was below the 2019 Target, so the formula for achievement below target is used to determine the metric score. The Verified Achievement for participants was above the 2018 Target, so the alternative calculation is used. Both formulas are illustrated below.

Table 11-132. Example metric score*

Scorecard	Metric	Verified Achievement	Lower Band	2019 Target	Upper Band	Metric Score
Scorecard A	CCM	9,000,000	7,500,000	10,000,000	15,000,000	0.9
	Participants	250	150	200	300	1.25

*Not all values may compute exactly due to rounding.

$$CCM \text{ Metric Score} = 1 - \frac{.25 * (10,000,000 - 9,000,000)}{(10,000,000 - 7,500,000)} = 1 - 0.1 = 0.9$$

$$Participant \text{ Metric Score} = 1 + \frac{0.5 * (250 - 200)}{(300 - 200)} = 1 + .25 = 1.25$$

The metric score for each metric is then multiplied by the applicable weight. In this example, CCM savings is weighted at 75% and participants at 25%. The weighted metric scores for the scorecard are summed for the weighted scorecard achievement.

Table 11-133. Example scorecard weighted score (WSA)*

Scorecard	Metric	Metric Score	Weight	Weighted Metric Score	Weighted Scorecard Achievement
Scorecard A	CCM	0.9	75%	0.675	0.9875
	Participants	1.25	25%	0.3125	

*Not all values may compute exactly due to rounding.

For Scorecard A, if we assume a maximum incentive value of \$100,000, a weighted scorecard achievement of 0.9875 would result in an incentive of \$38,000, as demonstrated below.

$$(40\% \times \$100,000) \frac{(0.9875 - .75)}{.25} = \$40,000 \times \frac{(0.2375)}{.25} = \$40,000 \times 0.95 = \$38,000$$

Appendix M Lost Revenue and DSM Shareholder Incentive: Detailed Tables

Enbridge DSM shareholder incentive

Table 11-134. Enbridge's 2019 Resource Acquisition targets, achievements, and incentive*

Metric	Target	Verified Achievement	Weight	Metric Score	Weighted Metric Score
Large Volume Customer - CCM	435,731,127	502,499,656	40.00%	115.32%	46.13%
Small Volume Customer - CCM	298,605,963	369,469,773	40.00%	123.73%	49.49%
Participants	11,606	16,480	20.00%	142.00%	28.40%
Verified Total Weighted Scorecard Achieved					124.02%
Maximum Scorecard Incentive					\$7,013,471
Verified Scorecard Incentive Achieved					\$4,827,040

*Not all values may compute exactly due to rounding.

Table 11-135. Enbridge's 2019 Low Income scorecard targets, achievements, and incentive*

Metric	Target	Verified Achievement	Weight	Metric Score	Weighted Metric Score
Home Winterproofing CCM	20,605,874	27,618,723	45.00%	134.03%	60.31%
Low Income Multi Residential CCM	102,544,768	88,957,000	45.00%	86.75%	39.04%
Low Income New Construction Applications	11	11	10.00%	100.00%	10.00%
Verified Total Weighted Scorecard Achieved					109.35%
Maximum Scorecard Incentive					\$2,264,127
Verified Scorecard Incentive Achieved					\$1,159,746

*Not all values may compute exactly due to rounding.

Table 11-136. Enbridge's 2019 Market Transformation scorecard targets, achievements, and incentive*

Metric	Target	Verified Achievement	Weight	Metric Score	Weighted Metric Score
School Energy Competition Schools	32	32	10.00%	100.00%	10.00%
Run-it-Right Participants	36	84	20.00%	200.00%	40.00%
Comprehensive Energy Management Participants	16	7	20.00%	43.75%	8.75%
Residential Savings by Design Builders	30	39	10.00%	130.00%	13.00%
Residential Savings by Design Homes	2,536	2,989	15.00%	117.86%	17.68%
Commercial Savings by Design Developments	30	35	25.00%	116.67%	29.17%
Verified Total Weighted Scorecard Achieved					118.60%
Maximum Scorecard Incentive					\$1,172,402
Verified Scorecard Incentive Achieved					\$730,586

*Not all values may compute exactly due to rounding.

Union DSM shareholder incentive

Table 11-137. Union's 2019 Resource Acquisition targets, achievements, and incentive*

Metric	Target	Verified Achievement	Weight	Metric Score	Weighted Metric Score
CCM	798,585,979	935,593,811	75.00%	117.16%	87.87%
Home Reno Rebate Homes Built	8,308	10,958	25.00%	131.90%	32.97%
Verified Total Weighted Scorecard Achieved					120.84%
Maximum Scorecard Incentive					\$6,682,671
Verified Scorecard Incentive Achieved					\$4,344,389

*Not all values may compute exactly due to rounding.

Table 11-138. Union’s 2019 Low Income targets, achievements, and incentive*

Metric	Target	Verified Achievement	Weight	Metric Score	Weighted Metric Score
Single Family CCM	43,788,748	51,732,240	60.00%	118.14%	70.88%
Multi-Family - Social & Assisted CCM	23,132,372	22,803,826	35.00%	98.58%	34.50%
Multi-Family - Market Rate CCM	7,780,746	4,774,193	5.00%	61.36%	3.07%
Verified Total Weighted Scorecard Achieved					108.46%
Maximum Scorecard Incentive					\$2,499,922
Verified Scorecard Incentive Achieved					\$1,253,615

*Not all values may compute exactly due to rounding.

Table 11-139. Union’s 2019 Large Volume targets, achievements, and incentive*

Metric	Target	Verified Achievement	Weight	Metric Score	Weighted Metric Score
CCM	137,666,792	72,370,192	100.00%	52.57%	52.57%
Verified Total Weighted Scorecard Achieved**					52.57%
Maximum Scorecard Incentive					\$706,956
Verified Scorecard Incentive Achieved					\$0.00

*Not all values may compute exactly due to rounding.

**A minimum total weighted scorecard achievement level of 75% is required to earn a portion of the available shareholder incentive.

Table 11-140. Union’s 2019 Market Transformation targets, achievements, and incentive*

Metric	Target	Verified Achievement	Weight	Metric Score	Weighted Metric Score
Optimum Home Builders	4	4	10.00%	100.00%	10.00%
Optimum Home Homes	90.00%	95.45%	10.00%	127.25%	12.73%
Optimum Home Percentage of Homes Built	4.34%	28.55%	30.00%	200.00%	60.00%
Commercial New Construction Developments	20	22	50.00%	110.00%	55.00%
Verified Total Weighted Scorecard Achieved					137.73%
Maximum Scorecard Incentive					\$413,228
Verified Scorecard Incentive Achieved					\$352,359

*Not all values may compute exactly due to rounding.

Table 11-141. Union's 2019 Performance Based targets, achievements, and incentive*

Metric	Target	Verified Achievement	Weight	Metric Score	Weighted Metric Score
RunSmart Participants	56	58	10.00%	103.57%	10.36%
RunSmart Savings %	0.70%	0.35%	40.00%	48.53%	19.41%
Strategic Energy Management Savings %	4.75%	0.00%	50.00%	0.00%	0.00%
Verified Total Weighted Scorecard Achieved					29.77%
Maximum Scorecard Incentive					\$147,223
Verified Scorecard Incentive Achieved					\$0.00

*Not all values may compute exactly due to rounding.

**A minimum total weighted scorecard achievement level of 75% is required to earn a portion of the available shareholder incentive.

Enbridge Lost Revenue

Table 11-142. Enbridge lost revenue volumes (10³ m³) by rate class, prorated by month*

Rate Class	Savings Volume by Month (1,000 m3)												Total
	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
Rate 110	745	7	5	5	326	58	62	98	44	478	14	-	1,841
Rate 115	2,816	784	-	-	504	73	110	11	-	7	-	-	4,304
Rate 135	73	-	82	195	-	101	94	18	46	8	-	-	618
Rate 145	-	-	-	-	-	-	-	-	-	-	-	-	-
Rate 170	67	-	-	-	-	-	82	13	-	45	-	-	206
TOTAL	3,701	791	87	200	830	231	348	139	90	538	14	-	6,969

*Not all values may compute exactly due to rounding.

Table 11-143. Enbridge lost revenue volumes (10³ m³) total volume, delivery rates, and revenue impact by rate class*

Rate Class	Savings Volume (1,000 m3)	Delivery Rate (\$/1,000 m3)	Revenue Impact (\$)
Rate 110	1,841	\$5.94	\$10,945
Rate 115	4,304	\$2.07	\$8,912
Rate 135	618	\$17.47	\$10,798
Rate 145	-	\$12.28	\$0
Rate 170	206	\$1.52	\$315
TOTAL	6,969		\$30,969

*Not all values may compute exactly due to rounding.

Union Lost Revenue

Table 11-144. Union lost revenue volumes (10³ m³) by rate class, prorated by month*

Rate Class	Savings Volume by Month (1,000 m3)												Total
	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
M4 Industrial	2,920	799	3,716	174	690	897	345	8	48	81	29	52	9,759
M5 Industrial	129	10	74	-	4	-	-	13	-	-	64	-	294
M7 Industrial	1,176	1,747	1,129	2	1,679	450	183	497	32	173	-	172	7,240
T1 Industrial	355	-	-	24	20	56	24	4	3	6	-	4	497
T2 Industrial	390	2	246	432	402	61	557	602	74	192	100	-	3,057
20 Industrial	1,434	15	76	-	54	35	12	0	2	6	6	13	1,653
100 Industrial	534	-	21	-	1	10	56	22	-	5	28	-	677
TOTAL	6,938	2,573	5,262	632	2,851	1,510	1,176	1,145	159	464	226	241	23,177

*Not all values may compute exactly due to rounding.

Table 11-145. Union lost revenue volumes (10³ m³) total volume, delivery rates, and revenue impact by rate class*

Rate Class	Savings Volume (1,000 m3)	Delivery Rate (\$/1,000 m3)	Revenue Impact (\$)
M4 Industrial	9,759	\$14.69	\$143,379
M5 Industrial	294	\$26.10	\$7,666
M7 Industrial	7,240	\$2.99	\$21,646
T1 Industrial	497	\$1.03	\$512
T2 Industrial	3,057	\$0.20	\$621
20 Industrial	1,653	\$6.62	\$10,939
100 Industrial	677	\$2.55	\$1,724
TOTAL	23,177		\$186,485

*Not all values may compute exactly due to rounding.

Appendix N Prescriptive Savings Verification

This appendix describes the detailed process used to verify the reported (tracked) prescriptive and quasi-prescriptive savings for Enbridge and Union programs.

Data Sources

Verification of prescriptive measures relies on several data sources provided by Enbridge and Union.

Tracking Files

The EC received one tracking file each from Enbridge and Union. Both tracking files are Excel files, and include prescriptive measures and additional information for measures from non-prescriptive programs.

TRM - Joint Submissions

The EC utilized documents titled "New and Updated DSM Measures - Joint Submission from Union Gas Ltd. and Enbridge Gas Distribution," referred to in this report as TRMs. The EC used the December 2018 TRM (TRM 3.0) as the primary source for identifying prescribed values, such as energy savings and measure life, for prescriptive measures. In addition to that primary TRM, the EC also used TRM 4.0¹¹¹.

Other Supporting Documentation

The Joint Submission documents did not contain all of the necessary detail to verify the savings for all measures. For example, savings for condensing boilers greater than 300 MBH are provided as a range. All prescriptive measures and corresponding verification sources are listed in the tables at the end of this appendix.

In addition to the TRMs, the EC also used the following for verification of savings for prescriptive measures, as cited in the tables at the end of this appendix.

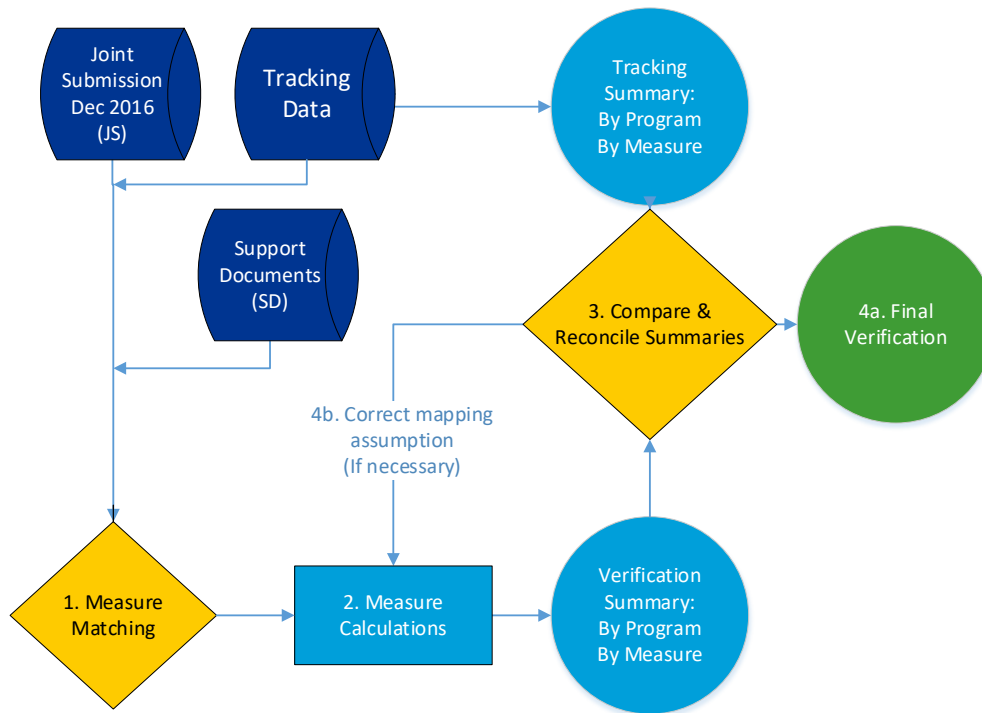
- C&I Prescriptive Showerheads, Enbridge, "Showerhead Verification Among Rental Buildings", Ipsos Research, March 2012
- C&I Prescriptive Condensing Boilers, Union, "Condensing Boilers Document": Prescriptive Commercial Boiler Program – Prescriptive Savings Analysis, AMEC Environmental and Infrastructure, November 8, 2012
- C&I Prescriptive High Efficiency Boilers, Enbridge, "High Efficiency Boiler Document"
- "Low Income Kits Verification Study": Final Report Following an Audit of the Union Gas ESK - Helping Homes Conserve – HHC – Program, Beslin Communication Group, March 15, 2013
- Low Income Multi-Residential Showerheads, Enbridge, "Multi-Residential Low Income Showerhead Verification": 2012 Multi-Residential Low Income Showerhead Verification for Enbridge Gas, Ipsos Research, March 2013
- "TAPS Report", TAPS Verification Program 2012 Year End Research Report, Study CR-604, Quadra Research, April 3, 2013
- "Adaptive Ecobee Thermostat Ping Report", Adaptive Ecobee Final Pings Redacted, February 26, 2020

Overall Methodology

The EC used a straightforward process to consistently verify savings for both utilities, summarized in Figure 11-10.

¹¹¹ Natural Gas Demand Side Management Technical Resource Manual Version 4.0

Figure 11-10. Savings verification process



The process includes the following high-level steps. Additional detail is presented below.

1. Manually match individual project measure savings against Joint Submission (JS) and Support Documents (SD) values, based first on measure name and then on other attributes, to calculate savings.
2. Calculate gross and net annual and lifetime savings for all measures.
3. Compare the summarized calculated savings and the tracked savings to identify discrepancies or disagreements.
4. When the EC determined that a discrepancy was due to an error in assigning the correct savings value, the EC assigned a new savings value to the measure and re-compared totals (4b). Once the EC resolved the correct savings value (through continued investigation of measure or clarification with utility) the record was verified (4a).

Table 11-146 shows the variables used from the utility tracking data to verify, summarize, and reconcile savings values. While variables such as measure life or free ridership were present in the tracking data, these were not used by the EC to calculate verified savings, but to identify discrepancies between verification and tracking summaries when comparing and reconciling savings totals. The EC used TRM or SD values for the verified savings calculations.

Table 11-146. Tracking variables used for prescriptive savings verification

Tracking Variable	Used In		
	Verification/Summary	Tracking Summary	Compare & Reconcile Summaries
Scorecard	X		X
Program	X		X
Decision Type (Early Replace, Retrofit, etc.)	X		X
Measure Name	X		X
Building Type	X		X
Equipment Type	X		X
Install Type	X		X
Number of Units	X		X
Capacity	X		X
Measure Life			X
Free Rider			X
Adjustment Factor			X
Gross Annual Natural Gas Savings (m3)		X	X
Net Annual Natural Gas Savings (m3)		X	X
Gross Cumulative Natural Gas Savings (m3)		X	X
Net Cumulative Natural Gas Savings (m3)		X	X

1. Measure Matching


The EC manually mapped measures into groups. Measures were filtered by name to assign them to a group, then matched against the TRM and SD measures to identify the correct savings values. For each project, the EC confirmed that the savings value listed for the measure matched the value listed for that measure type in the TRM and SD. The tables at the end of this appendix lists all tracked measure groups and their corresponding savings values and JS or SD source for Enbridge and Union, respectively.

2. Measure Calculations

There are two types of prescriptive measure calculations: Pure-Prescriptive and Quasi-Prescriptive. Quasi-Prescriptive measure savings require more than the per unit savings and the number of units to determine annual gross savings. For example, some boiler measures require the capacity of the boiler. Table 11-147 summarizes the differences between the two types.

Table 11-147. Explanation of calculation inputs for two types of prescriptive measures

Savings Type	Purely Prescriptive	Quasi-Prescriptive
Annual Gross	Per Unit Savings * # of Units	Unit Capacity Savings * Unit Capacity * # of Units
Annual Net	Annual Gross * (1 - Free Ridership) * Adjustment	
Lifetime Gross	Annual Gross * Measure Life	
Lifetime Net (CCM)	Annual Net * Measure Life	



The EC used Excel macros to identify savings inputs and apply savings calculations. The use of macros ensured consistent application of savings calculations and allowed for quick and accurate savings updates. The tables at the end of this appendix lists all calculated measure totals, as verified by the EC.

3. Compare & Reconcile Summaries

The EC summed savings values from utility tracking and from EC verification calculations by program and measure type, and tabulated by Annual Gross, Annual Net, Lifetime Gross, Lifetime Net, and project measure counts. The EC did this with the Pivot Table function in Excel, creating Tracking (utility tracking data) and Verification (EC calculated) Summaries, which provided two benefits. First, the EC was able to identify discrepancies between listed measure names, because any differences would result in a different number of summary rows between the two tables. Second, the pivot tables allowed for quick and accurate updates when the EC performed adjustments to our original matches.

By reviewing differences between the two summaries, the EC identified errors in the EC matches and differences between the EC matches and the original utility tracking data, allowing us to investigate the discrepancies. The tables at the end of this appendix lists all verification discrepancies where:

- **The tracking data did not contain sufficient information to identify savings:** In general, these measures were resolved with additional documentation and resulted in no change to savings. They are listed in this appendix to document the evaluation process and communication between the evaluator and the utility.
- **The tracking data was incorrect:** This may have been because different savings factors were identified through the verification process. The tables include the details for each measure.

4. Final Verification

Once all tracked measures were matched to TRM values, the savings calculated, and all discrepancies reconciled or explained, verified savings summaries were finalized. Final savings totals for each program are available within the appropriate appendix in this report.

Savings Calculation Values

Savings tables in this section utilize measure names and units from the TRM wherever possible. Utilities utilized different units (BTU vs kBTU) or name variations, those are not used here.

Table 11-148. Enbridge measure savings calculation values*

Program	Measure	Pure or Quasi	Source	Savings Factor (m ³)	Unit	EUL	Gross Realization Rate	Free Ridership	Adjustment Factor
C&I Direct Install	DI DCKV 10,001 - 15,000 CFM Cx [Retrofit]	Pure	TRM 3.0	17,529.00	unit	15	100.00%	5.00%	100.00%
C&I Direct Install	DI DCKV 5,001 - 10,000 CFM Cx [Retrofit]	Pure	TRM 3.0	10,517.00	unit	15	100.00%	5.00%	100.00%
C&I Direct Install	DI DCKV up to 5000 CFM Cx [Retrofit]	Pure	TRM 3.0	4,207.00	unit	15	100.00%	5.00%	100.00%
C&I Direct Install	Direct Install Air Curtain 10 x 10 Cx Offer	Pure	TRM 3.0	20,007.00	unit	15	100.00%	5.00%	100.00%
C&I Direct Install	Direct Install Air Curtain 8 x 10 Cx Offer	Pure	TRM 3.0	14,559.00	unit	15	100.00%	5.00%	100.00%
C&I Direct Install	Direct Install Air Curtain 8 x 8 Cx Offer	Pure	TRM 3.0	11,647.00	unit	15	100.00%	5.00%	100.00%
C&I Direct Install	Direct Install Air Curtain Single 7 x 3 Door Cx Offer	Pure	TRM 3.0	646.00	unit	15	100.00%	5.00%	100.00%
C&I Direct Install	Direct Install Air Curtain Single 7 x 6 Door Cx Offer	Pure	TRM 3.0	1,292.00	unit	15	100.00%	5.00%	100.00%
C&I Direct Install	Direct Install Ind Air Curtain 10 x 10 Cx Offer	Pure	TRM 3.0	20,007.00	unit	15	100.00%	5.00%	100.00%
C&I Direct Install	Direct Install Ind Air Curtain 8 x 10 Cx Offer	Pure	TRM 3.0	14,559.00	unit	15	100.00%	5.00%	100.00%
C&I Direct Install	Direct Install Ind Air Curtain 8 x 8 Cx Offer	Pure	TRM 3.0	11,647.00	unit	15	100.00%	5.00%	100.00%
C&I Direct Install	Direct Install Ind Air Curtain Single 7 x 3 Door Cx Offer	Pure	TRM 3.0	646.00	unit	15	100.00%	5.00%	100.00%
C&I Prescriptive	2-Stage Infrared Heaters (50,000 - 164,999 BTUH) [Retrofit]	Quasi	TRM 3.0, 2017 C&I Prescriptive Verification Study	13.10	kBTU/hour input capacity	17	102.68%	33.00%	100.00%
C&I Prescriptive	Air Curtain 8 x 10 Cx Offer	Pure	TRM 3.0	14,559.00	unit	15	100.00%	5.00%	100.00%
C&I Prescriptive	Air Curtain Double 7 x 3 Door Cx Offer	Pure	TRM 3.0	1,292.00	unit	15	100.00%	5.00%	100.00%
C&I Prescriptive	Air Curtain Pedestrian Double Door with Vestibule 2x7'x6' - Heated Air Curtain	Pure	TRM 3.0	1,731.00	unit	15	100.00%	5.00%	100.00%
C&I Prescriptive	Bonus Incentive - Air Curtain 10 x 10 Cx Offer	Pure	TRM 3.0	20,007.00	unit	15	100.00%	5.00%	100.00%

Program	Measure	Pure or Quasi	Source	Savings Factor (m ³)	Unit	EUL	Gross Realization Rate	Free Ridership	Adjustment Factor
C&I Prescriptive	Bonus Incentive - Air Curtain 8 x 10 Cx Offer	Pure	TRM 3.0	14,559.00	unit	15	100.00%	5.00%	100.00%
C&I Prescriptive	Bonus Incentive - DCKV up to 5000 CFM Cx [Retrofit]	Pure	TRM 3.0, 2017 C&I Prescriptive Verification Study	4,207.00	unit	15	102.74%	5.00%	100.00%
C&I Prescriptive	Bonus Incentive - Ind Air Curtain 10 x 10 Cx Offer	Pure	TRM 3.0	20,007.00	unit	15	100.00%	5.00%	100.00%
C&I Prescriptive	Bonus Incentive - Ozone Washer Extractor >60lbs<500lbs [New]	Quasi	TRM 3.0	0.03830	pounds/year	15	100.00%	8.00%	100.00%
C&I Prescriptive	Commercial High Eff Boiler 1000-1499MBH Seasonal Cx [Replacement]	Pure	TRM 3.0, High Efficiency Boiler Document, 2017 C&I Prescriptive Verification Study	12,141.00	unit	25	100.00%	12.00%	100.00%
C&I Prescriptive	Commercial High Eff Boiler 2000MBH Seasonal Cx [Replacement]	Pure	TRM 3.0, High Efficiency Boiler Document, 2017 C&I Prescriptive Verification Study	27,325.00	unit	25	100.00%	12.00%	100.00%
C&I Prescriptive	Commercial High Eff Boiler 600-999MBH Seasonal Cx [Replacement]	Pure	TRM 3.0, High Efficiency Boiler Document, 2017 C&I Prescriptive Verification Study	6,633.00	unit	25	100.00%	12.00%	100.00%
C&I Prescriptive	Commercial High Eff Boiler DWH 1000-1499MBH Non Seasonal Cx [Replacement]	Pure	TRM 3.0, High Efficiency Boiler Document, 2017 C&I Prescriptive Verification Study	5,431.00	unit	25	100.00%	12.00%	100.00%
C&I Prescriptive	Commercial High Eff Boiler DWH 600-999MBH Non Seasonal Cx [Replacement]	Pure	TRM 3.0, High Efficiency Boiler Document, 2017 C&I Prescriptive Verification Study	3,076.00	unit	25	100.00%	12.00%	100.00%
C&I Prescriptive	Cond Boiler 100-199MBH [Replacement]	Quasi	TRM 3.0	0.01019	BTU/hour	25	100.00%	5.00%	100.00%
C&I Prescriptive	Cond MUA Two Speed up to 14,000 CFM - Other/Commercial [New/Existing]	Quasi	TRM 3.0	1.22000	CFM	20	100.00%	5.00%	100.00%

Program	Measure	Pure or Quasi	Source	Savings Factor (m ³)	Unit	EUL	Gross Realization Rate	Free Ridership	Adjustment Factor
C&I Prescriptive	Cond Tankless High Usage >200 Kbtu Cx - Water Heating	Mixed	TRM 3.0	326+1.79	unit + kBTU/hour input capacity	20	100.00%	2.00%	100.00%
C&I Prescriptive	Cond Tankless High Usage 75-200 Kbtu Cx - Water Heating	Mixed	TRM 3.0	212+1.79	unit + kBTU/hour input capacity	20	100.00%	2.00%	100.00%
C&I Prescriptive	Cond Tankless Low Usage 75-200 Kbtu Cx - Water Heating	Mixed	TRM 3.0	212+0.79	unit + kBTU/hour input capacity	20	100.00%	2.00%	100.00%
C&I Prescriptive	Condensing Boiler 100-199MBH [Replacement]	Quasi	TRM 3.0	0.01019	BTU/hour	25	100.00%	5.00%	100.00%
C&I Prescriptive	Condensing Boilers - DHW 100 - 199 MBH [Replacement]	Quasi	TRM 3.0	0.01332	BTU/hour	25	100.00%	5.00%	100.00%
C&I Prescriptive	Condensing Boilers - DHW 200 - 299 MBH [Replacement]	Quasi	TRM 3.0	0.00996	BTU/hour	25	100.00%	5.00%	100.00%
C&I Prescriptive	Condensing Furnace High Efficiency 0-74 KBtu/hr Cx [Existing]	Quasi	TRM 3.0	3.11	kBTU/hour	18	100.00%	17.50%	100.00%
C&I Prescriptive	Condensing Furnace High Efficiency 75-149 KBtu/hr Cx [Existing]	Quasi	TRM 3.0	3.11	kBTU/hour	18	100.00%	17.50%	100.00%
C&I Prescriptive	Condensing Storage Water Heater High Utilization >75 and <=250 Kbtu/Hr Cx [New Construction]	Quasi	TRM 3.0	3.09	kBTU/hour input capacity	15	100.00%	5.00%	100.00%
C&I Prescriptive	Condensing Tankless High Usage 75-199 Kbtu Cx - Water Heating	Mixed	TRM 3.0	212+1.79	unit + kBTU/hour input capacity	20	100.00%	2.00%	100.00%
C&I Prescriptive	DCKV 10,001 - 15,000 CFM Cx [New]	Pure	TRM 3.0, 2017 C&I Prescriptive Verification Study	17,529.00	unit	15	102.74%	5.00%	100.00%
C&I Prescriptive	DCKV 10,001 - 15,000 CFM Cx [Retrofit]	Pure	TRM 3.0, 2017 C&I Prescriptive Verification Study	17,529.00	unit	15	102.74%	5.00%	100.00%
C&I Prescriptive	DCKV 5,001 - 10,000 CFM Cx [New]	Pure	TRM 3.0, 2017 C&I Prescriptive Verification Study	10,517.00	unit	15	102.74%	5.00%	100.00%

Program	Measure	Pure or Quasi	Source	Savings Factor (m ³)	Unit	EUL	Gross Realization Rate	Free Ridership	Adjustment Factor
C&I Prescriptive	DCKV 5,001 - 10,000 CFM Cx [Retrofit]	Pure	TRM 3.0, 2017 C&I Prescriptive Verification Study	10,517.00	unit	15	102.74%	5.00%	100.00%
C&I Prescriptive	DCKV up to 5,000 CFM Cx [New]	Pure	TRM 3.0, 2017 C&I Prescriptive Verification Study	4,207.00	unit	15	102.74%	5.00%	100.00%
C&I Prescriptive	DCKV up to 5000 CFM Cx [Retrofit]	Pure	TRM 3.0, 2017 C&I Prescriptive Verification Study	4,207.00	unit	15	102.74%	5.00%	100.00%
C&I Prescriptive	DCV Single Zone Retail with Maintenance Cx [New]	Quasi	TRM 3.0, 2017 C&I Prescriptive Verification Study	0.39200	ft ²	15	104.14%	20.00%	100.00%
C&I Prescriptive	DCV Single Zone Retail with Maintenance Cx [Retrofit]	Quasi	TRM 3.0, 2017 C&I Prescriptive Verification Study	0.39200	ft ²	15	104.14%	5.00%	100.00%
C&I Prescriptive	Destratification Fan Cx 20 ft [Retrofit]	Pure	TRM 3.0	2,029.00	unit	15	100.00%	10.00%	100.00%
C&I Prescriptive	Destratification Fan Cx 24 ft [Retrofit]	Pure	TRM 3.0	2,922.00	unit	15	100.00%	10.00%	100.00%
C&I Prescriptive	DW Single Tank Conveyor High Cx [New/Replacement]	Pure	TRM 3.0	540.00	unit	20	100.00%	27.00%	100.00%
C&I Prescriptive	DW Under-Counter High Temp Cx [New/Replacement]	Pure	TRM 3.0	137.00	unit	10	100.00%	40.00%	100.00%
C&I Prescriptive	Energy Star Steam Cooker [New/Replacement]	Pure	TRM 3.0	8,889.00	unit	12	100.00%	20.00%	100.00%
C&I Prescriptive	ERV High Use > 85% Cx [New/Existing]	Quasi	TRM 3.0	2.70	CFM	14	100.00%	5.00%	100.00%
C&I Prescriptive	ERV Vent Low Stand Office 75% Cx [New]	Quasi	TRM 3.0	2.33	CFM	14	100.00%	5.00%	100.00%
C&I Prescriptive	ERV Vent Med Int Retail Res 65% Cx [New]	Quasi	TRM 3.0	3.14	CFM	14	100.00%	5.00%	100.00%
C&I Prescriptive	ERV Vent Med Int Retail Res 75% Cx [New]	Quasi	TRM 3.0	3.64	CFM	14	100.00%	5.00%	100.00%
C&I Prescriptive	ERV Vent Med Stand Retail 55% Cx [New]	Quasi	TRM 3.0	2.65	CFM	14	100.00%	5.00%	100.00%
C&I Prescriptive	ERV Vent Med Stand Retail 65% Cx [New]	Quasi	TRM 3.0	3.14	CFM	14	100.00%	5.00%	100.00%
C&I Prescriptive	ES Fryer Cx	Pure	TRM 3.0	1,408.00	unit	12	100.00%	20.00%	100.00%
C&I Prescriptive	HRV Vent High Int Multi Res 65% [New]	Quasi	TRM 3.0	4.76	CFM	14	100.00%	5.00%	100.00%
C&I Prescriptive	HRV Vent High Int Multi Res 75% [New]	Quasi	TRM 3.0	5.49	CFM	14	100.00%	5.00%	100.00%

Program	Measure	Pure or Quasi	Source	Savings Factor (m ³)	Unit	EUL	Gross Realization Rate	Free Ridership	Adjustment Factor
C&I Prescriptive	HRV Vent Med Stand Retail 55% [New]	Quasi	TRM 3.0	2.24	CFM	14	100.00%	5.00%	100.00%
C&I Prescriptive	Ind 2-Stage Infrared Heaters (165,000 - 300,000 BTUH) [Retrofit] - Space Heating	Quasi	TRM 3.0, 2017 C&I Prescriptive Verification Study	13.10	kBTU/hour input capacity	17	102.68%	33.00%	100.00%
C&I Prescriptive	Ind 2-Stage Infrared Heaters (50,000 - 164,999 BTUH) [Retrofit] - Space Heating	Quasi	TRM 3.0, 2017 C&I Prescriptive Verification Study	13.10	kBTU/hour input capacity	17	102.68%	33.00%	100.00%
C&I Prescriptive	Ind 2-Stage Infrared Heaters (50,000 - 164,999 BTUH) [Retrofit] - Steam Generation	Quasi	TRM 3.0, 2017 C&I Prescriptive Verification Study	13.10	kBTU/hour input capacity	17	102.68%	33.00%	100.00%
C&I Prescriptive	Ind Air Curtain 10 x 10 Cx Offer	Pure	TRM 3.0	20,007.00	unit	15	100.00%	5.00%	100.00%
C&I Prescriptive	Ind Air Curtain 8 x 10 Cx Offer	Pure	TRM 3.0	14,559.00	unit	15	100.00%	5.00%	100.00%
C&I Prescriptive	Ind Air Curtain Single 7 x 3 Door Cx Offer	Pure	TRM 3.0	646.00	unit	15	100.00%	5.00%	100.00%
C&I Prescriptive	Ind Destratification Fan 20 ft [Retrofit]	Pure	TRM 3.0	2,029.00	unit	15	100.00%	10.00%	100.00%
C&I Prescriptive	Ind Destratification Fan 24 ft [Retrofit]	Pure	TRM 3.0	2,922.00	unit	15	100.00%	10.00%	100.00%
C&I Prescriptive	Ind Single Stage & High Infrared Heaters (165,000 - 300,000 BTUH) [Retrofit] - Space Heating	Quasi	TRM 3.0, 2017 C&I Prescriptive Verification Study	11.50	kBTU/hour input capacity	17	102.68%	33.00%	100.00%
C&I Prescriptive	Ind Single Stage & High Infrared Heaters (50,000 - 164,999 BTUH) [Retrofit] - Space Heating	Quasi	TRM 3.0, 2017 C&I Prescriptive Verification Study	11.50	kBTU/hour input capacity	17	102.68%	33.00%	100.00%
C&I Prescriptive	MS Broilers High Efficiency Under-Fired - 4 foot [New/Replacement]	Pure	TRM 3.0	3,347.00	unit	12	100.00%	20.00%	100.00%
C&I Prescriptive	MS Energy Star Steam Cooker [New/Replacement]	Pure	TRM 3.0	8,889.00	unit	12	100.00%	20.00%	100.00%
C&I Prescriptive	MS ES Fryer Cx	Pure	TRM 3.0	1,408.00	unit	12	100.00%	20.00%	100.00%
C&I Prescriptive	Multi Res High Eff Boiler DWH 300-599MBH Non Seasonal Cx [Replacement]	Pure	TRM 3.0, High Efficiency Boiler Document, 2017 C&I Prescriptive Verification Study	1,861.00	unit	25	100.00%	20.00%	100.00%

Program	Measure	Pure or Quasi	Source	Savings Factor (m ³)	Unit	EUL	Gross Realization Rate	Free Ridership	Adjustment Factor
C&I Prescriptive	Multi-Res High Eff Boiler 1000-1499MBH Seasonal Cx [Replacement]	Pure	TRM 3.0, High Efficiency Boiler Document, 2017 C&I Prescriptive Verification Study	12,141.00	unit	25	100.00%	20.00%	100.00%
C&I Prescriptive	Multi-Res High Eff Boiler 1500-1999MBH Seasonal Cx [Replacement]	Pure	TRM 3.0, High Efficiency Boiler Document, 2017 C&I Prescriptive Verification Study	19,189.00	unit	25	100.00%	20.00%	100.00%
C&I Prescriptive	Multi-Res High Eff Boiler 600-999MBH Seasonal Cx [Replacement]	Pure	TRM 3.0, High Efficiency Boiler Document, 2017 C&I Prescriptive Verification Study	6,633.00	unit	25	100.00%	20.00%	100.00%
C&I Prescriptive	Multi-Res High Eff Boiler DWH 600-999MBH Non Seasonal Cx [Replacement]	Pure	TRM 3.0, High Efficiency Boiler Document, 2017 C&I Prescriptive Verification Study	3,076.00	unit	25	100.00%	20.00%	100.00%
C&I Prescriptive	Ozone Washer Extractor =/<60lbs Cx [New]	Quasi	TRM 3.0	0.03830	pounds/year	15	100.00%	8.00%	100.00%
C&I Prescriptive	Ozone Washer Extractor >60lbs<500lbs [New]	Quasi	TRM 3.0	0.03830	pounds/year	15	100.00%	8.00%	100.00%
C&I Prescriptive	School Board Boiler Elementary Cx [Replacement]	Pure	TRM 3.0	12,217.00	unit	25	100.00%	12.00%	100.00%
C&I Prescriptive	School Board Campaign - School Board Boiler Elementary Cx [Replacement]	Pure	TRM 3.0	12,217.00	unit	25	100.00%	12.00%	100.00%
C&I Prescriptive	Showerheads 1.50 GPM Cx Multi-Res - Water Heating	Pure	TRM 3.0, Showerhead Verification Study Among Rental Buildings	30.60	unit	10	100.00%	10.00%	84.50%
C&I Prescriptive	Single Stage & High Intensity Infrared Heaters (165,000 - 300,000 BTUH) [Retrofit]	Quasi	TRM 3.0, 2017 C&I Prescriptive Verification Study	11.50	kBTU/hour input capacity	17	102.68%	33.00%	100.00%
C&I Prescriptive	Single Stage & High Intensity Infrared Heaters (50,000 - 164,999 BTUH) [Retrofit]	Quasi	TRM 3.0, 2017 C&I Prescriptive Verification Study	11.50	kBTU/hour input capacity	17	102.68%	33.00%	100.00%

Program	Measure	Pure or Quasi	Source	Savings Factor (m ³)	Unit	EUL	Gross Realization Rate	Free Ridership	Adjustment Factor
Home Winterproofing	Bathroom Aerator	Pure	TRM 3.0, TAPS Report	6.40	unit	10	100.00%	0.00%	22.50%
Home Winterproofing	Kitchen Aerator	Pure	TRM 3.0, TAPS Report	11.56	unit	10	100.00%	0.00%	33.50%
Home Winterproofing	Showerhead Replacement	Pure	TRM 3.0, Multi-Residential Low Income Showerhead Verification	28.20	unit	10	100.00%	0.00%	87.70%
Home Winterproofing	Smart Thermostats	Pure	TRM 3.0	217.00	unit	15	100.00%	0.00%	100.00%
Home Winterproofing	Smart Thermostats	Pure	TRM 3.0	173.00	unit	15	100.00%	0.00%	100.00%
Home Winterproofing	Smart Thermostats	Pure	TRM 3.0	173.00	unit	15	100.00%	0.00%	100.00%
Home Winterproofing	Smart Thermostats	Pure	TRM 3.0	217.00	unit	15	100.00%	0.00%	100.00%
Low-Income Multi-Residential	Low Income Condensing MUA Two Speed up to 14,000 CFM - Multi-Residential/Long Term Care [New/Existing]	Quasi	TRM 3.0	2.45	CFM	20	100.00%	0.00%	100.00%
Low-Income Multi-Residential	Low Income Condensing Storage Water Heater High Utilization >250 Kbtu/Hr Cx [New Construction]	Quasi	TRM 3.0	3.09	kBTU/hour input capacity	15	100.00%	0.00%	100.00%
Low-Income Multi-Residential	Low Income Condensing Storage Water Heater High Utilization >75 and <=250 Kbtu/Hr Cx [New Construction]	Quasi	TRM 3.0	3.09	kBTU/hour input capacity	15	100.00%	0.00%	100.00%
Low-Income Multi-Residential	Low Income High Eff Boiler 1500-1999MBH Seasonal Cx [Replacement]	Pure	TRM 3.0, High Efficiency Boiler Document	19,189.00	unit	25	100.00%	0.00%	100.00%
Low-Income Multi-Residential	Low Income High Eff Boiler 300-599MBH Seasonal Cx [Replacement]	Pure	TRM 3.0, High Efficiency Boiler Document	3,496.00	unit	25	100.00%	0.00%	100.00%
Residential Adaptive Thermostats	Smart Thermostats	Pure	TRM 3.0, Adaptive Ecobee Thermostat Ping Report	185.00	unit	15	100.00%	4.00%	78.40%
Residential Adaptive Thermostats	Smart Thermostats - classic	Pure	TRM 3.0	185.00	unit	15	100.00%	4.00%	100.00%

*Not all values may compute exactly due to rounding.

Table 11-149. Union measures savings calculation values*

Program	Measure	Pure or Quasi	Source	Savings Factor (m ³)	Unit	EUL	Gross Realization Rate	Free Ridership	Adjustment Factor
C&I Direct Install	Air Curtain - Dock-In - 10 x 10	Pure	TRM 3.0	20,007.00	unit	15	100.00%	5.00%	100.00%
C&I Direct Install	Air Curtain - Dock-In - 8 x 10	Pure	TRM 3.0	14,559.00	unit	15	100.00%	5.00%	100.00%
C&I Direct Install	Air Curtain - Dock-In - 8 x 8	Pure	TRM 3.0	11,647.00	unit	15	100.00%	5.00%	100.00%
C&I Prescriptive	Air Curtain - (2) 7 x 3 Door	Pure	TRM 3.0	1,292.00	unit	15	100.00%	5.00%	100.00%
C&I Prescriptive	Air Curtain - (2) 7 x 6 Door	Pure	TRM 3.0	2,584.00	unit	15	100.00%	5.00%	100.00%
C&I Prescriptive	Air Curtain - 7 x 3 Door	Pure	TRM 3.0	646.00	unit	15	100.00%	5.00%	100.00%
C&I Prescriptive	Air Curtain - 8 x 10 with LTO BONUS	Pure	TRM 3.0	14,559.00	unit	15	100.00%	5.00%	100.00%
C&I Prescriptive	Air Curtain - 8 x 6 Door	Pure	TRM 3.0	1,560.00	unit	15	100.00%	5.00%	100.00%
C&I Prescriptive	Air Curtain - 8 x 8 with LTO BONUS	Pure	TRM 3.0	11,647.00	unit	15	100.00%	5.00%	100.00%
C&I Prescriptive	Air Curtain - Dock-In - 10 x 10 with LTO BONUS	Pure	TRM 3.0	20,007.00	unit	15	100.00%	5.00%	100.00%
C&I Prescriptive	Air Curtain Heated - w/ Vestibule - (2)7x3	Pure	TRM 3.0	865.00	unit	15	100.00%	5.00%	100.00%
C&I Prescriptive	Air Curtain Heated - w/ Vestibule - (2)7x6	Pure	TRM 3.0	1,731.00	unit	15	100.00%	5.00%	100.00%
C&I Prescriptive	Air Curtain Heated - w/ Vestibule - 7x6	Pure	TRM 3.0	865.00	unit	15	100.00%	5.00%	100.00%
C&I Prescriptive	Air Curtain Heated - w/ Vestibule - 8x6	Pure	TRM 3.0	1,045.00	unit	15	100.00%	5.00%	100.00%
C&I Prescriptive	Commercial Condensing Unit Heater	Quasi	TRM 3.0	5.92	kBTU/hour input capacity	18	100.00%	0.00%	100.00%
C&I Prescriptive	Commercial Condensing Unit Heater	Quasi	TRM 3.0	7.89	kBTU/hour input capacity	18	100.00%	0.00%	100.00%
C&I Prescriptive	Commercial Condensing Unit Heater	Quasi	TRM 3.0	7.89	kBTU/hour input capacity	18	100.00%	0.00%	100.00%
C&I Prescriptive	Commercial Energy Star Fryer - INSTALLED AFTER MARCH 1st 2018	Pure	TRM 3.0	1,408.00	unit	12	100.00%	20.00%	100.00%

Program	Measure	Pure or Quasi	Source	Savings Factor (m ³)	Unit	EUL	Gross Realization Rate	Free Ridership	Adjustment Factor
C&I Prescriptive	Commercial Energy Star Fryer - INSTALLED BEFORE MARCH 1st 2018	Pure	TRM 3.0	1,408.00	unit	12	100.00%	20.00%	100.00%
C&I Prescriptive	Commercial Energy Star Steam Cooker - INSTALLED AFTER 1st MARCH 2018	Pure	TRM 3.0	8,889.00	unit	12	100.00%	20.00%	100.00%
C&I Prescriptive	Commercial High Efficiency Furnace	Quasi	TRM 3.0	3.11	kBTU/hour	18	100.00%	17.50%	100.00%
C&I Prescriptive	Commercial High Efficiency Furnace	Quasi	TRM 3.0	2.33	kBTU/hour	18	100.00%	17.50%	100.00%
C&I Prescriptive	Commercial Under-Fired Broiler - INSTALLED AFTER 1st MARCH 2018	Pure	TRM 3.0	2,511.00	unit	12	100.00%	20.00%	100.00%
C&I Prescriptive	Condensing Boiler - Space Heating - 300 to 999 MBH - NC2018	Quasi	TRM 3.0, 2017 C&I Prescriptive Verification Study	0.01040	BTU/hour	25	101.66%	5.00%	100.00%
C&I Prescriptive	Condensing Boiler - Space Heating - 300 to 999 MBH - RF	Quasi	TRM 3.0, 2017 C&I Prescriptive Verification Study	0.01040	BTU/hour	25	101.66%	5.00%	100.00%
C&I Prescriptive	Condensing Boiler - Space Heating - GTE 1000 MBH - NC2018	Quasi	TRM 3.0, 2017 C&I Prescriptive Verification Study	0.01040	BTU/hour	25	101.66%	5.00%	100.00%
C&I Prescriptive	Condensing Boiler - Space Heating - GTE 1000 MBH - RF	Quasi	TRM 3.0, 2017 C&I Prescriptive Verification Study	0.01040	BTU/hour	25	101.66%	5.00%	100.00%
C&I Prescriptive	Condensing Boiler - Space Heating - LT 300 MBH - NC2018	Quasi	TRM 3.0, 2017 C&I Prescriptive Verification Study	0.01019	BTU/hour	25	101.66%	5.00%	100.00%
C&I Prescriptive	Condensing Boiler - Space Heating - LT 300 MBH - NC2018	Quasi	TRM 3.0, 2017 C&I Prescriptive Verification Study	0.01019	BTU/hour	25	101.66%	5.00%	100.00%
C&I Prescriptive	Condensing Boiler - Space Heating - LT 300 MBH - NC2019	Quasi	TRM 3.0, 2017 C&I Prescriptive Verification Study	0.01019	BTU/hour	25	101.66%	5.00%	100.00%
C&I Prescriptive	Condensing Boiler - Space Heating - LT 300 MBH - NC2019	Quasi	TRM 3.0, 2017 C&I Prescriptive Verification Study	0.01019	BTU/hour	25	101.66%	5.00%	100.00%
C&I Prescriptive	Condensing Boiler - Space Heating - LT 300 MBH - NC2019	Quasi	TRM 3.0, 2017 C&I Prescriptive Verification Study	0.01019	BTU/hour	25	101.66%	5.00%	100.00%
C&I Prescriptive	Condensing Boiler - Space Heating - LT 300 MBH - RF	Quasi	TRM 3.0, 2017 C&I Prescriptive Verification Study	0.01019	BTU/hour	25	101.66%	5.00%	100.00%

Program	Measure	Pure or Quasi	Source	Savings Factor (m ³)	Unit	EUL	Gross Realization Rate	Free Ridership	Adjustment Factor
C&I Prescriptive	Condensing Boiler - Space Heating - LT 300 MBH - RF	Quasi	TRM 3.0, 2017 C&I Prescriptive Verification Study	0.01019	BTU/hour	25	101.66%	5.00%	100.00%
C&I Prescriptive	Condensing Boiler - Space Heating - LT 300 MBH - RF	Quasi	TRM 3.0, 2017 C&I Prescriptive Verification Study	0.01019	BTU/hour	25	101.66%	5.00%	100.00%
C&I Prescriptive	Condensing Boiler - Water Heating - 300 to 999 MBH - RF	Quasi	TRM 3.0, Condensing Boiler Document, 2017 C&I Prescriptive Verification Study	0.00608	BTU/hour	25	101.66%	5.00%	100.00%
C&I Prescriptive	Condensing Boiler - Water Heating - 300 to 999 MBH - RF	Quasi	TRM 3.0, Condensing Boiler Document, 2017 C&I Prescriptive Verification Study	0.00735	BTU/hour	25	101.66%	5.00%	100.00%
C&I Prescriptive	Condensing Boiler - Water Heating - GTE 1000 MBH - NC2018	Quasi	TRM 3.0, Condensing Boiler Document, 2017 C&I Prescriptive Verification Study	0.00644	BTU/hour	25	101.66%	5.00%	100.00%
C&I Prescriptive	Condensing Boiler - Water Heating - GTE 1000 MBH - RF	Quasi	TRM 3.0, Condensing Boiler Document, 2017 C&I Prescriptive Verification Study	0.00591	BTU/hour	25	101.66%	5.00%	100.00%
C&I Prescriptive	Condensing Boiler - Water Heating - GTE 1000 MBH - RF	Quasi	TRM 3.0, Condensing Boiler Document, 2017 C&I Prescriptive Verification Study	0.00644	BTU/hour	25	101.66%	5.00%	100.00%
C&I Prescriptive	Condensing Boiler - Water Heating - LT 300 MBH - NC2019	Quasi	TRM 3.0, 2017 C&I Prescriptive Verification Study	0.01332	BTU/hour	25	101.66%	5.00%	100.00%
C&I Prescriptive	Condensing Boiler - Water Heating - LT 300 MBH - NC2019	Quasi	TRM 3.0, 2017 C&I Prescriptive Verification Study	0.00996	BTU/hour	25	101.66%	5.00%	100.00%
C&I Prescriptive	Condensing Boiler - Water Heating - LT 300 MBH - NC2019	Quasi	TRM 3.0, 2017 C&I Prescriptive Verification Study	0.01332	BTU/hour	25	101.66%	5.00%	100.00%
C&I Prescriptive	Condensing Boiler - Water Heating - LT 300 MBH - RF	Quasi	TRM 3.0, 2017 C&I Prescriptive Verification Study	0.00996	BTU/hour	25	101.66%	5.00%	100.00%

Program	Measure	Pure or Quasi	Source	Savings Factor (m ³)	Unit	EUL	Gross Realization Rate	Free Ridership	Adjustment Factor
C&I Prescriptive	Condensing Boiler - Water Heating - LT 300 MBH - RF	Quasi	TRM 3.0, 2017 C&I Prescriptive Verification Study	0.01332	BTU/hour	25	101.66%	5.00%	100.00%
C&I Prescriptive	Condensing Storage Water Heater - GT 250 kBTU/hr	Quasi	TRM 3.0	2.22	kBTU/hour input capacity	15	100.00%	5.00%	100.00%
C&I Prescriptive	Condensing Storage Water Heater - GT 250 kBTU/hr	Quasi	TRM 3.0	3.09	kBTU/hour input capacity	15	100.00%	5.00%	100.00%
C&I Prescriptive	Condensing Storage Water Heater - GT 250 kBTU/hr	Quasi	TRM 3.0	1.36000	kBTU/hour input capacity	15	100.00%	5.00%	100.00%
C&I Prescriptive	Condensing Storage Water Heater - GT 75 & LTE 250 kBTU/Hr	Quasi	TRM 3.0	3.09	kBTU/hour input capacity	15	100.00%	5.00%	100.00%
C&I Prescriptive	Condensing Storage Water Heater - GT 75 & LTE 250 kBTU/Hr	Quasi	TRM 3.0	2.22	kBTU/hour input capacity	15	100.00%	5.00%	100.00%
C&I Prescriptive	Condensing Storage Water Heater - GT 75 & LTE 250 kBTU/Hr	Quasi	TRM 3.0	1.36000	kBTU/hour input capacity	15	100.00%	5.00%	100.00%
C&I Prescriptive	Condensing Tankless Water Heater - GT 75 & LT 200 kBTU/hr	Mixed	TRM 3.0	212+0.79	unit + kBTU/hour input capacity	20	100.00%	2.00%	100.00%
C&I Prescriptive	Condensing Tankless Water Heater - GT 75 & LT 200 kBTU/hr	Mixed	TRM 3.0	212+1.29	unit + kBTU/hour input capacity	20	100.00%	2.00%	100.00%
C&I Prescriptive	Condensing Tankless Water Heater - GT 75 & LT 200 kBTU/hr	Mixed	TRM 3.0	212+1.79	unit + kBTU/hour input capacity	20	100.00%	2.00%	100.00%
C&I Prescriptive	Condensing Tankless Water Heater - GTE 200 kBTU/hr	Mixed	TRM 3.0	326+1.29	unit + kBTU/hour input capacity	20	100.00%	2.00%	100.00%
C&I Prescriptive	DCKV- NC - 10,001 to 15,000 cfm - Install After July 13 2018	Pure	TRM 3.0	17,529.00	unit	15	100.00%	5.00%	100.00%
C&I Prescriptive	DCKV- NC - 5,001 to 10,000 cfm - Install After July 13 2018	Pure	TRM 3.0	10,517.00	unit	15	100.00%	5.00%	100.00%

Program	Measure	Pure or Quasi	Source	Savings Factor (m ³)	Unit	EUL	Gross Realization Rate	Free Ridership	Adjustment Factor
C&I Prescriptive	DCKV- NC - Up to 5,000 cfm - Install After July 13 2018	Pure	TRM 3.0	4,207.00	unit	15	100.00%	5.00%	100.00%
C&I Prescriptive	DCKV- RF - 10,001 to 15,000 cfm with LTO BONUS	Pure	TRM 3.0	17,529.00	unit	15	100.00%	5.00%	100.00%
C&I Prescriptive	DCKV- RF - 10,001 to 15,000 cfm with LTO BONUS	Pure	TRM 3.0	17,529.00	unit	15	100.00%	5.00%	100.00%
C&I Prescriptive	DCKV- RF - 5,001 to 10,000 cfm with LTO BONUS	Pure	TRM 3.0	10,517.00	unit	15	100.00%	5.00%	100.00%
C&I Prescriptive	DCKV- RF - 5,001 to 10,000 cfm with LTO BONUS	Pure	TRM 3.0	10,517.00	unit	15	100.00%	5.00%	100.00%
C&I Prescriptive	DCKV- RF - Up to 5,000 cfm with LTO BONUS	Pure	TRM 3.0	4,207.00	unit	15	100.00%	5.00%	100.00%
C&I Prescriptive	DCV - Office - NC/TNR	Quasi	TRM 3.0	0.11200	ft ²	15	100.00%	20.00%	100.00%
C&I Prescriptive	DCV - Office - Retrofit	Quasi	TRM 3.0	0.11200	ft ²	15	100.00%	5.00%	100.00%
C&I Prescriptive	DCV - Retail - NC/TNR	Quasi	TRM 3.0	0.39200	ft ²	15	100.00%	20.00%	100.00%
C&I Prescriptive	DCV - Retail - Retrofit	Quasi	TRM 3.0	0.39200	ft ²	15	100.00%	5.00%	100.00%
C&I Prescriptive	DCV-Cinemas & Performing Arts-Retrofit	Quasi	TRM 3.0	1.69000	ft ²	15	100.00%	5.00%	100.00%
C&I Prescriptive	DCV-Community Center Meeting Spaces-NC/TNR	Quasi	TRM 3.0	0.44100	ft ²	15	100.00%	20.00%	100.00%
C&I Prescriptive	DCV-Community Center Meeting Spaces-Retrofit	Quasi	TRM 3.0	0.44100	ft ²	15	100.00%	5.00%	100.00%
C&I Prescriptive	DCV-Post-Secondary Education Classrooms-NC/TNR	Quasi	TRM 3.0	0.60100	ft ²	15	100.00%	20.00%	100.00%
C&I Prescriptive	DCV-Primary/Secondary Education Gymnasiums-NC/TNR	Quasi	TRM 3.0	1.48400	ft ²	15	100.00%	20.00%	100.00%
C&I Prescriptive	DCV-Primary/Secondary Education Gymnasiums-Retrofit	Quasi	TRM 3.0	1.48400	ft ²	15	100.00%	5.00%	100.00%
C&I Prescriptive	Destratification Fan - 20ft	Pure	TRM 3.0	2,029.00	unit	15	100.00%	10.00%	100.00%
C&I Prescriptive	Destratification Fan - 20ft	Pure	TRM 3.0	1,472.00	unit	15	100.00%	10.00%	100.00%
C&I Prescriptive	Destratification Fan - 24ft	Pure	TRM 3.0	2,120.00	unit	15	100.00%	10.00%	100.00%
C&I Prescriptive	Dishwasher-Single Tank Conveyor-High Temperature	Pure	TRM 3.0	540.00	unit	20	100.00%	27.00%	100.00%

Program	Measure	Pure or Quasi	Source	Savings Factor (m ³)	Unit	EUL	Gross Realization Rate	Free Ridership	Adjustment Factor
C&I Prescriptive	Dishwasher-Under Counter-High Temperature	Pure	TRM 3.0	137.00	unit	10	100.00%	40.00%	100.00%
C&I Prescriptive	Dishwasher-Under Counter-Low Temperature	Pure	TRM 3.0	322.00	unit	10	100.00%	40.00%	100.00%
C&I Prescriptive	Energy Recovery Ventilator (ERV)-GTE 55% Sensible Heat Recovery	Quasi	TRM 3.0, 2017 C&I Prescriptive Verification Study	1.69000	CFM	14	99.55%	5.00%	100.00%
C&I Prescriptive	Energy Recovery Ventilator (ERV)-GTE 55% Sensible Heat Recovery	Quasi	TRM 3.0, 2017 C&I Prescriptive Verification Study	1.69000	CFM	14	99.55%	5.00%	100.00%
C&I Prescriptive	Energy Recovery Ventilator (ERV)-GTE 55% Sensible Heat Recovery	Quasi	TRM 3.0, 2017 C&I Prescriptive Verification Study	2.65	CFM	14	99.55%	5.00%	100.00%
C&I Prescriptive	Energy Recovery Ventilator (ERV)-GTE 65% Sensible Heat Recovery	Quasi	TRM 3.0, 2017 C&I Prescriptive Verification Study	2.01	CFM	14	99.55%	5.00%	100.00%
C&I Prescriptive	Energy Recovery Ventilator (ERV)-GTE 65% Sensible Heat Recovery	Quasi	TRM 3.0, 2017 C&I Prescriptive Verification Study	3.14	CFM	14	99.55%	5.00%	100.00%
C&I Prescriptive	Energy Recovery Ventilator (ERV)-GTE 65% Sensible Heat Recovery	Quasi	TRM 3.0, 2017 C&I Prescriptive Verification Study	2.01	CFM	14	99.55%	5.00%	100.00%
C&I Prescriptive	Energy Recovery Ventilator (ERV)-GTE 65% Sensible Heat Recovery	Quasi	TRM 3.0, 2017 C&I Prescriptive Verification Study	5.66	CFM	14	99.55%	5.00%	100.00%
C&I Prescriptive	Energy Recovery Ventilator (ERV)-GTE 65% Sensible Heat Recovery	Quasi	TRM 3.0, 2017 C&I Prescriptive Verification Study	3.14	CFM	14	99.55%	5.00%	100.00%
C&I Prescriptive	Energy Recovery Ventilator (ERV)-GTE 65% Sensible Heat Recovery	Quasi	TRM 3.0, 2017 C&I Prescriptive Verification Study	5.66	CFM	14	99.55%	5.00%	100.00%
C&I Prescriptive	Energy Recovery Ventilator (ERV)-GTE 65% SHR - In-Suite	Quasi	TRM 3.0, 2017 C&I Prescriptive Verification Study	5.66	CFM	14	99.55%	5.00%	100.00%
C&I Prescriptive	Energy Recovery Ventilator (ERV)-GTE 65% SHR - In-Suite	Quasi	TRM 3.0, 2017 C&I Prescriptive Verification Study	5.66	CFM	14	99.55%	5.00%	100.00%
C&I Prescriptive	Energy Recovery Ventilator (ERV)-GTE 75% Sensible Heat Recovery	Quasi	TRM 3.0, 2017 C&I Prescriptive Verification Study	2.33	CFM	14	99.55%	5.00%	100.00%
C&I Prescriptive	Energy Recovery Ventilator (ERV)-GTE 75% Sensible Heat Recovery	Quasi	TRM 3.0, 2017 C&I Prescriptive Verification Study	2.33	CFM	14	99.55%	5.00%	100.00%

Program	Measure	Pure or Quasi	Source	Savings Factor (m ³)	Unit	EUL	Gross Realization Rate	Free Ridership	Adjustment Factor
C&I Prescriptive	Energy Recovery Ventilator (ERV)-GTE 75% Sensible Heat Recovery	Quasi	TRM 3.0, 2017 C&I Prescriptive Verification Study	3.64	CFM	14	99.55%	5.00%	100.00%
C&I Prescriptive	Energy Recovery Ventilator (ERV)-GTE 75% Sensible Heat Recovery	Quasi	TRM 3.0, 2017 C&I Prescriptive Verification Study	6.56	CFM	14	99.55%	5.00%	100.00%
C&I Prescriptive	Energy Recovery Ventilator (ERV)-GTE 85% Sensible Heat Recovery	Quasi	TRM 3.0, 2017 C&I Prescriptive Verification Study	7.46	CFM	14	99.55%	5.00%	100.00%
C&I Prescriptive	Energy Recovery Ventilator (ERV)-GTE 85% Sensible Heat Recovery	Quasi	TRM 3.0, 2017 C&I Prescriptive Verification Study	2.65	CFM	14	99.55%	5.00%	100.00%
C&I Prescriptive	Energy Recovery Ventilator (ERV)-GTE 85% Sensible Heat Recovery	Quasi	TRM 3.0, 2017 C&I Prescriptive Verification Study	2.65	CFM	14	99.55%	5.00%	100.00%
C&I Prescriptive	Energy Recovery Ventilator (ERV)-Incremental-GTE 65% Sensible Heat Recovery	Quasi	TRM 3.0, 2017 C&I Prescriptive Verification Study	0.90000	CFM	14	99.55%	5.00%	100.00%
C&I Prescriptive	Energy Recovery Ventilator (ERV)-Incremental-GTE 65% Sensible Heat Recovery	Quasi	TRM 3.0, 2017 C&I Prescriptive Verification Study	0.32000	CFM	14	99.55%	5.00%	100.00%
C&I Prescriptive	Energy Recovery Ventilator (ERV)-Incremental-GTE 75% Sensible Heat Recovery	Quasi	TRM 3.0, 2017 C&I Prescriptive Verification Study	0.64000	CFM	14	99.55%	5.00%	100.00%
C&I Prescriptive	Heat Recovery Ventilator (HRV)-GTE 55% Sensible Heat Recovery	Quasi	TRM 3.0	4.03	CFM	14	100.00%	5.00%	100.00%
C&I Prescriptive	Heat Recovery Ventilator (HRV)-GTE 55% Sensible Heat Recovery	Quasi	TRM 3.0	1.43000	CFM	14	100.00%	5.00%	100.00%
C&I Prescriptive	Heat Recovery Ventilator (HRV)-GTE 55% Sensible Heat Recovery	Quasi	TRM 3.0	4.03	CFM	14	100.00%	5.00%	100.00%
C&I Prescriptive	Heat Recovery Ventilator (HRV)-GTE 55% Sensible Heat Recovery	Quasi	TRM 3.0	2.24	CFM	14	100.00%	5.00%	100.00%
C&I Prescriptive	Heat Recovery Ventilator (HRV)-GTE 55% Sensible Heat Recovery	Quasi	TRM 3.0	1.43000	CFM	14	100.00%	5.00%	100.00%
C&I Prescriptive	Heat Recovery Ventilator (HRV)-GTE 65% Sensible Heat Recovery	Quasi	TRM 3.0	4.76	CFM	14	100.00%	5.00%	100.00%

Program	Measure	Pure or Quasi	Source	Savings Factor (m ³)	Unit	EUL	Gross Realization Rate	Free Ridership	Adjustment Factor
C&I Prescriptive	Heat Recovery Ventilator (HRV)-GTE 65% Sensible Heat Recovery	Quasi	TRM 3.0	2.64	CFM	14	100.00%	5.00%	100.00%
C&I Prescriptive	Heat Recovery Ventilator (HRV)-GTE 65% Sensible Heat Recovery	Quasi	TRM 3.0	1.69000	CFM	14	100.00%	5.00%	100.00%
C&I Prescriptive	Heat Recovery Ventilator (HRV)-GTE 65% Sensible Heat Recovery	Quasi	TRM 3.0	1.69000	CFM	14	100.00%	5.00%	100.00%
C&I Prescriptive	Heat Recovery Ventilator (HRV)-GTE 65% Sensible Heat Recovery	Quasi	TRM 3.0	4.76	CFM	14	100.00%	5.00%	100.00%
C&I Prescriptive	Heat Recovery Ventilator (HRV)-GTE 65% SHR - In-Suite	Quasi	TRM 3.0	4.76	CFM	14	100.00%	5.00%	100.00%
C&I Prescriptive	Heat Recovery Ventilator (HRV)-GTE 75% Sensible Heat Recovery	Quasi	TRM 3.0	1.95000	CFM	14	100.00%	5.00%	100.00%
C&I Prescriptive	Heat Recovery Ventilator (HRV)-GTE 75% Sensible Heat Recovery	Quasi	TRM 3.0	1.95000	CFM	14	100.00%	5.00%	100.00%
C&I Prescriptive	Heat Recovery Ventilator (HRV)-GTE 75% Sensible Heat Recovery	Quasi	TRM 3.0	3.05	CFM	14	100.00%	5.00%	100.00%
C&I Prescriptive	Heat Recovery Ventilator (HRV)-GTE 75% Sensible Heat Recovery	Quasi	TRM 3.0	5.49	CFM	14	100.00%	5.00%	100.00%
C&I Prescriptive	Heat Recovery Ventilator (HRV)-GTE 75% Sensible Heat Recovery	Quasi	TRM 3.0	3.05	CFM	14	100.00%	5.00%	100.00%
C&I Prescriptive	Heat Recovery Ventilator (HRV)-GTE 75% Sensible Heat Recovery	Quasi	TRM 3.0	5.49	CFM	14	100.00%	5.00%	100.00%
C&I Prescriptive	Heat Recovery Ventilator (HRV)-GTE 85% Sensible Heat Recovery	Quasi	TRM 3.0	6.22	CFM	14	100.00%	5.00%	100.00%
C&I Prescriptive	Heat Recovery Ventilator (HRV)-GTE 85% Sensible Heat Recovery	Quasi	TRM 3.0	2.21	CFM	14	100.00%	5.00%	100.00%
C&I Prescriptive	Heat Recovery Ventilator (HRV)-GTE 85% Sensible Heat Recovery	Quasi	TRM 3.0	6.22	CFM	14	100.00%	5.00%	100.00%

Program	Measure	Pure or Quasi	Source	Savings Factor (m ³)	Unit	EUL	Gross Realization Rate	Free Ridership	Adjustment Factor
C&I Prescriptive	Heat Recovery Ventilator (HRV)-GTE 85% Sensible Heat Recovery	Quasi	TRM 3.0	2.21	CFM	14	100.00%	5.00%	100.00%
C&I Prescriptive	Heat Recovery Ventilator (HRV)-Incremental-GTE 65% Sensible Heat Recovery	Quasi	TRM 3.0	0.26000	CFM	14	100.00%	5.00%	100.00%
C&I Prescriptive	Heat Recovery Ventilator (HRV)-Incremental-GTE 75% Sensible Heat Recovery	Quasi	TRM 3.0	0.52000	CFM	14	100.00%	5.00%	100.00%
C&I Prescriptive	Infrared Heater - Single Stage / High Intensity	Quasi	TRM 3.0, 2017 C&I Prescriptive Verification Study	8.60	kBTU/hour input capacity	17	102.67%	33.00%	100.00%
C&I Prescriptive	Infrared Heater - Single Stage / High Intensity	Quasi	TRM 3.0, 2017 C&I Prescriptive Verification Study	8.60	kBTU/hour input capacity	17	102.67%	33.00%	100.00%
C&I Prescriptive	Infrared Heater - Single Stage / High Intensity	Quasi	TRM 3.0, 2017 C&I Prescriptive Verification Study	11.50	kBTU/hour input capacity	17	102.67%	33.00%	100.00%
C&I Prescriptive	Infrared Heater - Single Stage / High Intensity	Quasi	TRM 3.0, 2017 C&I Prescriptive Verification Study	11.50	kBTU/hour input capacity	17	102.67%	33.00%	100.00%
C&I Prescriptive	Infrared Heater - Single Stage / High Intensity	Quasi	TRM 3.0, 2017 C&I Prescriptive Verification Study	8.60	kBTU/hour input capacity	17	102.67%	33.00%	100.00%
C&I Prescriptive	Infrared Heater - Two Stage	Quasi	TRM 3.0, 2017 C&I Prescriptive Verification Study	9.80	kBTU/hour input capacity	17	102.67%	33.00%	100.00%
C&I Prescriptive	Infrared Heater - Two Stage	Quasi	TRM 3.0, 2017 C&I Prescriptive Verification Study	9.80	kBTU/hour input capacity	17	102.67%	33.00%	100.00%
C&I Prescriptive	Infrared Heater - Two Stage	Quasi	TRM 3.0, 2017 C&I Prescriptive Verification Study	13.10	kBTU/hour input capacity	17	102.67%	33.00%	100.00%
C&I Prescriptive	Infrared Heater - Two Stage	Quasi	TRM 3.0, 2017 C&I Prescriptive Verification Study	13.10	kBTU/hour input capacity	17	102.67%	33.00%	100.00%
C&I Prescriptive	Infrared Heater - Two Stage	Quasi	TRM 3.0, 2017 C&I Prescriptive Verification Study	9.80	kBTU/hour input capacity	17	102.67%	33.00%	100.00%
C&I Prescriptive	Make-Up Air Unit (MUA) - 2 Speed GTE 5000 CFM - WITH LTO BONUS	Quasi	TRM 3.0	1.22000	CFM	20	100.00%	5.00%	100.00%
C&I Prescriptive	Make-Up Air Unit (MUA) - Constant Speed	Quasi	TRM 3.0	0.91900	CFM	20	100.00%	5.00%	100.00%

Program	Measure	Pure or Quasi	Source	Savings Factor (m ³)	Unit	EUL	Gross Realization Rate	Free Ridership	Adjustment Factor
C&I Prescriptive	Make-Up Air Unit (MUA) - VFD	Quasi	TRM 3.0	3.00	CFM	20	100.00%	5.00%	100.00%
C&I Prescriptive	Make-Up Air Unit (MUA) - VFD	Quasi	TRM 3.0	2.03	CFM	20	100.00%	5.00%	100.00%
C&I Prescriptive	Make-Up Air Unit (MUA) - VFD - GTE 5000 CFM WITH LTO BONUS	Quasi	TRM 3.0	2.03	CFM	20	100.00%	5.00%	100.00%
C&I Prescriptive	Ozone Laundry - Washer Extractor	Quasi	TRM 3.0	0.03830	pounds/year	15	100.00%	8.00%	100.00%
C&I Prescriptive	Ozone Laundry - Washer Extractor purchased after June 21st 2019	Quasi	TRM 3.0	0.03830	pounds/year	15	100.00%	8.00%	100.00%
C&I Prescriptive	Ozone Laundry - Washer Extractor purchased after June 21st 2019	Quasi	TRM 3.0	0.03830	pounds/year	15	100.00%	8.00%	100.00%
Furnace End-of-Life	Furnace - Social and Assisted Housing	Quasi	TRM 3.0	1.05000	kBTU/hour input capacity	18	100.00%	0.00%	100.00%
Home Weatherization	Bathroom Aerator	Pure	TRM 3.0, Low Income Kits Verification Study	6.40	unit	10	100.00%	1.00%	86.10%
Home Weatherization	Kitchen Aerator	Pure	TRM 3.0, Low Income Kits Verification Study	11.56	unit	10	100.00%	1.00%	81.20%
Home Weatherization	Pipe Insulation	Pure	TRM 3.0, Low Income Kits Verification Study	3.64	foot	15	100.00%	1.00%	93.90%
Home Weatherization	Showerhead Replacement 1.25 GPM	Pure	TRM 3.0, Low Income Kits Verification Study	28.20	unit	10	100.00%	1.00%	79.90%
Home Weatherization	Smart Thermostats	Pure	TRM 3.0	173.00	unit	15	100.00%	1.00%	100.00%
Home Weatherization	Smart Thermostats	Pure	TRM 3.0	173.00	unit	15	100.00%	1.00%	100.00%
Home Weatherization	Smart Thermostats	Pure	TRM 3.0	217.00	unit	15	100.00%	1.00%	100.00%
Home Weatherization	Smart Thermostats	Pure	TRM 3.0	217.00	unit	15	100.00%	1.00%	100.00%
Indigenous	Bathroom Aerator	Pure	TRM 3.0	6.40	unit	10	100.00%	1.00%	100.00%
Indigenous	Kitchen Aerator	Pure	TRM 3.0	11.56	unit	10	100.00%	1.00%	100.00%
Indigenous	Pipe Insulation	Pure	TRM 3.0	3.64	foot	15	100.00%	1.00%	100.00%

Program	Measure	Pure or Quasi	Source	Savings Factor (m ³)	Unit	EUL	Gross Realization Rate	Free Ridership	Adjustment Factor
Indigenous	Showerhead Replacement 1.25 GPM	Pure	TRM 3.0	28.20	unit	10	100.00%	1.00%	100.00%
Multi-family	Commercial High Efficiency Furnace In-Suite-LI	Quasi	TRM 3.0	1.05000	kBTU/hour input capacity	18	100.00%	5.00%	100.00%
Multi-family	Condensing Boiler - Space Heating - 300 to 999 MBH	Quasi	TRM 3.0	0.01040	BTU/hour	25	100.00%	5.00%	100.00%
Multi-family	Condensing Boiler - Space Heating - GTE 1000 MBH	Quasi	TRM 3.0	0.01040	BTU/hour	25	100.00%	5.00%	100.00%
Multi-family	Condensing Boiler - Space Heating - LT 300 MBH	Quasi	TRM 3.0	0.01019	BTU/hour	25	100.00%	5.00%	100.00%
Multi-family	Condensing Boiler - Space Heating - LT 300 MBH	Quasi	TRM 3.0	0.01019	BTU/hour	25	100.00%	5.00%	100.00%
Multi-family	Condensing Boiler - Space Heating - LT 300 MBH	Quasi	TRM 3.0	0.01019	BTU/hour	25	100.00%	5.00%	100.00%
Multi-family	Condensing Boiler - Water Heating - GTE 1000 MBH	Quasi	TRM 3.0, Condensing Boiler Document	0.00644	BTU/hour	25	100.00%	5.00%	100.00%
Multi-family	Condensing Boiler - Water Heating - LT 300 MBH	Quasi	TRM 3.0	0.01332	BTU/hour	25	100.00%	5.00%	100.00%
Multi-family	Condensing Boiler - Water Heating - LT 300 MBH	Quasi	TRM 3.0	0.00996	BTU/hour	25	100.00%	5.00%	100.00%
Multi-family	Condensing Storage Water Heater - GT 250 kBTU/hr	Quasi	TRM 3.0	3.09	kBTU/hour input capacity	15	100.00%	5.00%	100.00%
Multi-family	Condensing Storage Water Heater - GT 75 & LTE 250 kBTU/Hr	Quasi	TRM 3.0	3.09	kBTU/hour input capacity	15	100.00%	5.00%	100.00%
Multi-family	Condensing Tankless Water Heater - GT 75 & LT 200 kBTU/hr	Mixed	TRM 3.0	212+1.79	unit + kBTU/hour input capacity	20	100.00%	2.00%	100.00%
Multi-family	Energy Recovery Ventilator (ERV)-GTE 75% Sensible Heat Recovery-LI	Quasi	TRM 3.0	6.56	CFM	14	100.00%	5.00%	100.00%
Multi-family	Energy Recovery Ventilator (ERV)-GTE 75% SHR - In-Suite-LI	Quasi	TRM 3.0	6.56	CFM	14	100.00%	5.00%	100.00%
Multi-family	Energy Recovery Ventilator (ERV)-Incremental-GTE 65% Sensible Heat Recovery	Quasi	TRM 3.0	0.90000	CFM	14	100.00%	5.00%	100.00%
Multi-family	Energy Recovery Ventilator (ERV)-Incremental-GTE 75% Sensible Heat Recovery	Quasi	TRM 3.0	1.80000	CFM	14	100.00%	5.00%	100.00%

Program	Measure	Pure or Quasi	Source	Savings Factor (m ³)	Unit	EUL	Gross Realization Rate	Free Ridership	Adjustment Factor
Multi-family	Heat Recovery Ventilator (HRV)-GTE 65% SHR - In-Suite-LI	Quasi	TRM 3.0	4.76	CFM	14	100.00%	5.00%	100.00%
Multi-family	Make-Up Air Unit (MUA) - 2 Speed	Quasi	TRM 3.0	2.45	CFM	20	100.00%	5.00%	100.00%
Multi-family	Make-Up Air Unit (MUA) - VFD	Quasi	TRM 3.0	3.00	CFM	20	100.00%	5.00%	100.00%
Residential Adaptive Thermostats	Smart Thermostats	Pure	TRM 3.0	185.00	unit	15	100.00%	4.00%	100.00%
Residential Adaptive Thermostats	Smart Thermostats-Instant Rebate	Pure	TRM 3.0, Adaptive Ecobee Thermostat Ping Report	185.00	unit	15	100.00%	4.00%	80.20%

*Not all values may compute exactly due to rounding.

Savings Calculation Measure Totals

Table 11-150. Enbridge Measure Savings, Tracked and Verified, by Annual and Cumulative, Gross and Net*

Program	Measure	Tracked				Verified			
		Annual		Cumulative		Annual		Cumulative	
		Gross	Net	Gross	Net	Gross	Net	Gross	Net
C&I Direct Install	DI DCKV 10,001 - 15,000 CFM Cx [Retrofit]	438,225	416,314	6,573,375	6,244,706	438,225	416,314	6,573,375	6,244,706
C&I Direct Install	DI DCKV 5,001 - 10,000 CFM Cx [Retrofit]	809,809	769,319	12,147,135	11,539,778	809,809	769,319	12,147,135	11,539,778
C&I Direct Install	DI DCKV up to 5000 CFM Cx [Retrofit]	21,035	19,983	315,525	299,749	21,035	19,983	315,525	299,749
C&I Direct Install	Direct Install Air Curtain 10 x 10 Cx Offer	960,336	912,319	14,405,040	13,684,788	960,336	912,319	14,405,040	13,684,788
C&I Direct Install	Direct Install Air Curtain 8 x 10 Cx Offer	2,955,477	2,807,703	44,332,155	42,115,547	2,955,477	2,807,703	44,332,155	42,115,547
C&I Direct Install	Direct Install Air Curtain 8 x 8 Cx Offer	489,174	464,715	7,337,610	6,970,730	489,174	464,715	7,337,610	6,970,730
C&I Direct Install	Direct Install Air Curtain Single 7 x 3 Door Cx Offer	18,734	17,797	281,010	266,960	18,734	17,797	281,010	266,960
C&I Direct Install	Direct Install Air Curtain Single 7 x 6 Door Cx Offer	6,460	6,137	96,900	92,055	6,460	6,137	96,900	92,055
C&I Direct Install	Direct Install Ind Air Curtain 10 x 10 Cx Offer	300,105	285,100	4,501,575	4,276,496	300,105	285,100	4,501,575	4,276,496
C&I Direct Install	Direct Install Ind Air Curtain 8 x 10 Cx Offer	1,936,347	1,839,530	29,045,205	27,592,945	1,936,347	1,839,530	29,045,205	27,592,945
C&I Direct Install	Direct Install Ind Air Curtain 8 x 8 Cx Offer	163,058	154,905	2,445,870	2,323,577	163,058	154,905	2,445,870	2,323,577
C&I Direct Install	Direct Install Ind Air Curtain Single 7 x 3 Door Cx Offer	1,938	1,841	29,070	27,617	1,938	1,841	29,070	27,617
C&I Prescriptive	2-Stage Infrared Heaters (50,000 - 164,999 BTUH) [Retrofit]	1,076	721	18,293	12,257	1,076	721	18,293	12,257

Program	Measure	Tracked				Verified			
		Annual		Cumulative		Annual		Cumulative	
		Gross	Net	Gross	Net	Gross	Net	Gross	Net
C&I Prescriptive	Air Curtain 8 x 10 Cx Offer	43,677	41,493	655,155	622,397	43,677	41,493	655,155	622,397
C&I Prescriptive	Air Curtain Double 7 x 3 Door Cx Offer	2,584	2,455	38,760	36,822	2,584	2,455	38,760	36,822
C&I Prescriptive	Air Curtain Pedestrian Double Door with Vestibule 2x7'x6' - Heated Air Curtain	3,462	3,289	51,930	49,334	3,462	3,289	51,930	49,334
C&I Prescriptive	Bonus Incentive - Air Curtain 10 x 10 Cx Offer	40,014	38,013	600,210	570,200	40,014	38,013	600,210	570,200
C&I Prescriptive	Bonus Incentive - Air Curtain 8 x 10 Cx Offer	189,267	179,804	2,839,005	2,697,055	189,267	179,804	2,839,005	2,697,055
C&I Prescriptive	Bonus Incentive - DCKV up to 5000 CFM Cx [Retrofit]	4,322	4,106	64,834	61,592	4,322	4,106	64,834	61,592
C&I Prescriptive	Bonus Incentive - Ind Air Curtain 10 x 10 Cx Offer	20,007	19,007	300,105	285,100	20,007	19,007	300,105	285,100
C&I Prescriptive	Bonus Incentive - Ozone Washer Extractor >60lbs<500lbs [New]	160,904	148,032	2,413,561	2,220,476	160,904	148,032	2,413,561	2,220,476
C&I Prescriptive	Commercial High Eff Boiler 1000-1499MBH Seasonal Cx [Replacement]	20,504	18,044	512,600	451,088	24,282	21,368	607,050	534,204
C&I Prescriptive	Commercial High Eff Boiler 2000MBH Seasonal Cx [Replacement]	46,146	40,608	1,153,650	1,015,212	54,650	48,092	1,366,250	1,202,300
C&I Prescriptive	Commercial High Eff Boiler 600-999MBH Seasonal Cx [Replacement]	11,202	9,858	280,050	246,444	13,266	11,674	331,650	291,852
C&I Prescriptive	Commercial High Eff Boiler DWH 1000-1499MBH Non Seasonal Cx [Replacement]	14,550	12,804	363,750	320,100	16,293	14,338	407,325	358,446

Program	Measure	Tracked				Verified			
		Annual		Cumulative		Annual		Cumulative	
		Gross	Net	Gross	Net	Gross	Net	Gross	Net
C&I Prescriptive	Commercial High Eff Boiler DWH 600-999MBH Non Seasonal Cx [Replacement]	2,747	2,417	68,675	60,434	3,076	2,707	76,900	67,672
C&I Prescriptive	Cond Boiler 100-199MBH [Replacement]	3,213	3,052	80,325	76,309	3,210	3,049	80,246	76,234
C&I Prescriptive	Cond MUA Two Speed up to 14,000 CFM - Other/Commercial [New/Existing]	21,960	20,862	439,200	417,240	21,960	20,862	439,200	417,240
C&I Prescriptive	Cond Tankless High Usage >200 Kbtu Cx - Water Heating	756	740	15,112	14,810	756	740	15,112	14,810
C&I Prescriptive	Cond Tankless High Usage 75-200 Kbtu Cx - Water Heating	568	557	11,364	11,137	568	557	11,364	11,137
C&I Prescriptive	Cond Tankless Low Usage 75-200 Kbtu Cx - Water Heating	369	362	7,384	7,237	369	362	7,384	7,237
C&I Prescriptive	Condensing Boiler 100-199MBH [Replacement]	1,571	1,492	39,270	37,307	1,569	1,491	39,232	37,270
C&I Prescriptive	Condensing Boilers - DHW 100 - 199 MBH [Replacement]	1,995	1,895	49,875	47,381	1,998	1,898	49,950	47,453
C&I Prescriptive	Condensing Boilers - DHW 200 - 299 MBH [Replacement]	8,730	8,294	218,250	207,338	8,695	8,260	217,377	206,508
C&I Prescriptive	Condensing Furnace High Efficiency 0-74 KBtu/hr Cx [Existing]	403	332	7,254	5,985	404	334	7,277	6,004
C&I Prescriptive	Condensing Furnace High Efficiency 75-149 KBtu/hr Cx [Existing]	2,831	2,335	50,951	42,034	2,836	2,340	51,054	42,119
C&I Prescriptive	Condensing Storage Water Heater High Utilization >75 and <=250 Kbtu/Hr Cx [New Construction]	2,317	2,201	34,758	33,020	2,317	2,201	34,758	33,020

Program	Measure	Tracked				Verified			
		Annual		Cumulative		Annual		Cumulative	
		Gross	Net	Gross	Net	Gross	Net	Gross	Net
C&I Prescriptive	Condensing Tankless High Usage 75-199 Kbtu Cx - Water Heating	1,068	1,047	21,368	20,941	1,068	1,047	21,368	20,941
C&I Prescriptive	DCKV 10,001 - 15,000 CFM Cx [New]	36,019	34,218	540,279	513,265	36,019	34,218	540,279	513,265
C&I Prescriptive	DCKV 10,001 - 15,000 CFM Cx [Retrofit]	108,056	102,653	1,620,837	1,539,795	108,056	102,653	1,620,837	1,539,795
C&I Prescriptive	DCKV 5,001 - 10,000 CFM Cx [New]	64,831	61,589	972,465	923,842	64,831	61,589	972,465	923,842
C&I Prescriptive	DCKV 5,001 - 10,000 CFM Cx [Retrofit]	162,077	153,974	2,431,162	2,309,604	162,077	153,974	2,431,162	2,309,604
C&I Prescriptive	DCKV up to 5,000 CFM Cx [New]	34,578	32,849	518,673	492,739	34,578	32,849	518,673	492,739
C&I Prescriptive	DCKV up to 5000 CFM Cx [Retrofit]	99,412	94,442	1,491,184	1,416,625	99,412	94,442	1,491,184	1,416,625
C&I Prescriptive	DCV Single Zone Retail with Maintenance Cx [New]	26,499	21,199	397,488	317,990	26,535	21,228	398,023	318,418
C&I Prescriptive	DCV Single Zone Retail with Maintenance Cx [Retrofit]	997,835	947,943	14,967,527	14,219,150	999,178	949,219	14,987,675	14,238,292
C&I Prescriptive	Destratification Fan Cx 20 ft [Retrofit]	2,029	1,826	30,435	27,392	2,029	1,826	30,435	27,392
C&I Prescriptive	Destratification Fan Cx 24 ft [Retrofit]	26,298	23,668	394,470	355,023	26,298	23,668	394,470	355,023
C&I Prescriptive	DW Single Tank Conveyor High Cx [New/Replacement]	540	394	10,800	7,884	540	394	10,800	7,884
C&I Prescriptive	DW Under-Counter High Temp Cx [New/Replacement]	274	164	2,740	1,644	274	164	2,740	1,644
C&I Prescriptive	Energy Star Steam Cooker [New/Replacement]	8,889	7,111	106,668	85,334	8,889	7,111	106,668	85,334
C&I Prescriptive	ERV High Use > 85% Cx [New/Existing]	540	513	7,560	7,182	540	513	7,560	7,182
C&I Prescriptive	ERV Vent Low Stand Office 75% Cx [New]	2,330	2,214	32,620	30,989	2,330	2,214	32,620	30,989

Program	Measure	Tracked				Verified			
		Annual		Cumulative		Annual		Cumulative	
		Gross	Net	Gross	Net	Gross	Net	Gross	Net
C&I Prescriptive	ERV Vent Med Int Retail Res 65% Cx [New]	63,428	60,257	887,992	843,592	63,428	60,257	887,992	843,592
C&I Prescriptive	ERV Vent Med Int Retail Res 75% Cx [New]	116,116	110,310	1,625,624	1,544,343	116,116	110,310	1,625,624	1,544,343
C&I Prescriptive	ERV Vent Med Stand Retail 55% Cx [New]	2,915	2,769	40,810	38,770	2,915	2,769	40,810	38,770
C&I Prescriptive	ERV Vent Med Stand Retail 65% Cx [New]	43,586	41,407	610,209	579,698	43,586	41,407	610,209	579,698
C&I Prescriptive	ES Fryer Cx	98,560	78,848	1,182,720	946,176	98,560	78,848	1,182,720	946,176
C&I Prescriptive	HRV Vent High Int Multi Res 65% [New]	16,184	15,375	226,576	215,247	16,184	15,375	226,576	215,247
C&I Prescriptive	HRV Vent High Int Multi Res 75% [New]	15,372	14,603	215,208	204,448	15,372	14,603	215,208	204,448
C&I Prescriptive	HRV Vent Med Stand Retail 55% [New]	3,136	2,979	43,904	41,709	3,136	2,979	43,904	41,709
C&I Prescriptive	Ind 2-Stage Infrared Heaters (165,000 - 300,000 BTUH) [Retrofit] - Space Heating	2,690	1,802	45,734	30,642	2,690	1,802	45,734	30,642
C&I Prescriptive	Ind 2-Stage Infrared Heaters (50,000 - 164,999 BTUH) [Retrofit] - Space Heating	16,814	11,265	285,835	191,510	16,814	11,265	285,835	191,510
C&I Prescriptive	Ind 2-Stage Infrared Heaters (50,000 - 164,999 BTUH) [Retrofit] - Steam Generation	1,345	901	22,867	15,321	1,345	901	22,867	15,321
C&I Prescriptive	Ind Air Curtain 10 x 10 Cx Offer	60,021	57,020	900,315	855,299	60,021	57,020	900,315	855,299
C&I Prescriptive	Ind Air Curtain 8 x 10 Cx Offer	29,118	27,662	436,770	414,932	29,118	27,662	436,770	414,932
C&I Prescriptive	Ind Air Curtain Single 7 x 3 Door Cx Offer	646	614	9,690	9,206	646	614	9,690	9,206
C&I Prescriptive	Ind Destratification Fan 20 ft [Retrofit]	14,203	12,783	213,045	191,741	14,203	12,783	213,045	191,741

Program	Measure	Tracked				Verified			
		Annual		Cumulative		Annual		Cumulative	
		Gross	Net	Gross	Net	Gross	Net	Gross	Net
C&I Prescriptive	Ind Destratification Fan 24 ft [Retrofit]	40,908	36,817	613,620	552,258	40,908	36,817	613,620	552,258
C&I Prescriptive	Ind Single Stage & High Infrared Heaters (165,000 - 300,000 BTUH) [Retrofit] - Space Heating	11,808	7,911	200,739	134,495	11,808	7,911	200,739	134,495
C&I Prescriptive	Ind Single Stage & High Infrared Heaters (50,000 - 164,999 BTUH) [Retrofit] - Space Heating	10,450	7,002	177,654	119,028	10,450	7,002	177,654	119,028
C&I Prescriptive	MS Broilers High Efficiency Under-Fired - 4 foot [New/Replacement]	3,347	2,678	40,164	32,131	3,347	2,678	40,164	32,131
C&I Prescriptive	MS Energy Star Steam Cooker [New/Replacement]	8,889	7,111	106,668	85,334	8,889	7,111	106,668	85,334
C&I Prescriptive	MS ES Fryer Cx	70,400	56,320	844,800	675,840	70,400	56,320	844,800	675,840
C&I Prescriptive	Multi Res High Eff Boiler DWH 300-599MBH Non Seasonal Cx [Replacement]	1,662	1,330	41,550	33,240	1,861	1,489	46,525	37,220
C&I Prescriptive	Multi-Res High Eff Boiler 1000-1499MBH Seasonal Cx [Replacement]	20,504	16,403	512,600	410,080	24,282	19,426	607,050	485,640
C&I Prescriptive	Multi-Res High Eff Boiler 1500-1999MBH Seasonal Cx [Replacement]	32,406	25,925	810,150	648,120	38,378	30,702	959,450	767,560
C&I Prescriptive	Multi-Res High Eff Boiler 600-999MBH Seasonal Cx [Replacement]	33,606	26,885	840,150	672,120	39,798	31,838	994,950	795,960
C&I Prescriptive	Multi-Res High Eff Boiler DWH 600-999MBH Non Seasonal Cx [Replacement]	2,747	2,198	68,675	54,940	3,076	2,461	76,900	61,520

Program	Measure	Tracked				Verified			
		Annual		Cumulative		Annual		Cumulative	
		Gross	Net	Gross	Net	Gross	Net	Gross	Net
C&I Prescriptive	Ozone Washer Extractor =/<60lbs Cx [New]	4,613	4,244	69,199	63,663	4,613	4,244	69,199	63,663
C&I Prescriptive	Ozone Washer Extractor >60lbs<500lbs [New]	81,081	74,595	1,216,217	1,118,919	81,081	74,595	1,216,217	1,118,919
C&I Prescriptive	School Board Boiler Elementary Cx [Replacement]	31,662	27,863	791,550	696,564	73,302	64,506	1,832,550	1,612,644
C&I Prescriptive	School Board Campaign - School Board Boiler Elementary Cx [Replacement]	63,324	55,725	1,583,100	1,393,128	158,821	139,762	3,970,525	3,494,062
C&I Prescriptive	Showerheads 1.50 GPM Cx Multi-Res - Water Heating	11,322	10,190	113,220	101,898	9,567	8,610	95,671	86,104
C&I Prescriptive	Single Stage & High Intensity Infrared Heaters (165,000 - 300,000 BTUH) [Retrofit]	8,266	5,538	140,518	94,147	8,266	5,538	140,518	94,147
C&I Prescriptive	Single Stage & High Intensity Infrared Heaters (50,000 - 164,999 BTUH) [Retrofit]	19,602	13,133	333,227	223,262	19,602	13,133	333,227	223,262
Home Winterproofing	Bathroom Aerator	3,443	3,443	34,432	34,432	775	775	7,747	7,747
Home Winterproofing	Kitchen Aerator	4,647	4,647	46,471	46,471	1,557	1,557	15,568	15,568
Home Winterproofing	Showerhead Replacement	13,000	13,000	130,002	130,002	11,401	11,401	114,012	114,012
Home Winterproofing	Smart Thermostats	319,439	319,439	4,791,585	4,791,585	319,439	319,439	4,791,585	4,791,585
Low-Income Multi-Residential	Low Income Condensing MUA Two Speed up to 14,000 CFM - Multi-Residential/Long Term Care [New/Existing]	128,333	128,333	2,566,669	2,566,669	128,333	128,333	2,566,669	2,566,669

Program	Measure	Tracked				Verified			
		Annual		Cumulative		Annual		Cumulative	
		Gross	Net	Gross	Net	Gross	Net	Gross	Net
Low-Income Multi-Residential	Low Income Condensing Storage Water Heater High Utilization >250 Kbtu/Hr Cx [New Construction]	927	927	13,905	13,905	927	927	13,905	13,905
Low-Income Multi-Residential	Low Income Condensing Storage Water Heater High Utilization >75 and <=250 Kbtu/Hr Cx [New Construction]	927	927	13,905	13,905	927	927	13,905	13,905
Low-Income Multi-Residential	Low Income High Eff Boiler 1500-1999MBH Seasonal Cx [Replacement]	32,406	32,406	810,150	810,150	38,378	38,378	959,450	959,450
Low-Income Multi-Residential	Low Income High Eff Boiler 300-599MBH Seasonal Cx [Replacement]	5,904	5,904	147,600	147,600	6,992	6,992	174,800	174,800
Residential Adaptive Thermostats	Smart Thermostats	1,250,535	1,200,513	18,758,023	18,007,702	1,250,535	1,200,513	18,758,023	18,007,702
Residential Adaptive Thermostats	Smart Thermostats - classic	1,194,175	1,146,408	17,912,625	17,196,120	1,194,175	1,146,408	17,912,625	17,196,120

*Not all values may compute exactly due to rounding.

Table 11-151. Union Measure Savings, Tracked and Verified, by Annual and Cumulative, Gross and Net*

Program	Measure	Tracked				Verified			
		Annual		Cumulative		Annual		Cumulative	
		Gross	Net	Gross	Net	Gross	Net	Gross	Net
C&I Direct Install	Air Curtain - Dock-In - 10 x 10	3,061,071	2,908,017	45,916,065	43,620,262	3,061,071	2,908,017	45,916,065	43,620,262
C&I Direct Install	Air Curtain - Dock-In - 8 x 10	1,674,285	1,590,571	25,114,275	23,858,561	1,674,285	1,590,571	25,114,275	23,858,561
C&I Direct Install	Air Curtain - Dock-In - 8 x 8	372,704	354,069	5,590,560	5,311,032	372,704	354,069	5,590,560	5,311,032
C&I Prescriptive	Air Curtain - (2) 7 x 3 Door	1,292	1,227	19,380	18,411	1,292	1,227	19,380	18,411
C&I Prescriptive	Air Curtain - (2) 7 x 6 Door	2,584	2,455	38,760	36,822	2,584	2,455	38,760	36,822
C&I Prescriptive	Air Curtain - 7 x 3 Door	7,752	7,364	116,280	110,466	7,752	7,364	116,280	110,466
C&I Prescriptive	Air Curtain - 8 x 10 with LTO BONUS	160,149	152,142	2,402,235	2,282,123	160,149	152,142	2,402,235	2,282,123
C&I Prescriptive	Air Curtain - 8 x 6 Door	1,560	1,482	23,400	22,230	1,560	1,482	23,400	22,230
C&I Prescriptive	Air Curtain - 8 x 8 with LTO BONUS	69,882	66,388	1,048,230	995,819	69,882	66,388	1,048,230	995,819
C&I Prescriptive	Air Curtain - Dock-In - 10 x 10 with LTO BONUS	620,217	589,206	9,303,255	8,838,092	620,217	589,206	9,303,255	8,838,092
C&I Prescriptive	Air Curtain Heated - w/ Vestibule - (2)7x3	1,730	1,644	25,950	24,653	1,730	1,644	25,950	24,653
C&I Prescriptive	Air Curtain Heated - w/ Vestibule - (2)7x6	5,193	4,933	77,895	74,000	5,193	4,933	77,895	74,000
C&I Prescriptive	Air Curtain Heated - w/ Vestibule - 7x6	865	822	12,975	12,326	865	822	12,975	12,326
C&I Prescriptive	Air Curtain Heated - w/ Vestibule - 8x6	7,315	6,949	109,725	104,239	7,315	6,949	109,725	104,239
C&I Prescriptive	Commercial Condensing Unit Heater	10,869	10,869	195,647	195,647	10,869	10,869	195,647	195,647
C&I Prescriptive	Commercial Energy Star Fryer - INSTALLED AFTER MARCH 1st 2018	83,072	66,458	996,864	797,491	83,072	66,458	996,864	797,491
C&I Prescriptive	Commercial Energy Star Fryer - INSTALLED BEFORE MARCH 1st 2018	21,120	16,896	253,440	202,752	21,120	16,896	253,440	202,752

Program	Measure	Tracked				Verified			
		Annual		Cumulative		Annual		Cumulative	
		Gross	Net	Gross	Net	Gross	Net	Gross	Net
C&I Prescriptive	Commercial Energy Star Steam Cooker - INSTALLED AFTER 1st MARCH 2018	35,556	28,445	426,672	341,338	35,556	28,445	426,672	341,338
C&I Prescriptive	Commercial High Efficiency Furnace	26,499	21,861	476,974	393,504	26,499	21,861	476,974	393,504
C&I Prescriptive	Commercial Under-Fired Broiler - INSTALLED AFTER 1st MARCH 2018	2,511	2,009	30,132	24,106	2,511	2,009	30,132	24,106
C&I Prescriptive	Condensing Boiler - Space Heating - 300 to 999 MBH - NC2018	34,541	32,814	863,522	820,346	59,672	56,688	1,491,800	1,417,210
C&I Prescriptive	Condensing Boiler - Space Heating - 300 to 999 MBH - RF	957,955	910,058	23,948,884	22,751,440	1,181,819	1,122,728	29,545,480	28,068,206
C&I Prescriptive	Condensing Boiler - Space Heating - GTE 1000 MBH - NC2018	188,714	179,279	4,717,856	4,481,963	326,018	309,717	8,150,448	7,742,926
C&I Prescriptive	Condensing Boiler - Space Heating - GTE 1000 MBH - RF	1,791,186	1,701,626	44,779,640	42,540,658	2,209,766	2,099,278	55,244,159	52,481,951
C&I Prescriptive	Condensing Boiler - Space Heating - LT 300 MBH - NC2018	5,086	4,832	127,147	120,790	14,316	13,601	357,909	340,013
C&I Prescriptive	Condensing Boiler - Space Heating - LT 300 MBH - NC2019	10,179	9,670	254,478	241,754	28,653	27,221	716,335	680,519
C&I Prescriptive	Condensing Boiler - Space Heating - LT 300 MBH - RF	208,627	198,196	5,215,673	4,954,889	208,627	198,196	5,215,673	4,954,890
C&I Prescriptive	Condensing Boiler - Water Heating - 300 to 999 MBH - RF	50,993	48,443	1,274,826	1,211,085	74,357	70,639	1,858,931	1,765,985
C&I Prescriptive	Condensing Boiler - Water Heating - GTE 1000 MBH - NC2018	6,405	6,084	160,115	152,109	13,094	12,439	327,345	310,978
C&I Prescriptive	Condensing Boiler - Water Heating - GTE 1000 MBH - RF	49,860	47,367	1,246,491	1,184,167	72,777	69,139	1,819,434	1,728,463

Program	Measure	Tracked				Verified			
		Annual		Cumulative		Annual		Cumulative	
		Gross	Net	Gross	Net	Gross	Net	Gross	Net
C&I Prescriptive	Condensing Boiler - Water Heating - LT 300 MBH - NC2019	5,624	5,343	140,608	133,578	10,443	9,921	261,078	248,024
C&I Prescriptive	Condensing Boiler - Water Heating - LT 300 MBH - RF	26,337	25,020	658,430	625,509	26,337	25,020	658,430	625,509
C&I Prescriptive	Condensing Storage Water Heater - GT 250 kBTU/hr	34,393	32,673	515,896	490,101	34,393	32,673	515,896	490,101
C&I Prescriptive	Condensing Storage Water Heater - GT 75 & LTE 250 kBTU/Hr	17,181	16,322	257,719	244,833	17,181	16,322	257,719	244,833
C&I Prescriptive	Condensing Tankless Water Heater - GT 75 & LT 200 kBTU/hr	20,365	19,958	407,309	399,163	20,365	19,958	407,309	399,163
C&I Prescriptive	Condensing Tankless Water Heater - GTE 200 kBTU/hr	636	623	12,712	12,458	636	623	12,712	12,458
C&I Prescriptive	DCKV- NC - 10,001 to 15,000 cfm - Install After July 13 2018	35,058	33,305	525,870	499,577	35,058	33,305	525,870	499,577
C&I Prescriptive	DCKV- NC - 5,001 to 10,000 cfm - Install After July 13 2018	21,034	19,982	315,510	299,735	21,034	19,982	315,510	299,735
C&I Prescriptive	DCKV- NC - Up to 5,000 cfm - Install After July 13 2018	37,863	35,970	567,945	539,548	37,863	35,970	567,945	539,548
C&I Prescriptive	DCKV- RF - 10,001 to 15,000 cfm with LTO BONUS	87,645	83,263	1,314,675	1,248,941	87,645	83,263	1,314,675	1,248,941
C&I Prescriptive	DCKV- RF - 5,001 to 10,000 cfm with LTO BONUS	94,653	89,920	1,419,795	1,348,805	94,653	89,920	1,419,795	1,348,805
C&I Prescriptive	DCKV- RF - Up to 5,000 cfm with LTO BONUS	75,726	71,940	1,135,890	1,079,096	75,726	71,940	1,135,890	1,079,096
C&I Prescriptive	DCV - Office - NC/TNR	2,023	1,618	30,346	24,277	2,023	1,618	30,346	24,277
C&I Prescriptive	DCV - Office - Retrofit	10,461	9,938	156,921	149,075	10,461	9,938	156,920	149,074
C&I Prescriptive	DCV - Retail - NC/TNR	41,602	33,282	624,034	499,227	41,602	33,282	624,033	499,227
C&I Prescriptive	DCV - Retail - Retrofit	314,908	299,162	4,723,616	4,487,435	314,908	299,162	4,723,616	4,487,435

Program	Measure	Tracked				Verified			
		Annual		Cumulative		Annual		Cumulative	
		Gross	Net	Gross	Net	Gross	Net	Gross	Net
C&I Prescriptive	DCV-Cinemas & Performing Arts-Retrofit	101,400	96,330	1,521,000	1,444,950	101,400	96,330	1,521,000	1,444,950
C&I Prescriptive	DCV-Community Center Meeting Spaces-NC/TNR	30,275	24,220	454,120	363,296	30,275	24,220	454,120	363,296
C&I Prescriptive	DCV-Community Center Meeting Spaces-Retrofit	8,445	8,023	126,677	120,343	8,445	8,023	126,677	120,343
C&I Prescriptive	DCV-Post-Secondary Education Classrooms-NC/TNR	10,459	8,367	156,879	125,503	10,459	8,367	156,879	125,503
C&I Prescriptive	DCV-Primary/Secondary Education Gymnasiums-NC/TNR	5,491	4,393	82,362	65,890	5,491	4,393	82,362	65,890
C&I Prescriptive	DCV-Primary/Secondary Education Gymnasiums-Retrofit	5,194	4,934	77,910	74,015	5,194	4,934	77,910	74,015
C&I Prescriptive	Destratification Fan - 20ft	20,648	18,583	309,720	278,748	20,648	18,583	309,720	278,748
C&I Prescriptive	Destratification Fan - 24ft	8,480	7,632	127,200	114,480	8,480	7,632	127,200	114,480
C&I Prescriptive	Dishwasher-Single Tank Conveyor-High Temperature	1,080	788	21,600	15,768	1,080	788	21,600	15,768
C&I Prescriptive	Dishwasher-Under Counter-High Temperature	137	82	1,370	822	137	82	1,370	822
C&I Prescriptive	Dishwasher-Under Counter-Low Temperature	322	193	3,220	1,932	322	193	3,220	1,932
C&I Prescriptive	Energy Recovery Ventilator (ERV)-GTE 55% Sensible Heat Recovery	27,708	26,322	387,906	368,511	27,583	26,204	386,161	366,853
C&I Prescriptive	Energy Recovery Ventilator (ERV)-GTE 65% Sensible Heat Recovery	243,220	231,059	3,405,079	3,234,825	242,125	230,019	3,389,756	3,220,268

Program	Measure	Tracked				Verified			
		Annual		Cumulative		Annual		Cumulative	
		Gross	Net	Gross	Net	Gross	Net	Gross	Net
C&I Prescriptive	Energy Recovery Ventilator (ERV)-GTE 65% SHR - In-Suite	248,644	236,212	3,481,013	3,306,963	247,525	235,149	3,465,349	3,292,081
C&I Prescriptive	Energy Recovery Ventilator (ERV)-GTE 75% Sensible Heat Recovery	152,670	145,036	2,137,380	2,030,511	151,983	144,384	2,127,762	2,021,373
C&I Prescriptive	Energy Recovery Ventilator (ERV)-GTE 85% Sensible Heat Recovery	206,424	196,103	2,889,940	2,745,443	205,495	195,221	2,876,935	2,733,089
C&I Prescriptive	Energy Recovery Ventilator (ERV)-Incremental-GTE 65% Sensible Heat Recovery	6,784	6,445	94,980	90,231	6,754	6,416	94,553	89,825
C&I Prescriptive	Energy Recovery Ventilator (ERV)-Incremental-GTE 75% Sensible Heat Recovery	552	525	7,732	7,346	550	522	7,698	7,313
C&I Prescriptive	Heat Recovery Ventilator (HRV)-GTE 55% Sensible Heat Recovery	58,285	55,371	815,991	775,191	58,285	55,371	815,991	775,191
C&I Prescriptive	Heat Recovery Ventilator (HRV)-GTE 65% Sensible Heat Recovery	269,557	256,079	3,773,799	3,585,109	269,557	256,079	3,773,799	3,585,109
C&I Prescriptive	Heat Recovery Ventilator (HRV)-GTE 65% SHR - In-Suite	91,963	87,365	1,287,485	1,223,111	91,963	87,365	1,287,485	1,223,111
C&I Prescriptive	Heat Recovery Ventilator (HRV)-GTE 75% Sensible Heat Recovery	13,964	13,266	195,494	185,719	13,964	13,266	195,494	185,719
C&I Prescriptive	Heat Recovery Ventilator (HRV)-GTE 85% Sensible Heat Recovery	27,932	26,535	391,048	371,496	27,932	26,535	391,048	371,496
C&I Prescriptive	Heat Recovery Ventilator (HRV)-Incremental-GTE 65% Sensible Heat Recovery	17	16	237	225	17	16	237	225

Program	Measure	Tracked				Verified			
		Annual		Cumulative		Annual		Cumulative	
		Gross	Net	Gross	Net	Gross	Net	Gross	Net
C&I Prescriptive	Heat Recovery Ventilator (HRV)- Incremental-GTE 75% Sensible Heat Recovery	102	97	1,427	1,356	102	97	1,427	1,356
C&I Prescriptive	Infrared Heater - Single Stage / High Intensity	278,877	186,848	4,740,916	3,176,413	278,877	186,848	4,740,916	3,176,413
C&I Prescriptive	Infrared Heater - Two Stage	264,236	177,038	4,492,016	3,009,651	264,236	177,038	4,492,016	3,009,651
C&I Prescriptive	Make-Up Air Unit (MUA) - 2 Speed GTE 5000 CFM - WITH LTO BONUS	29,280	27,816	585,600	556,320	29,280	27,816	585,600	556,320
C&I Prescriptive	Make-Up Air Unit (MUA) - Constant Speed	4,595	4,365	91,900	87,305	4,595	4,365	91,900	87,305
C&I Prescriptive	Make-Up Air Unit (MUA) - VFD	72,659	69,026	1,453,178	1,380,519	72,659	69,026	1,453,178	1,380,519
C&I Prescriptive	Make-Up Air Unit (MUA) - VFD - GTE 5000 CFM WITH LTO BONUS	70,035	66,533	1,400,700	1,330,665	70,035	66,533	1,400,700	1,330,665
C&I Prescriptive	Ozone Laundry - Washer Extractor	54,660	50,287	819,898	754,306	54,660	50,287	819,898	754,306
C&I Prescriptive	Ozone Laundry - Washer Extractor purchased after June 21st 2019	24,341	22,394	365,117	335,907	24,341	22,394	365,117	335,907
Furnace End-of-Life	Furnace - Social and Assisted Housing	5,922	5,922	106,596	106,596	5,922	5,922	106,596	106,596
Home Weatherization	Bathroom Aerator	5,222	5,170	52,224	51,702	4,496	4,452	44,965	44,515
Home Weatherization	Kitchen Aerator	9,525	9,430	95,254	94,302	7,735	7,657	77,347	76,573
Home Weatherization	Pipe Insulation	23,450	23,216	351,752	348,235	22,024	21,804	330,358	327,054
Home Weatherization	Showerhead Replacement 1.25 GPM	26,762	26,494	267,618	264,942	21,383	21,169	213,827	211,689
Home Weatherization	Smart Thermostats	289,098	286,207	4,336,470	4,293,105	289,098	286,207	4,336,470	4,293,105
Indigenous	Bathroom Aerator	275	272	2,752	2,724	275	272	2,752	2,724

Program	Measure	Tracked				Verified			
		Annual		Cumulative		Annual		Cumulative	
		Gross	Net	Gross	Net	Gross	Net	Gross	Net
Indigenous	Kitchen Aerator	497	492	4,971	4,921	497	492	4,971	4,921
Indigenous	Pipe Insulation	907	898	13,612	13,475	908	899	13,614	13,478
Indigenous	Showerhead Replacement 1.25 GPM	1,213	1,200	12,126	12,005	1,213	1,200	12,126	12,005
Multi-family	Commercial High Efficiency Furnace In-Suite-LI	5,691	5,406	102,438	97,316	5,691	5,406	102,438	97,316
Multi-family	Condensing Boiler - Space Heating - 300 to 999 MBH	121,662	115,579	3,041,544	2,889,467	150,093	142,588	3,752,320	3,564,704
Multi-family	Condensing Boiler - Space Heating - GTE 1000 MBH	208,946	198,499	5,223,650	4,962,467	257,774	244,886	6,444,360	6,122,142
Multi-family	Condensing Boiler - Space Heating - LT 300 MBH	82,703	78,567	2,067,564	1,964,185	95,218	90,457	2,380,460	2,261,437
Multi-family	Condensing Boiler - Water Heating - GTE 1000 MBH	9,032	8,580	225,792	214,502	13,189	12,530	329,728	313,242
Multi-family	Condensing Boiler - Water Heating - LT 300 MBH	21,656	20,573	541,401	514,331	21,656	20,573	541,401	514,331
Multi-family	Condensing Storage Water Heater - GT 250 kBTU/hr	6,180	5,871	92,700	88,065	6,180	5,871	92,700	88,065
Multi-family	Condensing Storage Water Heater - GT 75 & LTE 250 kBTU/Hr	309	294	4,635	4,403	309	294	4,635	4,403
Multi-family	Condensing Tankless Water Heater - GT 75 & LT 200 kBTU/hr	11,396	11,168	227,928	223,369	11,396	11,168	227,928	223,370
Multi-family	Energy Recovery Ventilator (ERV)-GTE 75% Sensible Heat Recovery-LI	2,834	2,692	39,675	37,691	2,834	2,692	39,675	37,691
Multi-family	Energy Recovery Ventilator (ERV)-GTE 75% SHR - In-Suite-LI	24,088	22,884	337,236	320,375	24,088	22,884	337,236	320,375

Program	Measure	Tracked				Verified			
		Annual		Cumulative		Annual		Cumulative	
		Gross	Net	Gross	Net	Gross	Net	Gross	Net
Multi-family	Energy Recovery Ventilator (ERV)- Incremental-GTE 65% Sensible Heat Recovery	6,750	6,413	94,500	89,775	6,750	6,413	94,500	89,775
Multi-family	Energy Recovery Ventilator (ERV)- Incremental-GTE 75% Sensible Heat Recovery	3,600	3,420	50,400	47,880	3,600	3,420	50,400	47,880
Multi-family	Heat Recovery Ventilator (HRV)-GTE 65% SHR - In-Suite-LI	2,742	2,605	38,385	36,465	2,742	2,605	38,385	36,465
Multi-family	Make-Up Air Unit (MUA) - 2 Speed	23,309	22,144	466,186	442,877	23,309	22,144	466,186	442,877
Multi-family	Make-Up Air Unit (MUA) - VFD	400,200	380,190	8,004,000	7,603,800	400,200	380,190	8,004,000	7,603,800
Smart Thermostats	Smart Thermostats	100,640	96,614	1,509,600	1,449,216	100,640	96,614	1,509,600	1,449,216
Smart Thermostats	Smart Thermostats- Instant Rebate	483,835	464,481	7,257,519	6,967,218	483,835	464,481	7,257,519	6,967,218

*Not all values may compute exactly due to rounding.

Savings Verification Discrepancies

Table 11-152. Enbridge measure verification discrepancies

Program	Measure	Issue	Resolution	Tracked Cumulative Gross Savings	Tracked Cumulative Net Savings	Verified Cumulative Gross Savings	Verified Cumulative Net Savings
C&I Prescriptive	Commercial High Eff Boiler 1000-1499MBH Seasonal Cx [Replacement]	Utility applied boiler baseline study not approved as of TRM 3.0.	Utility applied boiler baseline consistent with TRM 3.0.	512,600	451,088	607,050	534,204
C&I Prescriptive	Commercial High Eff Boiler 2000MBH Seasonal Cx [Replacement]	Utility applied boiler baseline study not approved as of TRM 3.0.	Utility applied boiler baseline consistent with TRM 3.0.	1,153,650	1,015,212	1,366,250	1,202,300
C&I Prescriptive	Commercial High Eff Boiler 600-999MBH Seasonal Cx [Replacement]	Utility applied boiler baseline study not approved as of TRM 3.0.	Utility applied boiler baseline consistent with TRM 3.0.	280,050	246,444	331,650	291,852
C&I Prescriptive	Commercial High Eff Boiler DWH 1000-1499MBH Non Seasonal Cx [Replacement]	Utility applied boiler baseline study not approved as of TRM 3.0.	Utility applied boiler baseline consistent with TRM 3.0.	363,750	320,100	407,325	358,446
C&I Prescriptive	Commercial High Eff Boiler DWH 600-999MBH Non Seasonal Cx [Replacement]	Utility applied boiler baseline study not approved as of TRM 3.0.	Utility applied boiler baseline consistent with TRM 3.0.	68,675	60,434	76,900	67,672
C&I Prescriptive	Cond Boiler 100-199MBH [Replacement]	Utility applied boiler baseline study not approved as of TRM 3.0.	Utility applied boiler baseline consistent with TRM 3.0.	80,325	76,309	80,246	76,234
C&I Prescriptive	Condensing Boiler 100-199MBH [Replacement]	Utility applied boiler baseline study not approved as of TRM 3.0.	Utility applied boiler baseline consistent with TRM 3.0.	39,270	37,307	39,232	37,270
C&I Prescriptive	Condensing Boilers - DHW 100 - 199 MBH [Replacement]	Utility applied boiler baseline study not approved as of TRM 3.0.	Utility applied boiler baseline consistent with TRM 3.0.	49,875	47,381	49,950	47,453
C&I Prescriptive	Condensing Boilers - DHW 200 - 299 MBH [Replacement]	Utility applied boiler baseline study not approved as of TRM 3.0.	Utility applied boiler baseline consistent with TRM 3.0.	218,250	207,338	217,377	206,508

Program	Measure	Issue	Resolution	Tracked Cumulative Gross Savings	Tracked Cumulative Net Savings	Verified Cumulative Gross Savings	Verified Cumulative Net Savings
C&I Prescriptive	Condensing Furnace High Efficiency 0-74 KBtu/hr Cx [Existing]	Rounding.	-	7,254	5,985	7,277	6,004
C&I Prescriptive	Condensing Furnace High Efficiency 75-149 KBtu/hr Cx [Existing]	Rounding.	-	50,951	42,034	51,054	42,119
C&I Prescriptive	DCV Single Zone Retail with Maintenance Cx [New]	Utility applied different gross realization rate than was found in C&I Prescriptive Verification Study.	Utility applied gross realization rate consistent with the C&I Prescriptive Verification Study.	397,488	317,990	398,023	318,418
C&I Prescriptive	DCV Single Zone Retail with Maintenance Cx [Retrofit]	Utility applied different gross realization rate than was found in C&I Prescriptive Verification Study.	Utility applied gross realization rate consistent with the C&I Prescriptive Verification Study.	14,967,527	14,219,150	14,987,675	14,238,292
C&I Prescriptive	Multi Res High Eff Boiler DWH 300-599MBH Non Seasonal Cx [Replacement]	Utility applied boiler baseline study not approved as of TRM 3.0.	Utility applied boiler baseline consistent with TRM 3.0.	41,550	33,240	46,525	37,220
C&I Prescriptive	Multi-Res High Eff Boiler 1000-1499MBH Seasonal Cx [Replacement]	Utility applied boiler baseline study not approved as of TRM 3.0.	Utility applied boiler baseline consistent with TRM 3.0.	512,600	410,080	607,050	485,640
C&I Prescriptive	Multi-Res High Eff Boiler 1500-1999MBH Seasonal Cx [Replacement]	Utility applied boiler baseline study not approved as of TRM 3.0.	Utility applied boiler baseline consistent with TRM 3.0.	810,150	648,120	959,450	767,560
C&I Prescriptive	Multi-Res High Eff Boiler 600-999MBH Seasonal Cx [Replacement]	Utility applied boiler baseline study not approved as of TRM 3.0.	Utility applied boiler baseline consistent with TRM 3.0.	840,150	672,120	994,950	795,960
C&I Prescriptive	Multi-Res High Eff Boiler DWH 600-999MBH Non Seasonal Cx [Replacement]	Utility applied boiler baseline study not approved as of TRM 3.0.	Utility applied boiler baseline consistent with TRM 3.0.	68,675	54,940	76,900	61,520
C&I Prescriptive	School Board Boiler Elementary Cx [Replacement]	Utility applied boiler baseline study not approved as of TRM 3.0.	Utility applied boiler baseline consistent with TRM 3.0.	791,550	696,564	1,832,550	1,612,644

Program	Measure	Issue	Resolution	Tracked Cumulative Gross Savings	Tracked Cumulative Net Savings	Verified Cumulative Gross Savings	Verified Cumulative Net Savings
C&I Prescriptive	School Board Campaign - School Board Boiler Elementary Cx [Replacement]	Utility applied boiler baseline study not approved as of TRM 3.0.	Utility applied boiler baseline consistent with TRM 3.0.	1,583,100	1,393,128	3,970,525	3,494,062
C&I Prescriptive	Showerheads 1.50 GPM Cx Multi-Res - Water Heating	Utility phase out installation rate from Showerhead Verification Study Among Rental Buildings.	Utility applied installation rate from Showerhead Verification Study Among Rental Buildings.	113,220	101,898	95,671	86,104
Home Winterproofing	Bathroom Aerator	Utility phase out installation rate from TAPS Report.	Utility applied installation rate from Taps Report.	34,432	34,432	7,747	7,747
Home Winterproofing	Kitchen Aerator	Utility phase out installation rate from TAPS Report.	Utility applied installation rate from Taps Report.	46,471	46,471	15,568	15,568
Home Winterproofing	Showerhead Replacement	Utility phase out installation rate from TAPS Report.	Utility applied installation rate from Taps Report.	130,002	130,002	114,012	114,012
Low-Income Multi-Residential	Low Income High Eff Boiler 1500-1999MBH Seasonal Cx [Replacement]	Utility applied boiler baseline study not approved as of TRM 3.0.	Utility applied boiler baseline consistent with TRM 3.0.	810,150	810,150	959,450	959,450
Low-Income Multi-Residential	Low Income High Eff Boiler 300-599MBH Seasonal Cx [Replacement]	Utility applied boiler baseline study not approved as of TRM 3.0.	Utility applied boiler baseline consistent with TRM 3.0.	147,600	147,600	174,800	174,800

Table 11-153. Union measure verification discrepancies

Program	Measure	Issue	Resolution	Tracked Cumulative Gross Savings	Tracked Cumulative Net Savings	Verified Cumulative Gross Savings	Verified Cumulative Net Savings
C&I Prescriptive	Condensing Boiler - Space Heating - 300 to 999 MBH - NC2018	Utility applied boiler baseline study not approved as of TRM 3.0.	Utility applied boiler baseline consistent with TRM 3.0.	863,522	820,346	1,491,800	1,417,210
C&I Prescriptive	Condensing Boiler - Space Heating - 300 to 999 MBH - RF	Utility applied boiler baseline study not approved as of TRM 3.0.	Utility applied boiler baseline consistent with TRM 3.0.	23,948,884	22,751,440	29,545,480	28,068,206
C&I Prescriptive	Condensing Boiler - Space Heating - GTE 1000 MBH - NC2018	Utility applied boiler baseline study not approved as of TRM 3.0.	Utility applied boiler baseline consistent with TRM 3.0.	4,717,856	4,481,963	8,150,448	7,742,926
C&I Prescriptive	Condensing Boiler - Space Heating - GTE 1000 MBH - RF	Utility applied boiler baseline study not approved as of TRM 3.0.	Utility applied boiler baseline consistent with TRM 3.0.	44,779,640	42,540,658	55,244,159	52,481,951
C&I Prescriptive	Condensing Boiler - Space Heating - LT 300 MBH - NC2018	Utility applied boiler baseline study not approved as of TRM 3.0.	Utility applied boiler baseline consistent with TRM 3.0.	127,147	120,790	357,909	340,013
C&I Prescriptive	Condensing Boiler - Space Heating - LT 300 MBH - NC2019	Utility applied boiler baseline study not approved as of TRM 3.0.	Utility applied boiler baseline consistent with TRM 3.0.	254,478	241,754	716,335	680,519
C&I Prescriptive	Condensing Boiler - Space Heating - LT 300 MBH - RF	Utility applied boiler baseline study not approved as of TRM 3.0.	Utility applied boiler baseline consistent with TRM 3.0.	5,215,673	4,954,889	5,215,673	4,954,890
C&I Prescriptive	Condensing Boiler - Water Heating - 300 to 999 MBH - RF	Utility applied boiler baseline study not approved as of TRM 3.0.	Utility applied boiler baseline consistent with TRM 3.0.	1,274,826	1,211,085	1,858,931	1,765,985
C&I Prescriptive	Condensing Boiler - Water Heating - GTE 1000 MBH - NC2018	Utility applied boiler baseline study not approved as of TRM 3.0.	Utility applied boiler baseline consistent with TRM 3.0.	160,115	152,109	327,345	310,978
C&I Prescriptive	Condensing Boiler - Water Heating - GTE 1000 MBH - RF	Utility applied boiler baseline study not approved as of TRM 3.0.	Utility applied boiler baseline consistent with TRM 3.0.	1,246,491	1,184,167	1,819,434	1,728,463

Program	Measure	Issue	Resolution	Tracked Cumulative Gross Savings	Tracked Cumulative Net Savings	Verified Cumulative Gross Savings	Verified Cumulative Net Savings
C&I Prescriptive	Condensing Boiler - Water Heating - LT 300 MBH - NC2019	Utility applied boiler baseline study not approved as of TRM 3.0.	Utility applied boiler baseline consistent with TRM 3.0.	140,608	133,578	261,078	248,024
C&I Prescriptive	DCV - Retail - NC/TNR	Utility applied different gross realization rate than was found in C&I Prescriptive Verification Study.	Utility applied gross realization rate consistent with the C&I Prescriptive Verification Study.	624,034	499,227	624,033	499,227
C&I Prescriptive	DCV - Retail - Retrofit	Utility applied different gross realization rate than was found in C&I Prescriptive Verification Study.	Utility applied gross realization rate consistent with the C&I Prescriptive Verification Study.	4,723,616	4,487,435	4,723,616	4,487,435
C&I Prescriptive	Energy Recovery Ventilator (ERV)-GTE 55% Sensible Heat Recovery	Utility applied different gross realization rate than was found in C&I Prescriptive Verification Study.	Utility applied gross realization rate consistent with the C&I Prescriptive Verification Study.	387,906	368,511	386,161	366,853
C&I Prescriptive	Energy Recovery Ventilator (ERV)-GTE 65% Sensible Heat Recovery	Utility applied different gross realization rate than was found in C&I Prescriptive Verification Study.	Utility applied gross realization rate consistent with the C&I Prescriptive Verification Study.	3,405,079	3,234,825	3,389,756	3,220,268
C&I Prescriptive	Energy Recovery Ventilator (ERV)-GTE 65% SHR - In-Suite	Utility applied different gross realization rate than was found in C&I Prescriptive Verification Study.	Utility applied gross realization rate consistent with the C&I Prescriptive Verification Study.	3,481,013	3,306,963	3,465,349	3,292,081
C&I Prescriptive	Energy Recovery Ventilator (ERV)-GTE 75% Sensible Heat Recovery	Utility applied different gross realization rate than was found in C&I Prescriptive Verification Study.	Utility applied gross realization rate consistent with the C&I Prescriptive Verification Study.	2,137,380	2,030,511	2,127,762	2,021,373

Program	Measure	Issue	Resolution	Tracked Cumulative Gross Savings	Tracked Cumulative Net Savings	Verified Cumulative Gross Savings	Verified Cumulative Net Savings
C&I Prescriptive	Energy Recovery Ventilator (ERV)-GTE 85% Sensible Heat Recovery	Utility applied different gross realization rate than was found in C&I Prescriptive Verification Study.	Utility applied gross realization rate consistent with the C&I Prescriptive Verification Study.	2,889,940	2,745,443	2,876,935	2,733,089
C&I Prescriptive	Energy Recovery Ventilator (ERV)-Incremental-GTE 65% Sensible Heat Recovery	Utility applied different gross realization rate than was found in C&I Prescriptive Verification Study.	Utility applied gross realization rate consistent with the C&I Prescriptive Verification Study.	94,980	90,231	94,553	89,825
C&I Prescriptive	Energy Recovery Ventilator (ERV)-Incremental-GTE 75% Sensible Heat Recovery	Utility applied different gross realization rate than was found in C&I Prescriptive Verification Study.	Utility applied gross realization rate consistent with the C&I Prescriptive Verification Study.	7,732	7,346	7,698	7,313
Home Weatherization	Bathroom Aerator	Utility phase out installation rate from Low Income Kits Verification Study.	Utility applied installation rate from Low Income Kits Verification Study.	52,224	51,702	44,965	44,515
Home Weatherization	Kitchen Aerator	Utility phase out installation rate from Low Income Kits Verification Study.	Utility applied installation rate from Low Income Kits Verification Study.	95,254	94,302	77,347	76,573
Home Weatherization	Pipe Insulation	Utility phase out installation rate from Low Income Kits Verification Study.	Utility applied installation rate from Low Income Kits Verification Study.	351,752	348,235	330,358	327,054
Home Weatherization	Showerhead Replacement 1.25 GPM	Utility phase out installation rate from Low Income Kits Verification Study.	Utility applied installation rate from Low Income Kits Verification Study.	267,618	264,942	213,827	211,689
Indigenous	Pipe Insulation	Utility phase out installation rate from Low Income Kits Verification Study.	Utility applied installation rate from Low Income Kits Verification Study.	13,612	13,475	13,614	13,478

Program	Measure	Issue	Resolution	Tracked Cumulative Gross Savings	Tracked Cumulative Net Savings	Verified Cumulative Gross Savings	Verified Cumulative Net Savings
Multi-family	Condensing Boiler - Space Heating - 300 to 999 MBH	Utility applied boiler baseline study not approved as of TRM 3.0.	Utility applied boiler baseline consistent with TRM 3.0.	3,041,544	2,889,467	3,752,320	3,564,704
Multi-family	Condensing Boiler - Space Heating - GTE 1000 MBH	Utility applied boiler baseline study not approved as of TRM 3.0.	Utility applied boiler baseline consistent with TRM 3.0.	5,223,650	4,962,467	6,444,360	6,122,142
Multi-family	Condensing Boiler - Space Heating - LT 300 MBH	Utility applied boiler baseline study not approved as of TRM 3.0.	Utility applied boiler baseline consistent with TRM 3.0.	2,067,564	1,964,185	2,380,460	2,261,437
Multi-family	Condensing Boiler - Water Heating - GTE 1000 MBH	Utility applied boiler baseline study not approved as of TRM 3.0.	Utility applied boiler baseline consistent with TRM 3.0.	225,792	214,502	329,728	313,242

Appendix O Program Spending Tables

Table 11-154. Enbridge 2019 approved and spent budget*

Scorecard/Program	OEB-Approved Budget	Utility Spending	Difference	
			\$	%
Resource Acquisition Total	\$42,056,270	\$48,382,408	\$6,326,138	15%
Home Energy Conservation	\$18,360,000	\$29,420,859	\$11,060,859	60%
Residential Adaptive Thermostats	\$2,218,500	\$1,357,609	-\$860,891	-39%
Commercial & Industrial Custom	\$7,508,793	\$7,318,213	-\$190,580	-3%
Commercial & Industrial Direct Install	\$4,853,510	\$3,887,196	-\$966,314	-20%
Commercial & Industrial Prescriptive	\$2,277,564	\$1,381,605	-\$895,959	-39%
Energy Leaders Initiative	-	\$4,600	\$4,600	-
Run it Right (RA Portion)	\$1,618,946	\$217,725	-\$1,401,221	-87%
Comprehensive Energy Management (RA portion)	\$96,900	-	-\$96,900	-100%
Resource Acquisition Overhead	\$5,122,057	\$4,794,602	-\$327,455	-6%
Low Income Total	\$13,576,837	\$13,690,519	\$113,682	1%
Home Winterproofing	\$6,605,744	\$7,141,896	\$536,152	8%
Low Income Multi Residential	\$3,889,562	\$3,278,499	-\$611,063	-16%
Low Income New Construction	\$1,428,000	\$1,722,304	\$294,304	21%
Low Income Overhead	\$1,653,531	\$1,547,820	-\$105,711	-6%
Market Transformation Total	\$7,030,304	\$7,479,856	\$449,552	6%
Residential Savings by Design	\$3,320,443	\$4,178,404	\$857,961	26%
Commercial Savings by Design	\$1,098,300	\$1,492,392	\$394,092	36%
Run it Right (MTEM portion)	\$322,236	\$528,343	\$206,107	64%
Comprehensive Energy Management (MTEM portion)	\$923,100	\$223,818	-\$699,282	-76%
School Energy Competition	\$510,000	\$255,413	-\$254,587	-50%
Market Transformation Overhead	\$856,225	\$801,486	-\$54,739	-6%
Portfolio Overhead	\$3,758,362	\$3,290,656	-\$467,706	-12%
Process and Program Evaluation	\$1,736,746	\$1,524,765	-\$211,981	-12%
DSM IT Chargeback**	\$1,000,000	\$342,245	-\$657,755	-66%
Collaboration and Innovation**	\$1,021,616	\$1,145,846	\$124,230	12%
Achievable Potential Study**	-	\$277,800	\$277,800	-
Enbridge Total	\$66,421,773	\$72,843,440	\$6,421,667	10%

*Not all values may compute exactly due to rounding.

**These line items are collapsed into the Other category in Table 9-2.

Table 11-155. Union 2019 approved and spent budget*

Scorecard/Program	OEB-Approved Budget	Utility Spending	Difference	
			\$	%
Resource Acquisition Total	\$37,810,983	\$40,581,858	\$2,770,875	7%
Resource Acquisition - Residential	\$15,407,697	\$22,612,143	\$7,204,446	47%
Home Reno Rebate	\$12,226,000	\$19,815,812	\$7,589,812	62%
Residential Adaptive Thermostats	\$1,500,000	\$550,816	-\$949,184	-63%
Residential Overhead	\$1,681,697	\$2,245,515	\$563,818	34%
Resource Acquisition - Commercial & Industrial	\$22,403,286	\$17,969,715	-\$4,433,571	-20%
Commercial & Industrial Custom	\$7,808,000	\$8,865,926	\$1,057,926	14%
Commercial & Industrial Direct Install	\$2,500,000	\$2,011,911	-\$488,089	-20%
Commercial & Industrial Prescriptive	\$7,149,000	\$3,242,754	-\$3,906,246	-55%
Commercial & Industrial Overhead	\$4,946,286	\$3,849,124	-\$1,097,162	-22%
Low Income Total	\$14,144,720	\$13,367,910	-\$776,810	-5%
Home Weatherization	\$8,063,000	\$9,254,777	\$1,191,777	15%
Furnace End-of-Life	\$919,000	\$36,075	-\$882,925	-96%
Indigenous	\$456,000	\$327,899	-\$128,101	-28%
Multi-Family	\$3,031,000	\$2,598,715	-\$432,285	-14%
Low Income Overhead	\$1,675,720	\$1,150,443	-\$525,277	-31%
Large Volume Total	\$4,000,000	\$3,088,606	-\$911,394	-23%
Large Volume	\$3,150,000	\$2,684,610	-\$465,390	-15%
Large Volume Overhead	\$850,000	\$403,996	-\$446,004	-52%
Market Transformation Total	\$2,338,070	\$2,241,994	-\$96,076	-4%
Optimum Home	\$841,000	\$817,193	-\$23,807	-3%
Commercial New Construction	\$1,000,000	\$924,147	-\$75,853	-8%
Market Transformation Overhead	\$497,070	\$500,654	\$3,584	1%
Performance Based Total	\$833,000	\$579,846	-\$253,154	-30%
RunSmart	\$182,000	\$153,632	-\$28,368	-16%
Strategic Energy Management	\$400,000	\$309,007	-\$90,993	-23%
Performance-Based Overhead	\$251,000	\$117,207	-\$133,793	-53%
Portfolio Overhead	\$5,642,000	\$5,744,092	\$102,092	2%
Research	\$1,000,000	\$770,142	-\$229,858	-23%
Evaluation	\$1,300,000	\$919,748	-\$380,252	-29%
Administration	\$2,842,000	\$3,541,362	\$699,362	25%
Pilots**	\$500,000	\$311,748	-\$188,252	-38%
Open Bill Project**	-	\$4,968	\$4,968	-
Future Infrastructure Planning Study**	-	\$10,924	\$10,924	-
Achievable Potential Study**	-	\$185,200	\$185,200	-
Union Total	\$64,768,773	\$65,604,306	\$835,533	1%

*Not all values may compute exactly due to rounding.

**These line items are collapsed into the Other category in Table 9-7.

Appendix P Cost Effectiveness Methodology

Overview

The OEB requires the utilities to deliver portfolios that are cost effective at the “program” level. Each utility defines “program” differently, and both utilities define “program” differently from the OEB, as shown in Table 11-156. Throughout this report, the EC has used the OEB-defined Programs. The relevant cost effectiveness results are based on the utilities’ definition of program.

Table 11-156: 2019 “Programs” as defined by the OEB, Enbridge, and Union

Utility-Defined Programs	OEB-Defined Programs
Enbridge	
Resource Acquisition	Home Energy Conservation
	Residential Adaptive Thermostats
	Commercial and Industrial Custom
	Commercial and Industrial Direct Install
	Commercial and Industrial Prescriptive
Run it Right	
Low Income	Home Winterproofing
	Multi-Residential
Market Transformation	Residential Savings by Design
	Commercial Savings by Design
	School Energy Competition
	Run it Right
	Comprehensive Energy Management
Union	
Residential Resource Acquisition	Home Reno Rebate
	Residential Adaptive Thermostats
C&I Resource Acquisition	Commercial and Industrial Custom
	Commercial and Industrial Direct Install
	Commercial and Industrial Prescriptive
Low Income	Home Weatherization
	Indigenous
	Furnace End of Life
	Low Income Multi-Family
Large Volume	Large Volume
Market Transformation	Optimum Home
	Commercial New Construction
Performance Based	RunSmart
	Strategic Energy Management

To calculate cost effectiveness, the EC used the cost effectiveness model that has been applied in previous years using the utilities' verified savings. The key inputs used to calculate the TRC-Plus and PAC tests are shown in Table 11-157

Table 11-157: Key inputs used in the TRC-Plus and PAC tests

Input	Description	TRC	PAC
Overhead & Administration Costs	Fixed costs, including overhead & administration, program management, program support, enabling strategies (communications, marketing, and outreach) done by utilities, costs and fees for service (e.g., data management, contractor management).	✓	✓
Utility Incentives	Utility provided incentives to encourage adoption of efficiency measures.	✓	✓
Promotion Costs	Variable expenditures to deliver and promote programs.	✓	✓
Evaluation Costs	Expenditures associated with evaluation of programs at the scorecard level.		
Participant Cost	The incremental cost of program-driven measures.	✓	
Discount Rate	Discount rate used to weight long-term versus short-term benefits provided by the utilities (real discount rate of 4%).	✓	✓
Net Savings	Share of net savings driven by programs	✓	✓
Avoided Costs	Utility-avoided costs related to generation and distribution of energy from natural gas lines. Avoided Costs were provided by the utilities (see Appendix Q).	✓	✓
Measure EUL	See glossary.	✓	✓
Non-Energy Benefits	A 15% non-energy benefit (NEB) adder is applied to gas, electricity and water avoided costs representing environmental, economic, and health-related externalities.	✓	
Cost of Carbon	The avoided costs of carbon expressed as dollars per m ³ .	✓	✓

The cost effectiveness model had two main goals, including:

- Using a comprehensive model that can be easily modified to assess the impact of changing assumptions and methodology to calculate the TRC-Plus and PAC tests
- Ensuring consistent cost effectiveness calculations by regrouping both utilities in the same model

The EC model was then modified to adjust gross savings using realization rates and free ridership and spillover from the annual savings verification activities. Because the realization rates for other savings (e.g. electricity, water) were generally either not available or much less precise, the gas realization rates were used for all savings.

The EC cost effectiveness methodology applied in 2019 is consistent with what was done for the 2018, 2017, 2016, and 2015 analyses. This includes the cost of carbon, the inclusion of which began in 2017.

As part of the OEB's DSM Mid-Term Report, the OEB advised that carbon costs will be added to the cost-effectiveness test. Following the approach used to complete the 2019 Achievable Potential Study¹¹² and per the OEB's direction, the EC used the utility's avoided costs with the full carbon costs applied to all customers. The 15% non-energy benefit (NEB) adder was applied to gas, electricity and water avoided costs before adding carbon costs. The cost of carbon and NEB adder were applied to the TRC-Plus. The PAC test included carbon and natural gas resources only (i.e., there are no electricity and water benefits), but it does

¹¹² Navigant, 2019. Integrated Ontario Electricity and Natural Gas Achievable Potential Study.

not include the NEB adder. In tables later in this section, the EC has reported on what was provided by Enbridge and has not verified avoided figures.

Two new activities were included in 2019.

1. **Union’s Performance Based scorecard was screened for cost effectiveness.** The scorecard consists of two programs: RunSmart and Strategic Energy Management (SEM). Because the metrics for these programs are based on a participant metric and savings percent metric, the EC calculated cost effectiveness on the cumulative savings based on the savings percent metrics. SEM did not have any activity in 2019, but incentive and evaluation costs have been included in the overhead costs at the scorecard level.
2. **Program level cost effectiveness results are shown with and without overhead & administration costs.** A variety of costs are incurred by utilities to deliver programs, and how they are allocated at various levels (measure, program, sector, scorecard and portfolio) can impact their perceived economic benefits. Consistent with previous years, the EC did not apply the utilities’ portfolio overhead costs for research, evaluation, and administration. However, in past years, the EC has apportioned Enbridge’s explicit ‘overhead’ spend at the scorecard level to individual programs based on the distribution of savings. EAC members debated whether this was appropriate. The National Standards Practice Manual¹¹³ provides guidance on how to properly allocate overhead & administrative (O&A) costs (see text box below), however some believe that all O&A costs should be fully accounted for at the program level and it is not clear what the utilities include in the “overhead & admin costs” and what is truly variable and fixed. The OEB agreed to show program level cost effectiveness results with and without overhead & administrative costs. The O&A costs are still applied at the scorecard and portfolio levels.

Allocating Costs to Assess Cost Effectiveness

The National Standards Practice Manual (NSPM) for Benefit-Cost Analysis of Distributed Energy Resources recommends that only truly variable costs (i.e., costs that can be avoided) be included at the appropriate levels (e.g., measure, program, sector, portfolio) and costs that are largely fixed at a particular level be excluded. Including fixed costs at the wrong level may result in removal of programs that do not appear cost effective, reducing the economic benefits of efficiency resource acquisition. Fixed costs at one level should not, however, be excluded altogether and should be included at higher levels where they are variable and thus avoidable. The NSPM provides examples of the costs to include at various levels when assessing cost effectiveness and shown below:

- **Measure level:** When assessing cost-effectiveness, include only costs that increase or decrease in proportion to the number of measures installed. This includes the measure incremental cost and could include some variable program delivery costs such as rebate processing costs (e.g., if there are vendor costs for every rebate processed).
- **Program level:** Costs of administering and evaluating the program should be included at the program level and, in some cases, where marketing is variable. (Marketing is often treated as a fixed cost; it can play an important role in raising awareness and driving program participation, but costs do not typically change with participation)
- **Portfolio level:** Portfolio level costs that are largely fixed and do not change in proportion to the number of programs or participation levels (e.g., portfolio level marketing, management, and evaluation costs) should not be allocated to programs when assessing the cost effectiveness of individual programs. They should be included at portfolio level analysis.

¹¹³ <https://www.nationalenergyscreeningproject.org/the-national-standard-practice-manual-for-energy-efficiency/>

Summary of Results

Table 11-158 shows summary results for Enbridge TRC-Plus and PAC tests. Table 11-159 shows the same information for Union. The end of this section contains more tables with detailed results.

All of the utility-defined programs pass the OEB-defined cost effectiveness threshold of 0.7 for Low Income programs and 1.0 for all other programs using the TRC-Plus test, with the exception of Union's Performance Based Scorecard.

Table 11-158. Enbridge summary of cost effectiveness ratio results*

Scorecard	Final Verified Ratio		Final Verified Net Present Value (M\$)	
	TRC-Plus	PAC	TRC-Plus	PAC
Resource Acquisition	3.03	3.89	158.35	141.52
Low Income	2.19	2.14	16.57	13.64
Total	2.91	3.55	174.92	155.16

*Not all values may compute exactly due to rounding.

†Values calculated from original utility tracking data, pre-verification.

Table 11-159. Union summary of cost effectiveness ratio results*

Scorecard	Final Verified Ratio		Final Verified Net Present Value (M\$)	
	TRC-Plus	PAC	TRC-Plus	PAC
Resource Acquisition	2.41	4.46	123.04	140.41
Large Volume	2.46	4.29	8.67	10.17
Low Income	1.59	1.20	7.34	2.63
Performance Based	0.02	0.02	-0.53	-0.57
Total	2.31	3.65	138.52	152.63

*Not all values may compute exactly due to rounding.

†Values calculated from original utility tracking data, pre-verification.

Several OEB-defined programs did not meet the OEB-defined TRC-Plus cost effectiveness threshold with and without overhead & administrative (O&A) costs, specifically (note that the ratios without O&A costs are shown in brackets):

- **Enbridge's Resource Acquisition Run-It-Right program** fell short of 1.0 in the TRC-Plus test with a cost effectiveness ratio of 0.56 (0.56).
- **Union's Furnace-End-of-Life program** fell short of 0.7 in the TRC-Plus test with a cost effectiveness ratio of 0.61 (0.64).
- **Union's Indigenous program** fell short of 0.7 in the TRC-Plus test with a cost effectiveness ratio of 0.28 (0.29).
- **Union's Performance Based RunSmart program** fell short of 1.0 in the TRC-Plus test with a cost effectiveness ratio of 0.045 (0.09).

Cost Effectiveness Inputs

Avoided Costs

Table 11-160: Enbridge Gas Avoided Costs

Year	Water Heating (W)			Space Heating (S)			Combined Space & Water Heating			Industrial (I)		
	Baseload (\$/m ³)			Baseload (\$/m ³)			Baseload (\$/m ³)			Baseload (\$/m ³)		
	Rate	Dist adder	NPV	Rate	Dist adder	NPV	Rate	Dist adder	NPV	Rate	Dist adder	NPV
1	0.193	0.003	0.196	0.211	0.012	0.223	0.214	0.011	0.225	0.192	0.003	0.195
2	0.185	0.003	0.372	0.204	0.012	0.417	0.203	0.011	0.418	0.186	0.003	0.372
3	0.191	0.003	0.543	0.210	0.012	0.606	0.210	0.011	0.607	0.191	0.003	0.544
4	0.196	0.003	0.711	0.217	0.012	0.791	0.216	0.011	0.792	0.197	0.003	0.713
5	0.202	0.003	0.876	0.223	0.012	0.973	0.222	0.011	0.973	0.203	0.003	0.877
6	0.208	0.003	1.036	0.230	0.012	1.150	0.229	0.011	1.150	0.209	0.003	1.039
7	0.214	0.003	1.193	0.237	0.012	1.323	0.236	0.011	1.322	0.215	0.003	1.196
8	0.221	0.003	1.347	0.244	0.012	1.493	0.243	0.011	1.491	0.222	0.003	1.350
9	0.228	0.003	1.497	0.251	0.012	1.659	0.250	0.011	1.657	0.228	0.003	1.501
10	0.234	0.003	1.644	0.259	0.012	1.821	0.258	0.011	1.818	0.235	0.003	1.649
11	0.241	0.003	1.788	0.266	0.012	1.980	0.265	0.011	1.976	0.242	0.003	1.793
12	0.249	0.003	1.929	0.274	0.012	2.135	0.273	0.011	2.131	0.249	0.003	1.934
13	0.256	0.003	2.066	0.283	0.012	2.286	0.282	0.011	2.282	0.257	0.003	2.072
14	0.264	0.003	2.201	0.291	0.012	2.435	0.290	0.011	2.430	0.265	0.003	2.207
15	0.272	0.003	2.332	0.300	0.012	2.580	0.299	0.011	2.575	0.273	0.003	2.339
16	0.280	0.003	2.461	0.309	0.012	2.722	0.308	0.011	2.716	0.281	0.003	2.468
17	0.288	0.003	2.587	0.318	0.012	2.860	0.317	0.011	2.855	0.289	0.003	2.594
18	0.297	0.003	2.710	0.328	0.012	2.996	0.327	0.011	2.990	0.298	0.003	2.717
19	0.306	0.003	2.830	0.337	0.012	3.129	0.336	0.011	3.122	0.307	0.003	2.838
20	0.315	0.003	2.948	0.347	0.012	3.259	0.346	0.011	3.252	0.316	0.003	2.956
21	0.324	0.003	3.063	0.358	0.012	3.386	0.357	0.011	3.378	0.325	0.003	3.071
22	0.334	0.003	3.175	0.369	0.012	3.510	0.367	0.011	3.502	0.335	0.003	3.184
23	0.344	0.003	3.285	0.380	0.012	3.631	0.379	0.011	3.623	0.345	0.003	3.295
24	0.354	0.003	3.393	0.391	0.012	3.750	0.390	0.011	3.741	0.356	0.003	3.403
25	0.365	0.003	3.498	0.403	0.012	3.866	0.402	0.011	3.857	0.366	0.003	3.508
26	0.376	0.003	3.601	0.415	0.012	3.979	0.414	0.011	3.970	0.377	0.003	3.612
27	0.387	0.003	3.702	0.427	0.012	4.091	0.426	0.011	4.081	0.389	0.003	3.713
28	0.399	0.003	3.800	0.440	0.012	4.199	0.439	0.011	4.189	0.400	0.003	3.811
29	0.411	0.003	3.896	0.453	0.012	4.305	0.452	0.011	4.295	0.412	0.003	3.908
30	0.423	1.003	3.990	0.467	1.012	4.409	0.466	1.011	4.398	0.425	1.003	4.002

Table 11-161: Enbridge Water and Electricity Avoided Costs

Year	Res/Com/Ind			
	Water (\$/1000 litre)		Electricity (\$/Kwh)	
	Rate	NPV	Rate	NPV
1	0.898	0.898	0.133	0.133
2	0.909	1.761	0.134	0.261
3	0.921	2.591	0.136	0.383
4	0.932	3.389	0.138	0.501
5	0.944	4.156	0.140	0.615
6	0.956	4.894	0.141	0.724
7	0.968	5.603	0.143	0.829
8	0.981	6.285	0.145	0.930
9	0.993	6.941	0.147	1.027
10	1.006	7.572	0.149	1.120
11	1.018	8.178	0.151	1.210
12	1.031	8.761	0.153	1.296
13	1.044	9.322	0.155	1.379
14	1.058	9.861	0.156	1.459
15	1.071	10.380	0.158	1.536
16	1.085	10.878	0.160	1.609
17	1.098	11.357	0.163	1.680
18	1.112	11.818	0.165	1.749
19	1.127	12.261	0.167	1.814
20	1.141	12.688	0.169	1.877
21	1.155	13.097	0.171	1.938
22	1.170	13.491	0.173	1.996
23	1.185	13.870	0.175	2.052
24	1.200	14.234	0.178	2.106
25	1.215	14.585	0.180	2.158
26	1.231	14.921	0.182	2.208
27	1.246	15.245	0.184	2.256
28	1.262	15.557	0.187	2.302
29	1.278	15.856	0.189	2.346
30	1.294	16.144	0.191	2.389

Table 11-162: Enbridge Carbon Avoided Costs

Year	Res/Com/Ind	
	(\$/m ³)	
	Rate	NPV
1	0.039	0.039
2	0.059	0.095
3	0.078	0.165
4	0.098	0.249
5	0.099	0.330
6	0.100	0.407
7	0.102	0.482
8	0.103	0.553
9	0.104	0.622
10	0.106	0.689
11	0.107	0.752
12	0.108	0.813
13	0.110	0.872
14	0.111	0.929
15	0.112	0.983
16	0.114	1.036
17	0.115	1.086
18	0.117	1.134
19	0.118	1.181
20	0.120	1.226
21	0.121	1.269
22	0.123	1.310
23	0.124	1.350
24	0.126	1.388
25	0.128	1.425
26	0.129	1.460
27	0.131	1.494
28	0.133	1.527
29	0.134	1.558
30	0.136	1.589

Table 11-163: Union Gas Avoided Costs

Year	Residential/Commercial				Industrial	
	Baseload (m3)		Weather Sensitive (m3)		Baseload (m3)	
	Rate	NPV	Rate	NPV	Rate	NPV
1	0.132	0.132	0.179	0.179	0.133	0.133
2	0.131	0.257	0.177	0.347	0.134	0.260
3	0.131	0.375	0.179	0.509	0.133	0.380
4	0.152	0.505	0.201	0.681	0.154	0.511
5	0.176	0.648	0.226	0.864	0.178	0.656
6	0.181	0.788	0.231	1.042	0.182	0.796
7	0.177	0.918	0.229	1.210	0.179	0.927
8	0.176	1.040	0.228	1.369	0.177	1.051
9	0.180	1.159	0.233	1.523	0.182	1.171
10	0.191	1.278	0.245	1.676	0.192	1.291
11	0.199	1.397	0.255	1.828	0.201	1.411
12	0.202	1.511	0.259	1.974	0.204	1.526
13	0.205	1.622	0.263	2.115	0.207	1.637
14	0.211	1.729	0.269	2.252	0.213	1.746
15	0.213	1.832	0.273	2.384	0.215	1.850
16	0.221	1.934	0.282	2.514	0.223	1.953
17	0.222	2.031	0.284	2.638	0.224	2.050
18	0.219	2.122	0.281	2.754	0.220	2.142
19	0.234	2.214	0.298	2.871	0.236	2.234
20	0.247	2.306	0.312	2.988	0.249	2.327
21	0.247	2.394	0.313	3.099	0.249	2.416
22	0.250	2.478	0.317	3.206	0.252	2.500
23	0.256	2.559	0.325	3.310	0.258	2.583
24	0.262	2.639	0.332	3.410	0.264	2.663
25	0.268	2.716	0.339	3.508	0.270	2.741
26	0.274	2.791	0.347	3.603	0.276	2.816
27	0.281	2.864	0.355	3.695	0.283	2.890
28	0.288	2.935	0.363	3.785	0.290	2.961
29	0.294	3.004	0.371	3.872	0.297	3.031
30	0.301	3.071	0.380	3.956	0.304	3.098

Table 11-164: Union Carbon Avoided Costs

Year	Res/Com/Ind	
	Baseload/Weather Sensitive	
	Rate	NPV
1	0.039	0.039
2	0.059	0.095
3	0.078	0.165
4	0.098	0.249
5	0.099	0.330
6	0.100	0.407
7	0.102	0.482
8	0.103	0.553
9	0.104	0.622
10	0.106	0.689
11	0.107	0.752
12	0.108	0.813
13	0.110	0.872
14	0.111	0.929
15	0.112	0.983
16	0.114	1.036
17	0.115	1.086
18	0.117	1.134
19	0.118	1.181
20	0.120	1.226
21	0.121	1.269
22	0.123	1.310
23	0.124	1.350
24	0.126	1.388
25	0.128	1.425
26	0.129	1.460
27	0.131	1.494
28	0.133	1.527
29	0.134	1.558
30	0.136	1.589

Table 11-165: Union Water Avoided Costs

Year	Res/Com/Ind	
	Water (\$/1000 litre)	
	Rate	NPV
1	0.777	0.777
2	0.787	1.524
3	0.797	2.243
4	0.807	2.934
5	0.817	3.598
6	0.828	4.237
7	0.838	4.851
8	0.849	5.442
9	0.860	6.010
10	0.871	6.556
11	0.882	7.081
12	0.893	7.586
13	0.904	8.071
14	0.916	8.538
15	0.927	8.986
16	0.939	9.418
17	0.951	9.833
18	0.963	10.232
19	0.975	10.616
20	0.988	10.984
21	1.000	11.339
22	1.013	11.680
23	1.026	12.008
24	1.039	12.323
25	1.052	12.627
26	1.065	12.918
27	1.079	13.198
28	1.093	13.468
29	1.107	13.727
30	1.121	13.976

Table 11-166: Union Electricity Avoided Costs

Year	Res/Com/Ind	
	Electricity (\$/Kwh)	
	Rate	NPV
1	0.133	0.133
2	0.134	0.261
3	0.136	0.383
4	0.138	0.501
5	0.140	0.615
6	0.141	0.724
7	0.143	0.829
8	0.145	0.930
9	0.147	1.027
10	0.149	1.120
11	0.151	1.210
12	0.153	1.296
13	0.155	1.379
14	0.156	1.459
15	0.158	1.536
16	0.160	1.609
17	0.163	1.680
18	0.165	1.748
19	0.167	1.814
20	0.169	1.877
21	0.171	1.938
22	0.173	1.996
23	0.175	2.052
24	0.178	2.106
25	0.180	2.158
26	0.182	2.208
27	0.184	2.255
28	0.187	2.301
29	0.189	2.346
30	0.191	2.388

Results Tables

Enbridge Results

Table 11-167: Enbridge overall PAC results*†

Program	PAC Benefits (\$)	PAC Costs (\$)	PAC Value (\$)	PAC Ratio
Resource Acquisition	190,430,000	48,906,000	141,524,000	3.89
Low Income	25,607,000	11,968,000	13,639,000	2.14
Total	216,038,000	60,874,000	155,163,000	3.55

*Not all values may compute exactly due to rounding.

†All dollar values are rounded to the nearest thousand.

Table 11-168: Enbridge Residential PAC results*†

Program	Annual net savings (m\$)	Program-level Incentives (\$)	Program-level general admin costs (\$)	Portfolio Budget (\$)	PAC Benefits (\$)	PAC Costs (\$)	PAC Value (\$)	PAC Ratio w/ O&A Costs	PAC Ratio w/o O&A Costs
Residential Adaptive Thermostat	2,347,000	1,079,000	472,000	107,000	8,363,000	1,551,000	6,811,000	5.39	6.16
Home Energy Conservation	8,815,000	27,756,000	2,877,000	672,000	46,639,000	30,633,000	16,007,000	1.52	1.59
Verified Final Results	11,162,000	28,835,000	3,349,000	779,000	55,002,000	32,184,000	22,818,000	1.71	

*Not all values may compute exactly due to rounding.

†All dollar values are rounded to the nearest thousand.

Table 11-169: Enbridge Commercial & Industrial PAC results*†

Program	Annual net savings (m3)	Program-level Incentives (\$)	Program-level general admin costs (\$)	Portfolio Budget (\$)	PAC Benefits (\$)	PAC Costs (\$)	PAC Value (\$)	PAC Ratio w/ O&A Costs	PAC Ratio w/o O&A Costs
Run-it-Right‡	322,000	217,000	538,000	5,000	420,000	755,000	-335,000	0.56	0.56
Commercial & Industrial Prescriptive	3,017,000	1,060,000	589,000	149,000	11,221,000	1,650,000	9,571,000	6.80	8.12
Commercial & Industrial Direct Install	7,696,000	3,867,000	655,000	352,000	26,871,000	4,522,000	22,349,000	5.94	6.91
Commercial & Industrial Custom	24,261,000	6,394,000	3,401,000	1,373,000	96,917,000	9,796,000	87,122,000	9.89	13.24
Verified Final Results	35,295,000	11,539,000	5,184,000	1,879,000	135,429,000	16,722,000	118,706,000	8.10	

*Not all values may compute exactly due to rounding.

†All dollar values are rounded to the nearest thousand.

‡Run-it-Right costs include costs attributable to both the Resource Acquisition and Market Transformation scorecards.

Table 11-170: Enbridge Low Income PAC results*†

Program	Annual net savings (m3)	Program-level Incentives (\$)	Program-level general admin costs (\$)	Portfolio Budget (\$)	PAC Benefits (\$)	PAC Costs (\$)	PAC Value (\$)	PAC Ratio w/ O&A Costs	PAC Ratio w/o O&A Costs
Multi-Residential	4,563,000	2,901,000	1,558,000	271,000	19,635,000	4,460,000	15,175,000	4.40	5.99
Home Winterproofing	1,241,000	4,222,000	3,286,000	84,000	5,972,000	7,509,000	-1,536,000	0.80	0.84
Verified Final Results	5,803,000	7,123,000	4,845,000	355,000	25,607,000	11,968,000	13,639,000	2.14	

*Not all values may compute exactly due to rounding.

†All dollar values are rounded to the nearest thousand.

Table 11-171: Enbridge overall TRC-Plus results*†

Program	Annual net savings (m3)	Measure Incremental Costs (\$)	TRC Plus Benefits (\$)	Program Costs (\$)	Overhead (\$) ‡	TRC Plus Costs (\$)	TRC Plus Value (\$)	TRC Plus Ratio w/ O&A costs
Resource Acquisition	46,457,000	69,327,000	236,212,000	3,738,000	4,795,000	77,860,000	158,352,000	3.03
Low Income	5,803,000	9,035,000	30,449,000	3,297,000	1,548,000	13,880,000	16,569,000	2.19
Total	52,261,000	78,362,000	266,661,000	7,035,000	6,342,000	91,740,000	174,921,000	2.91

*Not all values may compute exactly due to rounding.

†All dollar values are rounded to the nearest thousand.

‡Portfolio overhead costs for research, evaluation, and administration are not being applied at the program level. Consistent with what was done in 2015, the EC calculated costs as the sum of all OEB-defined program costs, including program admin and overhead costs and spread these costs across all programs based on their weighted savings contribution. Costs do not include market transformation or portfolio overhead costs, with the exception of Run-it-Right, which includes Market Transformation costs.

Table 11-172: Enbridge Residential TRC-Plus results*†

Program	Annual net savings (m3)	Measure Incremental Costs (\$)	TRC Plus Benefits (\$)	TRC Plus Costs (equipment) (\$)	TRC Plus Value (equipment) (\$)	TRC Plus Ratio (equipment)	Program Admin Costs (\$)	TRC Plus Ratio w/ O&A costs	TRC Plus Ratio w/o O&A costs
Residential Adaptive Thermostat	2,347,000	4,342,000	13,214,000	4,342,000	8,872,000	3.04	472,000	2.74	2.86
Home Energy Conservation	8,815,000	41,766,000	66,263,000	41,766,000	24,497,000	1.59	2,877,000	1.48	1.53
Verified Final Results	11,162,000	46,108,000	79,477,000	46,108,000	33,369,000	1.72	3,349,000	1.61	-

*Not all values may compute exactly due to rounding.

†All dollar values are rounded to the nearest thousand.

Table 11-173: Enbridge Commercial/Industrial TRC-Plus results* †

Program	Annual net savings (m3)	Measure Incremental Costs (\$)	TRC Plus Benefits (\$)	TRC Plus Costs (equipment) (\$)	TRC Plus Value (equipment) (\$)	TRC Plus Ratio (equipment)	Program Admin Costs (\$)	TRC Plus Ratio w/ O&A costs	TRC Plus Ratio w/o O&A costs
Run-it-Right‡	322,000	131,000	467,000	131,000	336,000	3.58	538,000	0.70	0.71
Commercial & Industrial Prescriptive	3,017,000	2,796,000	13,771,000	2,796,000	10,975,000	4.93	589,000	4.07	4.42
Commercial & Industrial Direct Install	7,696,000	3,666,000	31,133,000	3,666,000	27,468,000	8.49	655,000	7.21	8.45
Commercial & Industrial Custom	24,261,000	16,627,000	111,364,000	16,627,000	94,738,000	6.70	3,401,000	5.56	6.35
Verified Final Results	35,295,000	23,219,000	156,735,000	23,219,000	133,516,000	6.75	5,184,000	5.52	-

*Not all values may compute exactly due to rounding.

†All dollar values are rounded to the nearest thousand.

‡Run-it-Right costs include costs attributable to both the Resource Acquisition and Market Transformation scorecards.

Table 11-174: Enbridge Low Income TRC-Plus results* †

Program	Annual net savings (m3)	Measure Incremental Costs (\$)	TRC Plus Benefits (\$)	TRC Plus Costs (equipment) (\$)	TRC Plus Value (equipment) (\$)	TRC Plus Ratio (equipment)	Program Admin Costs (\$)	TRC Plus Ratio w/ O&A costs	TRC Plus Ratio w/o O&A costs
Multi-Residential	4,563,000	5,484,000	22,678,000	5,484,000	17,194,000	4.14	1,558,000	3.22	3.87
Home Winterproofing	1,241,000	3,551,000	7,771,000	3,551,000	4,220,000	2.19	3,286,000	1.14	1.20
Verified Final Results	5,803,000	9,035,000	30,449,000	9,035,000	21,414,000	3.37	4,845,000	2.19	-

*Not all values may compute exactly due to rounding.

†All dollar values are rounded to the nearest thousand.

Union Results

Table 11-175: Union Low Income PAC results*

Program	Annual net savings (m3)	Program-level Incentives (\$)	Program-level general admin costs (\$)	Portfolio Budget (\$)	PAC Benefits (\$)	PAC Costs (\$)	PAC Value (\$)	PAC Ratio w/ O&A costs	PAC Ratio w/o O&A costs
Furnace End-of-Life	6,000	31,000	7,000	2,000	23,000	38,000	-15,000	0.61	0.64
Indigenous	21,000	254,000	81,000	16,000	95,000	335,000	-240,000	0.28	0.29
Home Weatherization	2,189,000	6,195,000	3,802,000	487,000	10,206,000	9,997,000	209,000	1.02	1.10
Multi Family	1,376,000	2,433,000	566,000	146,000	5,674,000	2,999,000	2,676,000	1.89	2.18
Verified Final Results	3,591,000	8,912,000	4,456,000	651,000	15,998,000	13,368,000	2,630,000	1.20	-

*Not all values may compute exactly due to rounding.

Table 11-176: Union Resource Acquisition PAC results*

Program	Annual net savings (m3)	Program-level Incentives (\$)	Program-level general admin costs (\$)	Portfolio Budget (\$)	PAC Benefits (\$)	PAC Costs (\$)	PAC Value (\$)	PAC Ratio w/ O&A costs	PAC Ratio w/o O&A costs
Home Reno Rebate	6,190,000	18,059,000	3,886,000	1,069,000	30,534,000	21,945,000	8,589,000	1.39	1.54
Residential Thermostats	561,000	352,000	315,000	32,000	1,890,000	667,000	1,223,000	2.83	3.43
Commercial & Industrial Prescriptive	7,798,000	2,697,000	1,330,000	196,000	32,051,000	4,026,000	28,025,000	7.96	9.88
Commercial & Industrial Direct Install	4,853,000	1,993,000	382,000	116,000	16,343,000	2,375,000	13,968,000	6.88	8.12
Commercial & Institutional Custom	33,382,000	8,786,000	2,782,000	563,000	100,170,000	11,569,000	88,601,000	8.66	11.30
Verified Final Results	52,783,000	31,888,000	8,694,000	1,977,000	180,987,000	40,582,000	140,405,000	4.46	-

*Not all values may compute exactly due to rounding.

Table 11-177: Union Large Volume PAC results*

Program	Annual net savings (m3)	Program-level Incentives (\$)	Program-level general admin costs (\$)	Portfolio Budget (\$)	PAC Benefits (\$)	PAC Costs (\$)	PAC Value (\$)	PAC Ratio w/ O&A costs	PAC Ratio w/o O&A costs
Large Volume	7,047,000	2,684,000	404,000	150,000	13,257,000	3,089,000	10,168,000	4.29	4.94
Verified Final Results	7,047,000	2,684,000	404,000	150,000	13,257,000	3,089,000	10,168,000	4.29	-

*Not all values may compute exactly due to rounding.

Table 11-178: Union Performance Based PAC results*

Program	Annual net savings (m3)	Program-level Incentives (\$)	Program-level general admin costs (\$)	Portfolio Budget (\$)	PAC Benefits (\$)	PAC Costs (\$)	PAC Value (\$)	PAC Ratio w/ O&A costs	PAC Ratio w/o O&A costs
RunSmart	8,000	28,000	126,000	13,000	10,000	271,000	-261,000	0.04	0.07
Strategic Energy Management	0	12,000	298,000	15,000	0	309,000	-309,000	0	0
Verified Final Results	8,000	39,000	424,000	28,000	10,000	580,000	-570,000	0.02	-

*Not all values may compute exactly due to rounding.

Table 11-179: Union Low Income TRC-Plus results*

Program	Annual net savings (m3)	Measure Incremental Costs (\$)	TRC Plus Benefits (\$)	TRC Plus Costs (equipment) (\$)	TRC Plus Value (equipment) (\$)	TRC Plus Ratio (equipment)	Program Admin Costs (\$)	TRC Plus Ratio w/ O&A costs	TRC Plus Ratio w/o O&A costs
Furnace End-of-Life	6,000	55,000	25,000	55,000	-29,000	0.46	7,000	0.41	0.42
Indigenous	21,000	153,000	119,000	153,000	-34,000	0.78	81,000	0.51	0.52
Home Weatherization	2,189,000	5,663,000	12,726,000	5,663,000	7,063,000	2.25	3,802,000	1.34	1.46
Multi Family	1,376,000	2,132,000	6,929,000	2,132,000	4,797,000	3.25	566,000	2.57	3.02
Verified Final Results	3,591,000	8,003,000	19,800,000	8,003,000	11,796,000	2.47	4,456,000	1.59	-

*Not all values may compute exactly due to rounding.

Table 11-180: Union Resource Acquisition TRC-Plus results*

Program	Annual net savings (m3)	Measure Incremental Costs (\$)	TRC Plus Benefits (\$)	TRC Plus Costs (equipment) (\$)	TRC Plus Value (equipment) (\$)	TRC Plus Ratio (equipment)	Program Admin Costs (\$)	TRC Plus Ratio w/ O&A costs	TRC Plus Ratio w/o O&A costs
Home Reno Rebate	6,190,000	26,910,000	42,298,000	26,910,000	15,388,000	1.57	3,886,000	1.37	1.48
Residential Thermostats	561,000	1,096,000	3,033,000	1,096,000	1,937,000	2.77	315,000	2.15	2.34
Commercial & Industrial Prescriptive	7,798,000	10,182,000	35,678,000	10,182,000	25,496,000	3.50	1,330,000	3.10	3.33
Commercial & Industrial Direct Install	4,853,000	1,633,000	16,759,000	1,633,000	15,126,000	10.26	382,000	8.32	10.15
Commercial & Institutional Custom	33,382,000	38,664,000	112,449,000	38,664,000	73,784,000	2.91	2,782,000	2.71	2.90
Verified Final Results	52,783,000	78,485,000	210,216,000	78,485,000	131,732,000	2.68	8,694,000	2.41	-

*Not all values may compute exactly due to rounding.

Table 11-181: Union Large Volume TRC-Plus results*

Program	Annual net savings (m3)	Measure Incremental Costs (\$)	TRC Plus Benefits (\$)	TRC Plus Costs (equipment) (\$)	TRC Plus Value (equipment) (\$)	TRC Plus Ratio (equipment)	Program Admin Costs (\$)	TRC Plus Ratio w/ O&A costs	TRC Plus Ratio w/o O&A costs
Large Volume	7,047,000	5,536,000	14,615,000	5,536,000	9,079,000	2.64	404,000	2.46	2.64
Verified Final Results	7,047,000	5,536,000	14,615,000	5,536,000	9,079,000	2.64	404,000	2.46	-

*Not all values may compute exactly due to rounding.

Table 11-182: Union Performance Based TRC-Plus results*

Program	Annual net savings (m3)	Measure Incremental Costs (\$)	TRC Plus Benefits (\$)	TRC Plus Costs (equipment) (\$)	TRC Plus Value (equipment) (\$)	TRC Plus Ratio (equipment)	Program Admin Costs (\$)	TRC Plus Ratio w/ O&M costs	TRC Plus Ratio w/o O&M costs
Run Smart	8,000	0	11,000	0	11,000	—	243,000	0.05	0.09
Strategic Energy Management	0	9	9	0	0	—	298,000	0.00	0.00
Verified Final Results	8,000	0	11,000	0	11,000	—	541,000	0.02	-

*Not all values may compute exactly due to rounding.

Appendix Q Findings and Recommendations: Summary Tables

This appendix contains summary tables of the findings and recommendations presented in Section 10 of this report.

2019 Annual Verification Recommendations

The 2019 annual verification identified several recommendations, some of which were previously identified in annual verification processes.

In the tables below, the primary outcomes of the findings and recommendation are classified into three categories: reduce costs (evaluation or program or both), improve savings accuracy, and decrease risk (multiple types of risk are in this category including risk of adjusted savings, risk to budgets or project schedules, and others).

Table 11-183. Overall annual verification - summary of recommendations

#	Finding	Recommendation	Previously Recommended	Applies to 2019		Primary Outcome		
				Utility	Evaluation	Reduce Costs	Improve Accuracy	Decrease Risk
O1	The Enbridge tracking file does not include information that allows the evaluator to identify all projects installed by a single customer.	A: Enbridge should include site-level information for all measures installed through the program.	✓	✓			✓	✓
O2	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 spreadsheet is developed, utilize the same electronic TRM for both utilities.	✓	✓	✓	✓	✓	✓
		D: OEB: develop means for consistent system.	✓	✓	✓	✓	✓	✓

O3	Explicit third-party documentation was not available for all program qualification and participation requirements for all programs.	A: Third-party documentation for each required element for all non-savings metrics should be collected and delivered.	✓	✓		✓	✓	✓
O4	Utility-provided documentation was sometimes overly redacted.	A: Review the documentation redaction procedures for future evaluations.		✓	✓	✓		✓

Table 11-184. Whole home simulation modelling - summary of recommendations

#	Finding	Recommendation	Previously Recommended	Applies to 2019		Primary Outcome		
				Utility	Evaluation	Reduce Costs	Improve Accuracy	Decrease Risk
SM1	The Union HRR program improved greatly with respect to data entry errors and outdated simulation results.	A: Continue the practices that resulted in a 100% realization rate and apply them to other whole home programs.		✓		✓		✓
SM2	Air sealing as a savings measure is present in a high percentage of single-family home retrofit projects.	A: Provide the EC with air sealing percent improvement and energy savings attributable to air sealing.	✓	✓			✓	✓
SM3	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.	✓		✓		✓	
SM4	Documentation does not indicate that auditors are approved Certified Energy Evaluators.	A: Provide confirmation of auditors' CEE status.		✓				✓

Table 11-185. Cost-effectiveness - summary of recommendations

#	Finding	Recommendation	Previously Recommended	Applies to 2019		Primary Outcome		
				Utility	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	Enbridge only includes resource acquisition costs in the CE analysis for the LEG Run-It-Right program – a deviation from previous years.	A: Include all costs in the cost effectiveness analysis for the LEG Run-It-Right program					✓	✓
CE3	Utilities have not historically provided their CE calculators for annual verification.	A: Provide all cost effectiveness workbooks, calculations, and inputs – at the outset of each annual verification cycle.		✓		✓	✓	✓