ONTARIO GAS DSM EVALUATION CONTRACTOR

2023 Natural Gas Demand-Side Management Annual Verification Final Report

Ontario Energy Board

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1 AUDIT OPINION

Enbridge Gas Inc. implemented energy conservation programs designed to reduce natural gas use at participating customer's homes and businesses throughout the 2023 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, Enbridge may be eligible for a performance incentive, called the shareholder incentive. The maximum possible shareholder incentive is $20,900,000, although this amount is only available if performance meets 125% of all OEB-approved targets. Enbridge may claim lost revenue as a result of the lower natural gas sales.

The Evaluation Contractor (EC) team[1] (DNV and Dunsky) provides the following opinion on the achieved natural gas savings, lost revenue, shareholder incentive, and cost effectiveness of the DSM programs offered by Enbridge for the calendar year ending December 31, 2023. 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.

The EC confirmed that the method to determine the cost effectiveness results followed the framework and past practice consistently and correctly; however, some key assumptions in 2023 do not match the reality of the current market. The resulting value is biased downward and is lower than in previous years. Specifically, three things individually affected the portfolio result enough to drive it below 1.0. These were an outlier inflation value across the portfolio, an unusual measure mix within one offering, and the approach to measure costs for some of the measures in the same offering. While these three concerns will persist into the 2024 program year, the EC expects them to be short-term and not representative of the long-term performance of the portfolio.

Definition	Enbridge Results
Shareholder Incentive	$6,919,404
Lost Revenue	$249,306
Verified Net Annual Energy Savings (m3)	121,146,974
Verified Net Cumulative Energy Savings (m3)	1,754,011,249
Total Dollars Spent (not reviewed)	$144,721,463
Benefit Cost Ratio (TRC-plus test)[2]	0.93

[1] DNV leads the Evaluation Contractor team and led the evaluation of the 2023 DSM programs, with contributions from Dunsky.

[2] Some key assumptions in 2023 which do not match the reality of the current market biased the result lower than previous years. This value is not representative of the long-term performance of the portfolio. Please see the discussion in Appendix Q of this report for more detail.

2 EXECUTIVE SUMMARY

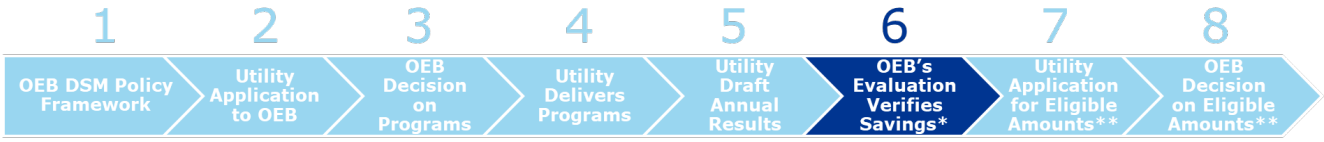
Enbridge Gas Inc.[3] delivers demand-side management (DSM) programs under the Natural Gas Demand Side Management Framework[4] developed by the Ontario Energy Board (OEB). Through the framework development and approval of DSM plans, the OEB sets budgets, targets, and cost effectiveness thresholds, in 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 and funded by ratepayers. The energy conservation programs are designed to reduce customer demand for gas through increases in energy efficient technologies, equipment, and behaviours 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 2023 and offered by Enbridge. The verification was conducted on behalf of the OEB by its independent, third-party evaluation contractor (EC), the team of DNV and Dunsky.

Figure 2-1 provides a general depiction of the broader process of creating DSM programs and their evaluation that led to this evaluation report.

Figure 2-1. Creation and evaluation process for DSM programs



*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, provide 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's shareholders. The financial incentive is determined by reviewing the utility's 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 the 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 2023 programs and applies them to the natural gas energy savings and achieved scorecard values reported by the utility to the OEB. For programs or metrics where no evaluation studies have been completed during the current evaluation, the EC team conducts a due diligence review of program documentation to verify the savings or metrics reported by the utilities.

[3] For ease of reference, throughout this report, the EC has referred to Enbridge Gas Inc. as Enbridge.

[4] EB-2021-0002

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 2-1 shows the verified, comprehensive scorecard results.

The OEB also requires the utility 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 2023 are the same ones used in the 2022 analysis. The cost effectiveness results (in terms of TRC-Plus benefit-cost ratio) for each program are found in Table 2-1 in the rightmost column. The bigger the number, the more cost effective the program is. This table also shows the amount of money spent by Enbridge to implement the energy efficiency programs.

The EC confirmed that the method to determine the cost effectiveness results followed the framework and past practice consistently and correctly; however, some key assumptions in 2023 do not match the reality of the current market. Specifically, three things individually biased the portfolio result downward enough to drive it below 1.0. First, an outlier inflation value of 6%[5] artificially devalues savings and benefits above more reasonable inflation forecasts while having no effect on costs, which are incurred in the first year. Second, an unusual measure mix within Enbridge's joint HER+ offering with Natural Resources Canada included a high proportion of cost inefficient measures. Third, the approach to measure costs for some of the measures in the HER+ offering was conservatively high. While these three concerns will persist into the 2024 program year, the EC expects them to be short-term and not representative of the long-term performance of the portfolio.[6]

Table 2-2 shows the verified revenues that Enbridge lost as a result of implementing DSM programs. The lost revenue is shown by rate class and is only the revenue lost during the 2023 calendar year.[7] A rate class is a group of customers that pay the same rate for their gas usage and service.

To ensure the approved DSM plan maintains sufficient longer-term benefits, Enbridge is also required to annually maintain a minimum weighted average measure life (WAML) of 14 years, excluding the Large Volume Program. Table 2-3 shows the WAML of Enbridge DSM programs in 2023.

In summary:

- Enbridge programs offered in 2023 were verified to achieve:
  - Savings in 2023 of 121,146,974 m^3
  - Cumulative savings of 1,754,011,249 m^3 (translating to emissions reductions of 3,369,456 tons of CO_2 equivalent[8])

In this report, we made several recommendations for the programs, focusing primarily on issues related to energy modelling, appropriate adjustment values, and cost effectiveness.

[5] Inflation was calculated in accordance with the OEB's 2022 DSM Framework (Section 11.1 – Inflation Rate, p. 33) as the four-quarter moving inflation rate based on the Gross Domestic Product Implicit Price Index for Final Domestic Demand, based on the most recently available information. While the resulting 6% inflation rate is anomalous and not representative of Bank of Canada or other forecasts of future inflation (which are closer to 2% per year), the 6% rate gets applied to the entire life of energy efficiency measures.

[6] See Appendix Q for greater detail.

[7] The lost revenue shown in this table is 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 CO_2 emission factors for natural gas provided by the Government of Canada.

2.1 Results tables

Table 2-1. Savings, spend, cost effectiveness, and incentive results*

Programs and Offerings	Metric	Verified Savings or Other Metric	Cumulative Savings	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)**
Residential Program		**22,808,759**	**495,924,190**			**$70,378,564**	**$64,103,929**	**-$6,274,634**	**0.50**	**-$171,038,659**
Residential Whole Home	Net Annual Gas Savings (m3)	15,379,280	384,482,006	103.0%	$2,174,628	$60,000,000	$55,316,708	-$4,683,292	0.37	-$203,893,778
Residential Single Measure	Net Annual Gas Savings (m3)	0	0			$4,617,424	$14,600	-$4,602,824	0.00	-$14,600
Residential Smart Home	Net Annual Gas Savings (m3)	7,429,479	111,442,184			$3,977,235	$7,563,752	$3,586,517	2.86	$32,869,719
Residential Administration	N/A	N/A	N/A	N/A		$1,783,905	$1,208,869	-$575,036	N/A	N/A
Low-Income Program		**6,250,013**	**126,943,660**			**$22,987,685**	**$23,844,021**	**$856,336**	**1.60**	**$16,035,157**
Home Winterproofing	Net Annual Gas Savings (m3)	3,247,883	69,515,817	113.0%	$841,771	$14,375,115	$17,551,495	$3,176,380	1.38	$6,758,668
Affordable Housing Multi-Residential	Net Annual Gas Savings (m3)	3,002,130	57,427,843	59.9%		$7,138,928	$5,124,136	-$2,014,792	2.03	$9,276,489
Low-Income Administration	N/A	N/A	N/A	N/A		$1,473,642	$1,168,390	-$305,252	N/A	N/A
Commercial Program		**25,051,993**	**402,007,212**			**$25,262,775**	**$20,859,883**	**-$4,402,892**	**1.19**	**$19,227,100**
Commercial Custom	Large Customer Net Annual Gas Savings (m3)	18,300,670	317,854,862	115.9%	$1,813,776	$11,895,830	$8,393,868	-$3,501,962	0.97	-$2,792,163
Prescriptive Downstream		2,612,970	33,520,416			$2,436,237	$3,066,057	$629,820	2.76	$22,019,263
Direct Install	Small Customer Net Annual Gas Savings (m3)	2,936,481	35,184,433	83.4%		$4,765,983	$3,745,020	-$1,020,963		
Prescriptive Midstream		1,201,871	15,447,502			$2,421,117	$1,889,589	-$531,528		
Commercial Administration	N/A	N/A	N/A	N/A		$3,743,608	$3,765,349	$3,743,608	N/A	N/A
Industrial Program		**44,309,314**	**653,664,607**			**$17,828,114**	**$13,289,021**	**-$4,539,093**	**2.90**	**$101,035,476**
Industrial Custom	Net Annual Gas Savings (m3)	44,309,314	653,664,607	88.0%	$953,119	$13,872,000	$9,637,297	-$4,234,703	2.90	$101,035,476
Industrial Administration	N/A	N/A	N/A	N/A		$3,956,114	$3,651,725	-$304,389	N/A	N/A
Large Volume Program		**22,726,895**	**75,471,581**			**$2,766,624**	**$2,684,891**	**-$81,733**	**3.28**	**$9,368,912**
Direct Access	Net Annual Gas Savings (m3)	22,726,895	75,471,581	244.4%	$627,000	$2,550,000	$2,493,024	-$56,976	3.28	$9,368,912
Large Volume Administration	N/A	N/A	N/A	N/A		$216,624	$191,867	-$24,757	N/A	N/A
Energy Performance Program		**N/A**	**N/A**			**$1,221,656**	**$1,464,037**	**$242,381**	**N/A**	**N/A**
Whole Building Pay for Performance	Participants	26	N/A	104.0%	$103,664	$1,117,500	$1,426,609	$309,109	N/A	N/A
Energy Performance Administration	N/A	N/A		N/A		$104,156	$37,428	-$66,728		
Building Beyond Code Program		**N/A**	**N/A**			**$8,437,503**	**$6,385,860**	**-$2,051,643**	**N/A**	**N/A**
Residential Savings by Design	Energy Star Homes	698	N/A	48.1%	$405,444	$4,057,500	$2,536,834	-$1,520,666	N/A	N/A
Commercial Savings by Design	Participants	24		85.7%		$1,236,000	$754,061	-$481,939		
Affordable Housing Savings by Design	Participants	21		116.7%		$2,138,000	$1,983,683	-$154,317		
Commercial Air Tightness Testing	Participants	5		100.0%		$483,432	$325,307	-$158,125		
	Qualified Agents	31		310.0%		$522,571	$785,975	$263,404		
Building Beyond Code Administration	N/A	N/A		N/A		$1,221,656	$1,464,037	$242,381		
Enbridge Program Total		**121,146,974**	**1,754,011,249**		**$6,919,404**	**$148,882,921**	**$132,631,642**	**-$16,251,278**	**0.93**	**-$37,461,834**
Portfolio Administrative Costs						$18,360,000	$12,089,820	-$6,270,180		
Enbridge Portfolio Total						**$167,242,921**	**$144,721,463**	**-$22,521,458**		

*Not all values may compute exactly due to rounding.

** Some key assumptions in 2023 which do not match the reality of the current market biased the result lower than previous years. This value is not representative of the long-term performance of the portfolio. Please see the discussion in Appendix Q of this report for more detail.

Table 2-2. Lost revenue results*

Rate Zone	Rate Class	Verified Lost Revenue
EGD	Rate 110	$38,979
	Rate 115	$3,009
	Rate 135	$11,195
	Rate 145	$1,859
	Rate 170	$1,009
Union South	Rate M4	$94,808
	Rate M5	$6,724
	Rate M7	$69,983
	Rate T1	$1,131
	Rate T2	$5,095
Union North	Rate 20	$7,010
	Rate 100	$8,504
Total		**$249,306**

*Not all values may compute exactly due to rounding.

Table 2-3. Weighted average measure life results*

Metric	Value
Verified Net Cumulative Natural Gas Savings (m3)**	1,678,539,668
Verified Net Annual Natural Gas Savings (m3)**	98,420,079
Weighted Average Measure Life	17.05

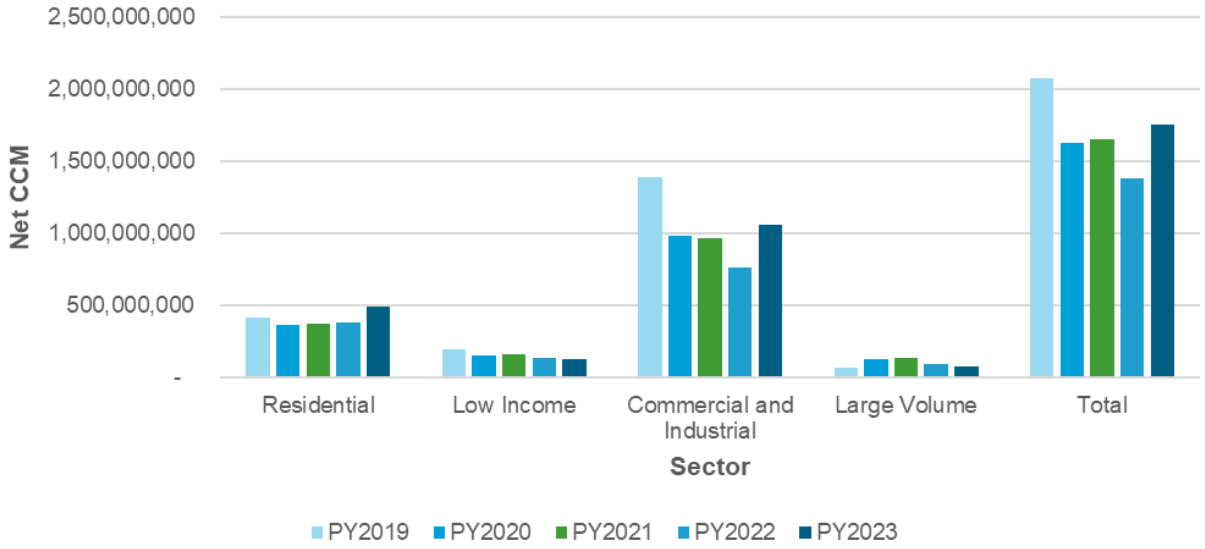
*Not all values may compute exactly due to rounding.
**Excludes the Large Volume Program

2.2 Historical Performance

This section places the PY2023 results in context of final verified results of recent years. Figure 2-2 and Figure 2-3 show historical portfolio performance for PY2019 through PY2023. For each sector, performance over time is displayed in order from left to right with PY2019 as the lightest blue bar and PY2023 as the darkest blue. These figures provide a point of comparison to program performance over time and highlight the efficacy of programs within their respective sectors.

Figure 2-2 shows net cumulative natural gas savings (net cumulative cubic meters, or net CCM) for PY2019 through PY2023 by sector and overall. Over the past five years, overall savings have dropped from more than 2 billion CCM to approximately 1.75 billion CCM, showing that the program has not achieved pre-COVID savings levels. As the figure illustrates, the Commercial and Industrial sector has consistently accounted for the largest portion of verified savings, followed by Residential, Low Income, and Large Volume. The Low Income sector has shown a general decline in net savings from 2019 through 2023, while Large Volume net savings peaked in 2021.

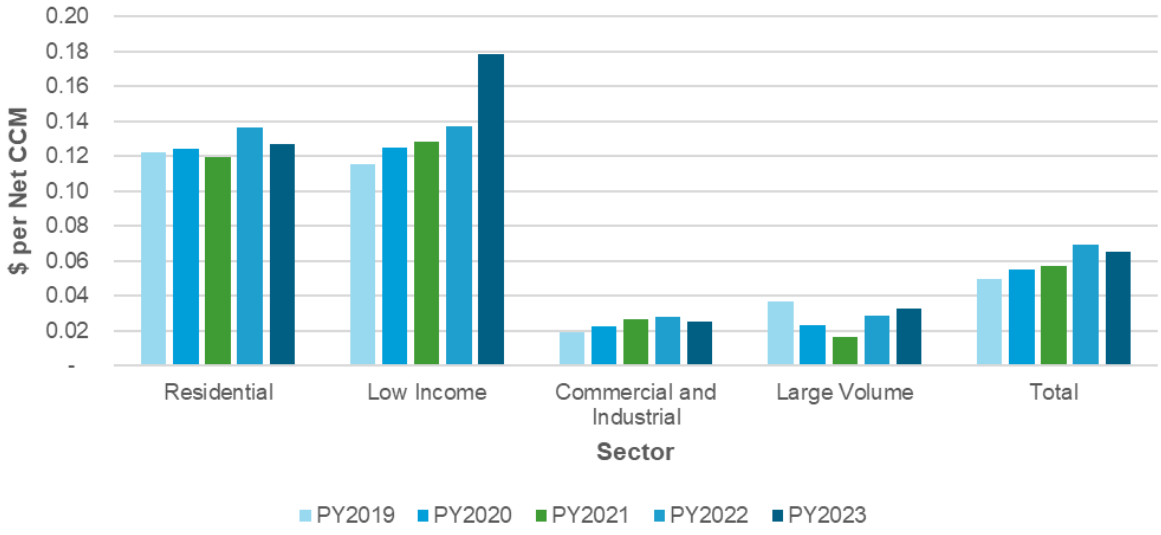
Figure 2-2. Historical Performance: net cumulative natural gas savings over time by sector*†



*Net CCM savings values were taken from past Annual Verification reports.
†The primary savings metric shifted in PY2023 from cumulative savings (shown in the figure) to annual savings.

Figure 2-3 shows dollars spent per net cumulative natural gas savings for PY2019 through PY2023 by sector. Lower values of dollars per CCM indicate more "efficient" programs, or programs that achieved greater savings at a lower cost. The figure shows that the most 'expensive' CCM achieved are consistently in the Low Income or Residential sectors; Low Income was the highest cost per CCM in 2023. The Commercial and Industrial and Large Volume sectors are approximately the same dollars per CCM, with Large Volume having the lowest value in 2021 and Commercial and Industrial the lowest in 2023. Overall, costs per CCM increased from 2019 through 2022 and dropped slightly in 2023.

Figure 2-3. Historical Performance: dollars spent per net cumulative natural gas savings over time



*Net CCM savings and dollars spent values were taken from past Annual Verification reports. The dollars spent value has not been adjusted for inflation.
†The dollars spent in this figure do not include overheads.

3 GLOSSARY OF KEY TERMS AND CONCEPTS

Term	Description
Action	A DSM measure that generates savings through optimization, maintenance, or repair of existing systems. Actions (vs. equipment) were categorized for the populations of measures based on tracking database information provided by Enbridge for sample design.
Adjustment factor	The adjustment factors are ratios of savings that allow evaluation findings from a sample of projects to be applied to and "adjust" the population of program savings. Realization rates and ratios are other common terms.
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	Energy used / equipment in place if the program measure had not been done.
Building envelope	Exterior surfaces (e.g., walls, windows, roof, and floor) of a building that separate the conditioned space from the outdoors.
C&I	Commercial and Industrial
Capacity Expansion	Measure that allows customer to increase production/productivity
CCM	Cumulative cubic meters (cumulative m^3). 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)	Activities related to the collection, analysis, and reporting of data for purposes of measuring gross custom program impacts.
Customer	Unique customers can be identified based on the account number and the contact information provided by Enbridge. A customer may have multiple site addresses, decision makers, and account numbers. Customers can only be identified for records for which we received contact information. (i.e., records associated with account numbers that have measures in the sample or backup sample).
Demand side management (DSM)	Modification of perceived customer demand for a product through various methods such as financial incentives, education, and other programs.
Domain	Grouping of like projects. A domain may be defined as projects within a specific sector or a category of measure types, end uses, or other.
Dual baseline	Savings calculation approach which addresses or combines the savings associated with early replacement and the savings after the early replacement period. This concept is relevant to the measurement of lifetime gas savings (CCM) but not first-year annual savings.

Term	Description
Early replacement (ER)	Measure that replaces a piece of equipment that is not past its estimated useful life (EUL) and in good operating condition. A measure category where a utility energy efficiency program has caused a customer to replace operable equipment with a higher efficiency alternative (also referred to as advancement).
Early replacement period (ER Period)	Time that the existing equipment would have continued to be in use. This is the same as remaining useful life (RUL). This concept is relevant to the measurement of lifetime gas savings (CCM) but not first-year annual savings.
Energy solutions advisor (ESA)	Energy Solutions Advisors work with customers on a one-to-one basis to address the unique processes and opportunities within each customer facility, identify energy savings opportunities, and promote Enbridge's DSM offerings.
Estimated 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). Typically, the median number of years that the measure will remain in service.
Ex ante	Program claimed or reported inputs, assumptions, savings, etc.
Ex post	Program inputs, assumptions, savings, etc. which are verified after the claimed savings are finalized. Does not include assessment of program influence.
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	Gross savings are changes in energy consumption and/or demand directly caused by program-related actions by participants, regardless of reasons for participation (savings relative to baseline, defined above).
In situ	Existing measure, conditions, and settings.
In-depth interviews (IDIs)	Structured technical interviews administered by evaluation engineers and market researchers either in person or more frequently, over the phone, IDIs offer more flexibility than computer-assisted telephone interviews and are best leveraged for complex projects and topics.
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.
Industry standard practice (ISP)	A common practice used within an industry but not formally defined by code or regulation.
Input assumptions	Assumptions such as operating characteristics and associated units of resource savings for DSM technologies and measures.
Lifetime cumulative savings	Total natural gas savings (CCM) over the life of a DSM measure. It can be claimed, gross, or net. Sometimes referred to as just "cumulative" or "lifetime."
Maintenance (maint.)	Repair, maintain, or restore to prior efficiency.
Measure	Equipment, technology, practice, or behaviour that, once installed or working, results in energy use reduction. Measures are identified in the tracking data as unique line items for which savings within a custom project are quantified. Multiple measures may belong to the same project.

Term	Description
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)	Verification of savings using methods not including attribution/free ridership assessment.
Metric	This is a term used by the OEB to measure a utility's program achievement. Under the DSM framework, programs are grouped into categories, called scorecards. Each offering within a scorecard is assigned at least one metric that is used to measure utility performance. The metric for many offerings is annual savings, or a reduction in natural gas consumption, while other offerings 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	Multifamily (multi-residential)
Natural replacement	A measure category where the equipment is replaced on failure or where a utility energy efficiency program has not influenced the customer decision to replace but once the decision has been made, the utility program influences a higher efficiency alternative. (see replace on burnout)
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, or a category of efficiency measures in new construction or major renovations, whose baseline would be the relevant code or standard market practice.
Non-early replacement period (non-ER period)	Time after the ER period up to the EUL.
Non-energy impacts	Sometimes called non-energy benefits, these are the wider socio-economic or environmental outcomes that arise from energy efficiency improvements, aside from energy savings. NEIs can include but are not limited to impacts such as improved safety, improved health, and job creation. For example, offering participants may benefit from increased property value, and improved health and comfort. The TRC-Plus test includes a 15% adder to the benefits calculation to account for NEIs.
Normal replacement (NR)	Measure that replaces a piece of equipment that is past EUL and in good operating condition.
Offering	One or more DSM activities or measures which a utility may use to affect a specifically identified target market in their choices around the amount and timing of energy consumption.
Persistence	The extent to which a DSM measure remains installed and performing as originally predicted in relation to its EUL.
Portfolio	A group of DSM programs which have been selected and combined in order to achieve the objectives of a utility's DSM Plan.
Program	The programs outlined in Enbridge's Multi-Year Plan are comprised of one or more offerings and address the needs of a subset of Enbridge's customer base.
Program evaluation	Activities related to the collection, analysis, and reporting of data for purposes of measuring program impacts 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.

Term	Description
Project	Projects are identified in the tracking data based on the project code. A project may have multiple measures as indicated by sub-codes in the current data tracking system.
Rate class	The OEB establishes distribution rate classes for Enbridge. Distribution rate classes group customers with similar energy profiles.
Realization rate	A combination of adjustment factors, which represents ratios between two savings values. For example, the final realization rate is the ratio between evaluated savings and program claimed savings.
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)	Measure that replaces a failed or failing piece of equipment. (see natural replacement)
Retrofit	A measure category that includes the addition of an efficiency measure to an existing facility such as insulation or air sealing to control air leakage.
Retrofit add-on (REA)	Measure that reduces energy use by modifying an existing piece of equipment.
Scorecard	A scorecard allows for multiple different kinds of metrics such as natural gas savings and/or participants enrolled to be used simultaneously to measure annual utility performance. A scorecard identified for each program year can be found in the Ontario Energy Board Decision and Order EB-2021-0002.
Scorecard Achievement	The verified value for program-specific metric targets (annual savings, 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 125%.
Site	Sites are identified based on unique site addresses provided by 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 a site id.
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)	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	Telephone-supported engineering review.
Unit of analysis	The level at which the data are analysed, which in 2023 will likely be a "measure" or sub-project level for Enbridge.
Vendors	Program trade allies, business partners, contractors, and suppliers who work with program participants to implement energy saving measures.

4 INTRODUCTION

Enbridge Gas Inc.[9] delivers demand-side management (DSM) offerings under the Natural Gas Demand Side Management Framework[10] developed by the Ontario Energy Board (OEB). The 2023 Natural Gas DSM Annual Verification Report has been prepared for the OEB to report the results of the annual verification of Enbridge's natural gas DSM programs delivered in 2023. These verifications were conducted by the OEB's Evaluation Contractor (EC) team of DNV and Dunsky.

As part of the utility DSM plan, offerings are grouped into categories, called program scorecards. Each offering within a scorecard is assigned at least one metric that is used to measure utility performance. The metric for many offerings is net annual gas (m3) savings, while other offerings 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.[11] The EC uses sampling, engineering reviews, documentation verification, and other techniques to verify Enbridge's performance against the target for each 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).[12] Scorecard results, which can be found in the main body of this report, are based on verification activities described in detail in the appendices.

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

Under the new framework, to ensure the approved DSM plan maintains sufficient longer-term benefits, Enbridge is also required to annually maintain a minimum weighted average measure life (WAML) of 14 years, excluding the Large Volume Program.

The OEB requires Enbridge to deliver DSM programs that are cost-effective, which means the verified benefits produced by the programs outweigh the cost of their implementation. Cost effectiveness results can be found in Section 6.3 and APPENDIX Q.

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, Enbridge, non-utility stakeholders, independent experts, and an observer from the Independent Electricity System Operator (IESO), the Ministry of Energy, and Natural Resources Canada. 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.

[9] For ease of reference, throughout this report, the EC has referred to Enbridge Gas Inc. as Enbridge.
[10] EB-2021-0002
[11] For the 2023 program year, these targets were prescribed. This is described in more detail in APPENDIX L.
[12] A minimum weighted scorecard achievement level of 75% is required to earn a portion of the available shareholder incentive for a scorecard.

5 SCORECARD RESULTS

5.1 Residential Program

Offerings within the Residential Program provide residential customers with financial incentives that reduce the cost of upgrading to more energy efficient technologies and equipment for their homes. The program aims to reduce natural gas consumption, increase home comfort, and help customers manage their energy bills.

This section summarizes the results of the EC's review of the Residential Program scorecard. The metric for the Residential Program scorecard is total net annual natural gas savings.

A detailed explanation of the verification activities for all Residential Program offerings can be found in APPENDIX E. Verified program achievements are listed in Table 5-1 with DSM shareholder incentive results in Table 5-2.

Table 5-1. 2023 Residential verified achievements*

Offering	Metric	Verified Achievement	
		Offering-Level	Metric-Level
Residential Whole Home		15,379,280	
Residential Single Measure	Net Annual Gas Savings (m3)	-	22,808,759
Residential Smart Home		7,429,479	

*Not all values may compute exactly due to rounding.

Table 5-2. 2023 Residential targets, achievements, weights, and incentive*†

Metric	Target	Verified Achievement	Weight	Metric Score	Weighted Metric Score
Net Annual Gas Savings (m3)	22,135,911	22,808,759	100.00%	103.04%	103.04%
Verified Total Weighted Scorecard Achieved					103.04%
Maximum Scorecard Incentive					$4,598,000
Verified Scorecard Incentive Achieved					**$2,174,628**

*Not all values may compute exactly due to rounding.
†See APPENDIX M for a detailed description of the scorecard and incentive calculations.

5.2 Low-Income Program

Offerings within the Low-Income Program provide eligible customers with opportunities to improve the energy efficiency of their homes (for residential customers) and buildings (for building owners and multifamily customers).

This section summarizes the results of the EC's review of the Low-Income Program scorecard. The metrics for the Low-Income Program scorecard include:

- Total net annual natural gas savings for single family homes
- Total net annual natural gas savings for multi-residential homes

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

Table 5-3. 2023 Low-Income verified achievements

Offering	Metric	Verified Achievement	
		Offering-Level	Metric-Level
Home Winterproofing	Net Annual Gas Savings (m3)	3,247,883	3,247,883
Affordable Housing Multi-Residential	Net Annual Gas Savings (m3)	3,002,130	3,002,130

Table 5-4. 2023 Low-Income scorecard targets, achievements, weights, and incentive*†

Metric	Target	Verified Achievement	Weight	Metric Score	Weighted Metric Score
Single Family Net Annual Gas Savings (m3)	2,873,511	3,247,883	50.00%	113.03%	56.51%
Multi-Residential Net Annual Gas Savings (m3)	5,015,604	3,002,130	50.00%	59.86%	29.93%
Verified Total Weighted Scorecard Achieved					86.44%
Maximum Scorecard Incentive					$4,598,000
Verified Scorecard Incentive Achieved					**$841,771**

*Not all values may compute exactly due to rounding.
†See APPENDIX M for a detailed description of the scorecard and incentive calculations.

5.3 Commercial Program

Offerings within the Commercial Program provide commercial customers with financial incentives that reduce the cost of upgrading to more energy efficient technologies and equipment.

This section summarizes the results of the EC's review of the Commercial Program scorecard. The metrics for the Commercial Program scorecard include:

- Total net annual large customer natural gas savings
- Total net annual small customer natural gas savings

A detailed explanation of the verification activities for all Commercial Program offerings can be found in APPENDIX G. Verified program achievements are listed in Table 5-5 with DSM shareholder incentive results in Table 5-7.

Table 5-5. 2023 Commercial verified achievements*

Offering	Metric	Verified Achievement	
		Offering-Level	Metric-Level
Commercial Custom	Large Customer Net Annual Gas Savings (m3)	16,005,301	17,820,262
Prescriptive Downstream		1,332,830	
Direct Install		202,891	
Prescriptive Midstream		279,241	
Commercial Custom	Small Customer Net Annual Gas Savings (m3)	2,295,369	7,231,731
Prescriptive Downstream		1,280,140	
Direct Install		2,733,591	
Prescriptive Midstream		922,630	

*Not all values may compute exactly due to rounding.

Table 5-6 shows the net annual natural gas savings by offering, as verified by the EC. Unlike Table 5-5, this table shows overall offering totals, not broken out by large or small customer metrics.

Table 5-6. 2023 Commercial savings

Offering	Net Annual Savings (m3)
Commercial Custom	18,300,670
Prescriptive Downstream	2,612,970
Direct Install	2,936,481
Prescriptive Midstream	1,201,871
Commercial Program Total	**25,051,993**

*Not all values may compute exactly due to rounding.

Table 5-7. 2023 Commercial targets, achievements, weights, and incentive*†

Metric	Target	Verified Achievement	Weight	Metric Score	Weighted Metric Score
Large Customer Net Annual Gas Savings (m3)	15,378,752	17,820,262	50.00%	115.88%	57.94%
Small Customer Net Annual Gas Savings (m3)	8,667,713	7,231,731	50.00%	83.43%	41.72%
Verified Total Weighted Scorecard Achieved					99.65%
Maximum Scorecard Incentive					$4,598,000
Verified Scorecard Incentive Achieved					**$1,813,776**

*Not all values may compute exactly due to rounding.
†See APPENDIX M for a detailed description of the scorecard and incentive calculations.

5.4 Industrial Program

Offerings within the Industrial Program provide participants with technical support as well as financial incentives to overcome key barriers associated with the identification, quantification, justification, and implementation of energy efficiency measures.

This section summarizes the results of the EC's review of the Industrial Program scorecard. The metric for the Industrial Program scorecard is net annual natural gas savings.

A detailed explanation of the verification activities for all Industrial Program offerings can be found in APPENDIX H. Verified program achievements are listed in Table 5-8, with DSM shareholder incentive results in Table 5-9.

Table 5-8. 2023 Industrial verified achievements

Offering	Metric	Verified Achievement	
		Offering-Level	Metric-Level
Industrial Custom	Net Annual Gas Savings (m3)	44,309,314	44,309,314

Table 5-9. 2023 Industrial targets, achievements, weights, and incentive*†

Metric	Target	Verified Achievement	Weight	Metric Score	Weighted Metric Score
Net Annual Gas Savings (m3)	50,376,897	44,309,314	100.00%	87.96%	87.96%
Verified Total Weighted Scorecard Achieved					87.96%
Maximum Scorecard Incentive					$4,598,000
Verified Scorecard Incentive Achieved					**$953,119**

*Not all values may compute exactly due to rounding.
†See APPENDIX M for a detailed description of the scorecard and incentive calculations.

5.5 Large Volume Program

The Direct Access offering comprises the entire Large Volume Program. This program provides large volume customers[13] with training presentations, energy efficiency calculation tools, energy use analysis, and other technical assistance. 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.

This section summarizes the results of the EC's review of the Large Volume Program scorecard. The metric for the Large Volume Program scorecard is total net annual natural gas savings.

A detailed explanation of the verification activities for the Large Volume Program can be found in APPENDIX I. Verified program achievements are listed in Table 5-10, with DSM shareholder incentive results in Table 5-11.

Table 5-10. 2023 Large Volume verified achievements

Offering	Metric	Verified Achievement	
		Offering-Level	Metric-Level
Direct Access	Net Annual Gas Savings (m3)	22,726,895	22,726,895

Table 5-11. 2023 Large Volume targets, achievements, weights, and incentive*†

Metric	Target	Verified Achievement	Weight	Metric Score	Weighted Metric Score
Net Annual Gas Savings (m3)	9,300,000	22,726,895	100.00%	200.00%	200.00%
Verified Total Weighted Scorecard Achieved					200.00%
Maximum Scorecard Incentive					$627,000
Verified Scorecard Incentive Achieved					**$627,000**

*Not all values may compute exactly due to rounding.
†See APPENDIX M for a detailed description of the scorecard and incentive calculations.

[13] Large volume customers are those with very high natural gas consumption, typically large industrial and commercial facilities, within Rate T2 or Rate 100 in the Union rate zones.

5.6 Energy Performance Program

Offerings within the Energy Performance Program focus on helping participating organizations save energy by implementing capital, operational, and behavioural energy efficiency measures.

This section summarizes the results of the EC's review of the Energy Performance Program scorecard. For 2023, the metric for the Energy Performance Program scorecard is number of participants in the Whole Building Pay for Performance offering.

A detailed explanation of the verification activities for the Energy Performance Program can be found in APPENDIX J. Verified program achievements are listed in Table 5-12, with DSM shareholder incentive results in Table 5-13.

Table 5-12. 2023 Energy Performance verified achievements

Offering	Metric	Verified Achievement	
		Offering-Level	Metric-Level
Whole Building Pay for Performance	Number of Participants	26	26

Table 5-13. 2023 Energy Performance scorecard targets, achievements, weights, and incentive*†

Metric	Target	Verified Achievement	Weight	Metric Score	Weighted Metric Score
Number of Participants	25	26	100.00%	104.00%	104.00%
Verified Total Weighted Scorecard Achieved					104.00%
Maximum Scorecard Incentive					$209,000
Verified Scorecard Incentive Achieved					**$103,664**

*Not all values may compute exactly due to rounding.
†See APPENDIX M for a detailed description of the scorecard and incentive calculations.

5.7 Building Beyond Code Program

Offerings within the Building Beyond Code Program focus on changing the behaviour and attitudes of builders related to energy efficiency, intending to cause permanent change in the new construction marketplace over time. Although energy savings may result from these offerings, savings are typically not the primary goal of the offerings.

This section summarizes the results of the EC's review of the Building Beyond Code Program scorecard. The metrics for the Building Beyond Code program scorecard include the number of:

- Energy Star homes in the Residential Savings by Design offering
- Net zero ready homes in the Residential Savings by Design offering
- Participants in the Commercial Savings by Design offering
- Participants in the Affordable Housing Savings by Design offering
- Participants in the Commercial Air Tightness Testing offering
- Qualified agents in the Commercial Air Tightness Testing offering

A detailed explanation of the verification activities for all Building Beyond Code offerings can be found in APPENDIX K. Verified program achievements are listed in Table 5-14, with DSM shareholder incentive results in Table 5-15.

Table 5-14. 2023 Building Beyond Code verified achievements

Offering	Metric	Verified Achievement	
		Offering-Level	Metric-Level
Residential Savings by Design	Number of Energy Star Homes	698	698
Commercial Savings by Design	Number of Participants	24	24
Affordable Housing Savings by Design	Number of Participants	21	21
Commercial Air Tightness Testing	Number of Participants	5	5
	Number of Qualified Agents	31	31

Table 5-15. 2023 Building Beyond Code targets, achievements, weights, and incentive*†

Offering	Metric	Target	Verified Achievement	Weight	Metric Score	Weighted Metric Score
Residential Savings by Design	Energy Star Homes	1,450	698	30.00%	48.14%	14.44%
Commercial Savings by Design	Participants	28	24	30.00%	85.71%	25.71%
Affordable Housing Savings by Design	Participants	18	21	30.00%	116.67%	35.00%
Commercial Air Tightness Testing	Participants	5	5	5.00%	100.00%	5.00%
	Qualified Agents	10	31	5.00%	200.00%	10.00%
Verified Total Weighted Scorecard Achieved						90.16%
Maximum Scorecard Incentive						$1,672,000
Verified Scorecard Incentive Achieved						**$405,444**

*Not all values may compute exactly due to rounding.
†See APPENDIX M for a detailed description of the scorecard and incentive calculations.

6 UTILTY SUMMARY OF SHAREHOLDER INCENTIVES, PROGRAM SPENDING, COST EFFECTIVENESS, AND LOST REVENUE

This section provides the results of the financial performance of the 2023 DSM programs.

6.1 Scorecard weights and shareholder incentives

Table 6-1 shows scorecard weights by metric and shareholder incentives by target for all programs with the metrics reviewed for the annual verification. Enbridge achieved a shareholder incentive of $6,919,404 or 33% of the maximum DSMSI incentive.

Table 6-1. Summary of 2024 achievement weights and shareholder incentives*

Program	Offering	Metrics	Weight	Utility Incentive
Residential	Residential Whole Home Residential Single Measure Residential Smart Home	Net Annual Gas Savings (m^3)	100%	$2,174,628
Low-Income	Home Winterproofing	Net Annual Gas Savings (m^3)	50%	$841,771
	Affordable Housing Multi-Residential	Net Annual Gas Savings (m^3)	50%	
Commercial	Commercial Custom Prescriptive Downstream	Large Customer Net Annual Gas Savings (m^3)[14]	50%	$1,813,776
	Direct Install Prescriptive Midstream	Small Customer Net Annual Gas Savings (m^3)[15]	50%	
Industrial	Industrial Custom	Net Annual Gas Savings (m^3)	100%	$953,119
Large Volume	Direct Access	Net Annual Gas Savings (m^3)	100%	$627,000
Energy Performance	Whole Building Pay for Performance	Participants	100%	$103,664
Building Beyond Code	Residential Savings by Design	Energy Star Homes	30%	$405,444
	Commercial Savings by Design	Participants	30%	
	Affordable Housing Savings by Design	Participants	30%	
	Commercial Air Tightness Testing	Participants	5%	
		Qualified Agents	5%	
Total Verified Utility Incentive				**$6,919,404**
Incentive if 100% of target achieve				**$8,360,000**
Maximum possible incentive (if 125% of target achieved)				**$20,900,000**

*Not all values may compute exactly due to rounding.

[14] Large commercial customers have a 3-year average annual consumption greater than or equal to 100,000 m^3/yr. Small commercial customers are below 100,000 m^3/yr.
[15] Ibid.

6.2 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 6-2 summarizes the spending across the portfolio. Additional spending detail is in APPENDIX P.

Table 6-2. Program cost summary*

Spending Area	OEB-Approved Budget	Utility Spending	Difference ($)	Difference (%)
Program Sub-total (no overhead)	$137,082,301	$121,822,039	-$15,260,262	-11%
Program Administration	$11,800,620	$10,809,604	-$991,016	-8%
Portfolio Administration	$11,252,522	$7,402,706	-$3,849,815	-34%
Other**	$7,107,478	$4,687,114	-$2,420,364-	-34%
Total DSM Budget	**$167,242,921**	**$144,721,463**	**-$22,521,458**	**-13%**

*Not all values may compute exactly due to rounding.
**Other includes "Evaluation and Regulatory" and "Research and Development."

6.3 Cost effectiveness summary[16]

Table 6-3 and Table 6-4 show summary results for the TRC-Plus and PAC tests, respectively, including the benefit cost ratio and the net present value. The EC confirmed that the method to determine the cost effectiveness results followed the framework and past practice consistently and correctly; however, some key assumptions in 2023 do not match the reality of the current market. Specifically, three things individually biased the portfolio result downward enough to drive it below 1.0. First, an outlier inflation value of 6%[17] artificially devalues savings and benefits above more reasonable inflation forecasts while having no effect on costs, which are incurred in the first year. Second, an unusual measure mix within Enbridge's joint HER+ offering with Natural Resources Canada included a high proportion of cost inefficient measures. Third, the approach to measure costs for some of the measures in the HER+ offering was conservatively high. While these three concerns will persist into the 2024 program year, the EC expects them to be short-term and not representative of the long-term performance of the portfolio. Additional detail, including key inputs used in each test, is provided in APPENDIX Q.

Table 6-3. Summary of cost-effectiveness ratio results, TRC-Plus Test*

Scorecard	NPV Benefits	NPV Costs	NPV Net Benefits (Benefits – Cost)	TRC-Plus Benefit Cost Ratio
Residential Program	$169,489,919	$340,528,578	-$171,038,659	0.50
Low Income Program	$42,609,738	$26,574,581	$16,035,157	1.60
Commercial Program	$122,939,435	$103,712,335	$19,227,100	1.19
Industrial Program	$154,094,217	$53,058,741	$101,035,476	2.90
Large Volume Program	$13,485,377	$4,116,465	$9,368,912	3.28
Total Portfolio**	**$502,618,685**	**$540,080,520**	**-$37,461,834**	**0.93**

*Not all values may compute exactly due to rounding.
**Total includes portfolio-level overhead costs that are not included in any of the individual program rows. This explains why the NPV Costs column does not appear to sum.

[16] Some key assumptions in 2023 which do not match the reality of the current market biased the result lower than previous years. This value is not representative of the long-term performance of the portfolio. Please see the discussion in Appendix Q of this report for more detail.

[17] Inflation was calculated in accordance with the OEB's 2022 DSM Framework (Section 11.1 – Inflation Rate, p. 33) as the four-quarter moving inflation rate based on the Gross Domestic Product Implicit Price Index for Final Domestic Demand, based on the most recently available information. While the resulting 6% inflation rate is anomalous and not representative of Bank of Canada or other forecasts of future inflation (which are closer to 2% per year), the 6% rate gets applied to the entire life of energy efficiency measures.

Table 6-4. Summary of cost effectiveness ratio results, PAC Test*

Scorecard	NPV Benefits	NPV Costs	NPV Net Benefits (Benefits – Cost)	PAC Benefit Cost Ratio
Residential Program	$152,137,556	$64,473,109	$87,664,447	2.36
Low Income Program	$39,576,459	$23,844,021	$15,732,438	1.66
Commercial Program	$114,482,116	$20,859,883	$93,622,233	5.49
Industrial Program	$152,644,478	$13,289,021	$139,355,456	11.49
Large Volume Program	$13,485,377	$2,684,891	$10,800,486	5.02
Total Portfolio**	**$472,325,986**	**$137,240,745**	**$335,085,241**	**3.44**

*Not all values may compute exactly due to rounding.
** Total includes portfolio-level overhead costs that are not included in any of the individual program rows. This explains why the NPV Costs column does not appear to sum.

6.4 Lost revenue by rate class

The EC summed the verified net annual natural gas savings (prorated by installation month) by rate class and estimated lost revenues. Table 6-5 shows the results for each rate class.

Table 6-5. Lost revenue results*

Rate Zone	Rate Class	Verified Lost Revenue
EGD	Rate 110	$38,979
	Rate 115	$3,009
	Rate 135	$11,195
	Rate 145	$1,859
	Rate 170	$1,009
Union South	Rate M4	$94,808
	Rate M5	$6,724
	Rate M7	$69,983
	Rate T1	$1,131
	Rate T2	$5,095
Union North	Rate 20	$7,010
	Rate 100	$8,504
Total		**$249,306**

*Not all values may compute exactly due to rounding.

6.5 Weighted average measure life

The EC calculated weighted average measure life (WAML) for all Enbridge programs, excluding the Large Volume Program. Table 6-6 shows the verified value. Please see Appendix M for more information on the calculation methodology.

Table 6-6. Weighted average measure life results*

Metric	Value
Verified Net Cumulative Natural Gas Savings (m3)**	1,678,539,668
Verified Net Annual Natural Gas Savings (m3)**	98,420,079
Weighted Average Measure Life	17.05

*Not all values may compute exactly due to rounding.
**Excludes the Large Volume Program

7 FINDINGS AND RECOMMENDATIONS

This section contains the findings and recommendations from the 2023 Annual Verification efforts and all other evaluations conducted on the 2023 programs or completed since the 2022 report. This includes Custom Project Savings Verification (CPSV) and Net to Gross (which includes both Free-ridership Based Attribution and Custom Agricultural Spillover).

7.1 2023 Annual Verification recommendations

Table 7-1 shows the findings and recommendations applying to the annual verification. In the tables, primary outcomes of each finding 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). Further details follow the table.

Table 7-1. Annual verification - summary of recommendations

#	Status	Finding	Recommendation	Previously Recommended	Applies to 2023		Primary Outcome		
					Enbridge	OEB	Reduce Costs	Improve Accuracy	Decrease Risk
1	In Progress	The energy savings from the home retrofit programs rely exclusively on the simulations provided by the delivery agents.	Should the program continue to use current modelling software, consider funding a study to verify the models produced by the utility agents.	✓		✓		✓	
2	New	Spillover values for C&I segments rely on the 2015 spillover study, which was conducted on legacy Union and Enbridge service territories which may not be tracked going forward.	A: If tracking legacy service territories, spillover values should be applied based on the legacy territory in which the participant facility is located.		✓			✓	✓
			B: If <u>not</u> tracking legacy service territories, a single savings-weighted value that represents a reasonable approximation should be calculated and applied.		✓			✓	✓
3	New	Enbridge monitored 2023 Whole Building P4P participants' adherence to specific participation criteria, identifying three participants that no longer qualified due to violating this stipulation.	Enbridge should continue providing these continual updates throughout the Annual Verification process, for the Whole Building P4P offering and any other offerings with similar criteria.		✓			✓	✓

#	Status	Finding	Recommendation	Previously Recommended	Applies to 2023		Primary Outcome		
					Enbridge	OEB	Reduce Costs	Improve Accuracy	Decrease Risk
4	New	Applied high inflation and discount rate undervalue future DSM benefits	OEB should consider establishing criteria pertaining to inflation that would require sensitivity analysis using a range of different inflation scenarios to assess how inflation impacts the overall cost-effectiveness and net present value			✓		✓	
5	New	The HER+ offering included a high number of electrification measures, resulting in large increases in electricity consumption, which has not been part of past programs. The cost effectiveness of these measures relies heavily on the assumption of electricity avoided cost, which has not been widely discussed because of its previously negligible impact.	The OEB should continue to work with Enbridge and the EAC to identify and implement changes to the cost effectiveness test assumptions that accurately reflect the impact of electrification measures. At a minimum, this discussion should include methods for determining electricity avoided costs.			✓		✓	
6	New	Enbridge is required to annually exceed a WAML of 14 years, excluding the Large Volume Program. The 14-year metric was calculated using a first-year NTG assumption to represent both first-year and lifetime NTG. The EC used individual values for first-year NTG and lifetime NTG, which is a more accurate reflection of net savings.	Enbridge should consider modifying its WAML metric calculation to be consistent with the more accurate calculation methodology used by the EC.		✓			✓	

1. **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 modelling 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. It is important to verify that the Energy Advisors using the modelling software are doing so consistently with industry best practice for natural gas efficiency programs. Such a detailed study is outside the scope of the annual verification. However, the 2023-2025 EM&V plan recommends a study to verify the savings estimates resulting from NRCan's modelling software. OEB is currently considering the value and timing of such a study. As a result, this recommendation from the previous report is in-progress.

   Recommendation A: Consider funding a study to verify the models produced by the utility agents to ensure they conform to standard industry practice. The EC acknowledges that the process evaluation for the Home Winterproofing offering may study the simulations more in depth and provide further assurance of its efficacy.

   Previously Recommended: Yes – since the 2015 AV report.

   Outcome: Greater certainty around savings estimates.

   Status: In progress

   Utility response: As noted in Table 7-1, this recommendation is directed to the OEB. For clarity, HOT2000 is the modelling software used in whole home modelling offerings. The residential whole home offerings are delivered by registered Energy Advisors affiliated with NRCan-licensed Service Organizations, with the expectation that NRCan HOT2000 protocols/standards are being followed. 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's program.

   OEB response: The OEB will consider this recommendation as it considers what future evaluation studies to undertake.

2. **Finding:** The most recent spillover study was conducted in 2024 on the Agricultural segment of the Industrial Program. The remaining commercial and industrial segments must rely on the 2015 study, which was conducted on legacy Union and legacy Enbridge service territories, resulting in a different spillover value for each utility. While Enbridge does track participants by legacy service territory in 2023, that may not be the case going forward. This will continue to be a problem until the 2015 study is fully replaced by new spillover values studied over the entire merged Enbridge territory.

   Recommendation A: Assuming Enbridge continues to track legacy service territories, spillover values should be applied based on the legacy territory in which the participant facility is located. This provides the most accurate representation of spillover based on the past studies.

   Previously Recommended: No – this is a new recommendation.

   Recommendation B: Assuming Enbridge *does not* continue to track legacy service territories, a single value should be calculated that represents a reasonable approximation of Recommendation A. If, within each segment, the proportion of energy savings from each territory is relatively unchanging from one program year to the next, a savings-weighted average should be calculated and applied. Enbridge calculated such a value from the 2023 program year. If the savings proportion is found to be relatively unchanging then the same values can be used going forward.

   Previously Recommended: No – this is a new recommendation.

Outcome: Greater certainty around savings estimates.

Status: New

Utility response: Enbridge agrees that 2015 spillover values will be applied on a legacy basis as long as that information continues to be tracked. Enbridge also notes that this finding supports the need to conduct updated commercial and industrial spillover studies measured on the amalgamated utility.

3. **Finding:** The Whole Building Pay for Performance offering eligibility criteria stipulates that "the building must have been operational without having undergone any capital retrofit upgrades between the start of the baseline period up to the start of the P4P Period." Enbridge monitored 2023 participants' adherence to this criterion, identifying three participants that no longer qualified due to this stipulation (including two between the draft and final versions of this Annual Verification report).

   Recommendation A: The EC appreciates Enbridge's ongoing, proactive checks on program participants. Enbridge should continue providing these continual updates throughout the Annual Verification process, for the Whole Building P4P offering and any other offerings with similar criteria. This open communication allows for clear and accurate verification of program metrics and builds trust and confidence in the annual verification process.

   Previously Recommended: No – this is a new recommendation.

   Outcome: Improved accuracy of verified program achievements.

   Status: New

   Utility response: The Utility will continue to gauge participation against a program's eligibility requirements.

4. **Finding:** The 2023 Framework is clear that a four-quarter moving inflation rate based on the Gross Domestic Product Implicit Price Index for Final Domestic Demand will be used, based on the most recently available information at the time avoided costs are updated. The inflation rate impacts both the nominal discount rate and the present value of future costs and benefits. Due to the high referenced inflation rate (6%), the nominal discount rate applied was also very high (10.24%), and this appears to undervalue the future benefits of DSM.

   Recommendation A: OEB should consider establishing criteria pertaining to inflation that would require sensitivity analysis using a range of different inflation scenarios (e.g., low, moderate and high inflation) to assess how inflation impacts the overall cost-effectiveness and net present value of DSM programs.

   Previously Recommended: No – this is a new recommendation.

   Outcome: A more nuanced understanding of the range of potential outcomes and program and portfolio cost effectiveness.

   Status: New

   Utility response: As noted in Table 7-1, this recommendation is directed to the OEB. For clarity, the net present value of avoided costs is insulated from the impact of inflation if the discount rate applied includes the same rate of inflation. As filed in EB-2024-0198 Exhibit C Tab 1 Schedule 1 pg 12, Enbridge proposes applying a 2% inflation rate to its avoided costs starting with the 2026 program year. The nominal discount rate will also include the proposed 2% inflation.

OEB response: The OEB has an active application from Enbridge Gas for approval of a new multi-year DSM plan and related policy updates where this recommendation can be considered.

5. **Finding:** Enbridge's 2023 joint HER+ offering with NRCan included a high number of electrification (fuel switching) measures, resulting in large increases in electricity consumption, which has not been part of past programs. The cost effectiveness of these measures relies heavily on the assumption of electricity avoided cost, which has not been widely discussed because of its previously negligible impact. The assumptions for electricity avoided cost don't differentiate between energy consumption and demand, which is inappropriate for measures such as heat pumps, which impact energy and demand differently.

   Recommendation A: The OEB should continue to work with Enbridge and the EAC to identify and implement changes to the cost effectiveness test assumptions that accurately reflect the impact of electrification measures. At minimum, this discussion should include the method for determining electricity avoided costs.

   Previously Recommended: No – this is a new recommendation.

   Outcome: Improved accuracy of verified cost effectiveness results.

   Status: New

   OEB response: The OEB is actively considering what updates are required to the cost effectiveness test to accurately assess programs that include electrification measures, including discussing with the IESO.

6. **Finding:** To ensure the approved DSM plan maintains sufficient long-term benefits, Enbridge is required to annually exceed a WAML of 14 years, excluding the Large Volume Program. The WAML is defined as the sum of the program year's net cumulative natural gas savings divided by the sum of that program year's net annual natural gas savings. The 14-year metric was calculated using a first-year NTG assumption to represent both first-year and lifetime NTG. However, some custom measures have different values for first-year and lifetime NTG. Because it is a more accurate representation of the net savings, the EC used these savings-specific values for first-year NTG and lifetime NTG in its WAML calculation. Using an overall (including all non-Large Volume prescriptive and custom measures) NTG ratio for first-year savings of 77.86% and an overall NTG ratio for lifetime savings of 73.67% results in a verified WAML of 17.05 years, compared to 18.10 years using only first-year NTG.

   Recommendation A: With consultation from the EAC, Enbridge should consider modifying its WAML metric calculation to be consistent with the more accurate calculation methodology used by the EC.

   Previously Recommended: No – this is a new recommendation.

   Outcome: Improved accuracy of portfolio achievement.

   Status: New

   Utility response: In Enbridge Gas's opinion, using two different NTG values in one ratio will modify the WAML in a way that was not intended. As the original threshold was developed using the same NTG value in the numerator and denominator, Enbridge Gas feels that the WAML result should be calculated in the same way, either with the annual NTG or the cumulative NTG in both the numerator and denominator. Alternatively, the threshold could be adjusted to reflect the two different values.

OEB response: The OEB appreciates the EC's feedback highlighting the differing annual NTG and cumulative NTG values. The OEB is currently in the process of reviewing Enbridge Gas's 2026 DSM plan application which includes specific revisions to policy guidance. Should any updated direction be provided through the OEB's adjudicative process, it will be included on a go-forward basis. For the 2024 evaluation, OEB staff will work with the EC and EAC on an approach to calculate the WAML that considers consistency with prior approvals, added value and increased accuracy.

7.2 Other study recommendations

7.2.1 CPSV recommendations

The following recommendations are summarized from the 2023 Custom Project Savings Verification study finalized in 2024. This study evaluates utility claimed savings from custom programs delivered to large volume, commercial, and industrial customers that encouraged them to reduce their energy consumption by providing customer-specific energy efficiency and conservation solutions. This includes reviewing the engineering calculations, inputs, and assumptions that produce the utilities' claimed gas savings providing a verification ratio. The entire report is included in APPENDIX S.

Table 7-2. CPSV summary of recommendations

#	Energy savings and program performance		Applies to		Primary beneficial outcome			
	Finding	Recommendation	Enbridge	OEB	Reduce costs	Increase savings	Customer satisfaction	Decrease risk
1	Enbridge continues to exhibit a strong commitment to accurate energy savings estimates.	Enbridge should continue its cultural commitment to accuracy.	✓			✓	✓	✓
2	The CPSV effort this year found realization rates between 90% and 100%	Continue performing custom savings verification on a regular basis.		✓				✓
		Consider approaches to sampling that can reduce sample sizes and costs.		✓	✓		✓	
3	Some measures in each utility program are routine maintenance, periodic repairs or like for like replacements that are considered standard care in other jurisdictions.	Establish a clear policy regarding eligibility of maintenance, repair and like for like replacement measures for the programs.	✓		✓			✓
4	The close relationships between Enbridge Energy Savings Consultants (ESCs) and customers provide advantages and challenges for evaluation.	Clarify the role of evaluation engineers, customers, and ESCs in the evaluation. Set and communicate clear expectations for each of the three roles so all parties are aligned.	✓	✓			✓	✓
5	Project documentation continues to improve.	Continue to improve data quality.	✓			✓		✓
6	Some Large Volume measures appear as two separate measure rows in the database due to having two sources of incentive funding.	Add a field to the tracking database to link two rows that are a single measure implementation.	✓		✓			

CPSV Finding 1: Enbridge continues to exhibit a strong commitment to accurate energy savings estimates. The utility has made significant investments in developing calculation tools that model savings accurately, such as the commercial and industrial Etools calculator, which is very thorough in attempting to model savings for key measures.

Enbridge's engineers have a strong understanding of their customers' building and process systems and show a commitment to finding accurate savings estimates. In this evaluation and in previous rounds of CPSV, the Enbridge

engineering team has appropriately questioned evaluation findings that increased savings as well as those that decreased savings.

Recommendation 1: Enbridge should continue its cultural commitment to accuracy.

Outcome 1: Accurate energy savings.

Utility response: Enbridge appreciates the recognition.

CPSV Finding 2: The CPSV effort this year found realization rates between 90% and 100% and identified adjustments for 40 percent of projects. Across the programs, adjustments increased savings for 16 measures and decreased savings for 21 measures. 16 measures had a large adjustment (verified savings more than 20% different from tracked), which was a decrease from the 2017 verification.

Recommendation 2a: Continue performing custom savings verification on a regular basis. Even a study that results in an adjustment of near 100% is still valuable because the programs know that their savings estimates will be reviewed. Knowing a review will be conducted improves the quality of ex ante estimates. The review itself also results in information that improves future program savings estimates.

Recommendation 2b: Consider approaches to sampling that can reduce sample sizes and costs. Consistent realization rates of close to 100% are an indication that frequent smaller sample CPSV may provide the benefits cited in recommendation 2a while allowing for lower cost.

Outcome 2: Accurate energy savings.

Utility response: As noted in Table 7-1, this recommendation is not directed to Enbridge. However, Enbridge agrees that future sample sizes ought to be revisited since realization rates are consistently close to 100%.

OEB response: The OEB appreciates these recommendations and will take them into consideration as part of future evaluation studies.

CPSV Finding 3: Some measures in each utility program are routine maintenance, periodic repairs or like for like replacements that are considered standard care in other jurisdictions.

Recommendation 3: Establish a clear policy regarding eligibility of maintenance, repair and like for like replacement measures for the programs.

Outcome 3: Reduced free-ridership risk.

Utility response: Enbridge does have a policy to not incent routine maintenance projects. However, in some cases, seemingly standard practices or routine maintenance at an industry level may not be standard practice for a specific customer. Furthermore, especially for complex projects, there can be varying opinions on which projects are standard or not. For reasons such as this, Enbridge requires flexibility in how it designs and implements its DSM programs.

Understanding industry practices that would have occurred without DSM programs, and not incenting such projects, is a key part of the Utility's approach to reducing free ridership. Enbridge continues to learn from the market and evolves program rules as needed. Net-to-gross evaluation will determine Enbridge's success at influencing projects. Ultimately, Enbridge is committed to minimizing free-ridership and will continue to make best efforts to do so.

CPSV Finding 4: The close relationships between Enbridge Energy Solutions Advisors (ESAs) and customers provide advantages and challenges for evaluation.

A major advantage is that evaluation response rates were higher than they would have been otherwise due to ESA involvement in recruitment and regular attendance at site visits. Another advantage is that at some sites the ESA was able to help ensure both customers and evaluation engineers are talking about the same equipment or parameters, reducing miscommunication risk.

In evaluating some sites, the evaluation faced challenges ensuring that the data collected was coming from the customer rather than the ESA. Customers at times would defer to the ESA for some questions, which risks introducing confirmation bias and less independence for the evaluation.

Recommendation 4: Clarify the role of evaluation engineers, customers, and ESA in the evaluation. Set and communicate clear expectations for each of the three roles so all parties are aligned.

Outcome 4: Independent and accurate evaluation with a positive customer experience.

Utility response: Enbridge agrees with the major advantages noted in the finding. ESA involvement is critical to ensuring that response rates remain high, miscommunication remains low, and that the on-site visits are conducted as effectively as possible. Customers often rely on ESAs for their technical expertise, savings calculations, and project support. In these cases, it is not unexpected that the customer relies on the ESA to respond to project verification questions.

Enbridge does communicate to its ESAs clear expectations for their roles and the roles of evaluation engineers and customers. For future CPSV studies, Enbridge maintains that ESAs are an important piece of CPSV activities and is open to discussions on means of improving that communication.

OEB response: The OEB will review the current communications provided to all involved in the CPSV process so that roles are clearly defined and maintained through the evaluation.

CPSV Finding 5: Project documentation continues to improve. In this evaluation, some specific areas for improvement were identified:

- Project data or details missing
  - Basecase heating system details (quantities, efficiencies and conditions)
  - Trend data used for ex ante savings estimates
  - Measure loading order in Virtual Grower
- Measure descriptions not matching what was installed
- Use of black box tools
- Hardcoded information in calculation spreadsheets
- Undocumented assumptions and inputs
  - Values (such as CFM, temperature setpoints etc) provided with no documentation
- Insufficient access to customer data (by customers).

Recommendation 5: Continue to improve data quality. Possible steps include:

  - Include explicit sources for all inputs and assumptions in the project documentation, with supporting evidence wherever possible
  - Store background studies and information sources with the project files and make them available to evaluators.
  - Provide evaluators full access to customer data.

- Provide pre- and post-installation photos, where available.
- Consider increasing documentation requirements for projects above certain incentive or gas savings amount
- Institute a checklist as part of project closeout to ensure all relevant project documentation is assembled as ready for verification

Outcome 5: Lower evaluation risk. Properly explaining and sourcing the savings calculation method and assumptions allows the evaluating engineer to more easily identify what needs to be verified. It also makes it easier to determine whether the methods and assumptions are reasonable and use ex ante assumptions rather than seek documented values elsewhere.

Utility Response: Enbridge is pleased that the EC has noted incremental improvements in project documentation and will continue refining project documentation.

All custom projects are reviewed by an internal QA/QC team of professional engineers. This QA/QC team attempts to apply the same scrutiny to projects as the EC. Two independent assessments of project savings and the type of documentation needed will not always align. In some cases, the verifier might request additional clarification documentation. In other cases, the Utility's documentation might have additional information the verifier was not looking for. This speaks to the strength of the verification process; the verifier can request further documentation from the Utility, the customer or a third party and regularly does so when needed.

The EC notes that it would like greater access to customer data. Enbridge provides the EC with the customer information it used to prepare the savings claim. Enbridge can also provide the EC with customer consumption data on request. Enbridge encourages customers selected for CPSV to participate and provide information as requested. However, customers ultimately have control over their data and what they chose to provide. In some cases, some of the data that is requested is not readily available or isn't stored all together.

CPSV Finding 6: Some Large Volume measures appear as two separate measure rows in the database due to having two sources of incentive funding. These were not always easy to identify in the data.

Recommendation 6: Add a field to the tracking database to link two rows that are a single measure implementation.

Outcome 6: Consistent identification of multiple row measures will reduce re-work for sampling and expansion in the evaluation.

Utility Response: Enbridge provided the EC with the data fields as requested. We were not made aware that the EC would have benefited from additional information on Large Volume projects. In future CPSV studies, the EC data request can note this requirement for Large Volume and Enbridge can link Large Volume projects that appear as more than one line item.

7.2.2 NTG recommendations

The following NTG recommendations are summarized from the 2023 Net-to-Gross Evaluation for Ontario's Natural Gas Custom C&I DSM Programs study finalized in 2024. This study researched attribution rates, which are estimates of the influence the utility had on the energy efficiency projects that were installed and measured as a percentage of the savings "attributable" to the utility. The results of this study are combined with the results of other studies to produce verified net cumulative gas savings for the utilities' 2023 Custom programs. The entire report is included in APPENDIX T.

Table 7-3. NTG summary of recommendations: free-ridership

	Energy savings and program performance		Applies to		Primary beneficial outcome			
	Finding	Recommendation	Enbridge	Evaluation	Reduce costs	Increase savings	Customer satisfaction	Decrease risk
1	FR-based attribution in the programs is variable	Evaluate free-ridership for the programs annually and couple the free-ridership evaluation with process evaluation		✓		✓		
2	FR-based attribution for the programs came primarily through acceleration	Consider strategies to have greater impact on increasing efficiency and amount (where applicable) of measures	✓			✓		
3	Many customers with high FR report involving Enbridge late in the process	Consider strategies to reduce customers taking advantage of the rebate for projects that are already fully decided upon.	✓			✓		✓
4	Return on Investment is mentioned consistently by customers and vendors as a key metric	Continue emphasis on ROI effect of incentives with customers. Consider helping to quantify kWh, water and other non-energy benefits of projects to sell projects that do not pass ROI on gas savings alone	✓			✓		
5	Safety code requirements differ among commercial buildings can affect energy saving measures	Consider reviewing safety code requirements for facilities likely to have higher than typical code.	✓					✓
6	Reducing Carbon tax bills is a driver for some customers	Consider ways to leverage Carbon tax and Carbon effects as part of the package to motivate customers to participate	✓			✓		
7	The Large Volume program has high free ridership	Consider the high free-ridership within the context of the cost effectiveness of the program. High free rider programs can still deliver meaningful cost-effective net savings.		✓		✓	✓	
		Conduct a process evaluation to improve Large Volume influence on customer projects	✓			✓	✓	✓
		Consider limiting the measure types or payback periods that are eligible for Large Volume incentives	✓			✓	✓	✓
8	Vendor attribution increased program attribution significantly for the Enbridge Commercial and Multifamily Segments	Consider expanding approaches to market for other programs that leverage third-party vendors.	✓		✓	✓		

	Energy savings and program performance		Applies to		Primary beneficial outcome			
	Finding	Recommendation	Enbridge	Evaluation	Reduce costs	Increase savings	Customer satisfaction	Decrease risk
9	Vendor attribution recruitment resulted in less completed interviews than desired.	Consider interviewing participating vendors independent of the participating customer sample and recruitment.		✓		✓		✓
10	In the attribution scoring methodology, timing assumptions, specifically the number of years assumed for "never would have implemented" have a significant effect on FR-based attribution.	Consider studying the typical planning horizons for each of the customer segments. The assumed planning horizon for companies is used in the scoring to determine at what point the program receives full influence credit for accelerating a measure's implementation.		✓				✓
11	The treatment of efficiency in the scoring has a relatively small effect FR-based attribution.	Consider simplifying the efficiency question sequence in future research to reduce survey length while still capturing attribution.		✓			✓	
12	A significant amount of spillover was found in the Agricultural segment.	Consider replicating the agriculture go-to-market approach in segments where it may provide similar results. In other customer groups this might be a combination of customer segmentation and specific measure type focus to achieve similar market effect in different niches.	✓			✓		
		Consider replicating the spillover study approach in segments where it may be applicable. Applicable segments include those with a strong program theory for market effects in a specific segment or segment-measure combination and those with known high market share for the program in an area.		✓		✓		
13	Data collection for the Agricultural segment spillover study was successful, with some areas for improvement.	The offered incentive and multi-modal survey approach led to higher than typical response rate for a general population study and should be considered for future research that includes non-participants.		✓	✓			✓
		Attempting to collect sufficient detail for site specific energy savings calculations provided marginal value and should be reconsidered.		✓	✓			
		Adding a question about why customers did not go through the program could provide additional value in future studies of this type.		✓				✓
14	The spillover study found 14.96% annual m3 spillover and 11.21% lifetime CCM spillover.	The spillover found in the study should be applied to the agricultural custom offering results using the percent of program savings ratios.	✓	✓		✓		
		The separate annual and lifetime ratios should be applied to calculate the annual and cumulative savings respectively.	✓	✓		✓		

	Energy savings and program performance		Applies to		Primary beneficial outcome			
	Finding	Recommendation	Enbridge	Evaluation	Reduce costs	Increase savings	Customer satisfaction	Decrease risk
		The spillover found in this study should replace the value found in the 2015 participant survey as this study covers both participant and non-participant spillover.	✓	✓		✓		

NTG Finding 1: FR-based attribution in the programs is variable.

Recommendation 1: Consistent evaluation of free-ridership coupled with process evaluation will help identify specific ways for each program to manage and reduce free-ridership. Consistent measurement of free-ridership early in the next DSM framework can help Enbridge and stakeholders to understand what is working to drive net savings and provide lessons for continuous improvement.

Outcome 1: Effective free-ridership management will allow the programs to continue to increase their net savings in future years.

Utility Response: As noted in Table 7-3, this recommendation is not directed at Enbridge.

OEB response: The OEB will consider this recommendation as it considers what future evaluation studies to undertake.

NTG Finding 2: FR-based attribution for the programs came primarily through acceleration rather than changes in efficiency or quantity. Acceleration periods tend to be considerably shorter than the estimated useful life (EUL) of a measure and thus the partial FR-based attribution that results is low relative to cumulative gross savings. Acceleration is less valuable to societal and provincial goals than changes in efficiency and quantity due to its short-term effect. Program goals in the current framework are first-year gas savings rather than cumulative savings, so this recommendation will not have a significant effect on program results.

Recommendation 2: To ensure the programs continue to deliver significant cumulative net savings, the utility should continue to:

- Identify unique solutions that save energy at customer plants
- Expand promotion of energy efficiency measures with low market penetration
- Motivate customers to increase the scope of their projects. Some options include multi-measure bonuses or escalating incentive structures that pay more for doing more.
- Promote long life measures and consider discontinuing the promotion of short-lived measures
- Proactively upsell equipment purchases from standard to efficient products
- Target hard -to-reach customers who have not participated in the past
- Adopt lessons learned from the Enbridge Commercial and Multifamily approach to market, working proactively with vendors
- Focus on promoting novel energy energy-saving solutions to industrial and agriculture customer problems. Several customers indicated that the project would not have happened without the utility because a utility representative identified a solution that they had not considered

In addition, the utilities should stop providing incentives for standard efficiency products in non-replace on burnout situations.

Outcome 2: Additional effect on efficiency and quantity of measures will increase net savings and hedge against regulatory risk if future frameworks revert to cumulative savings metrics.

Utility Response: Enbridge confirms that it will continue to pursue the listed items. Regarding the recommendation to no longer incent standard efficiency measures, seemingly standard measures at an industry level may not be standard for a specific customer. Furthermore, especially for complex projects, there can be varying opinions on what is considered standard. Enbridge doesn't provide incentives for projects that it considers standard. As such, it would be helpful to have examples of what DNV considers standard.

It should be expected that most influence in custom offerings comes from acceleration. Most projects involve a single piece of equipment or upgrade where increasing the quantity is not applicable. Efficiency is also not applicable when upgrades are binary (i.e. either the upgrade is made or not) and do not have varying levels of efficiency.

Enbridge remains committed to operating within the OEB's Framework, ensuring program designs are aligned with regulatory guidance, and addressing customer-specific needs. Within this Framework, acceleration is valuable as it secures future projects that may ultimately be delayed or abandoned entirely.

NTG Finding 3: Many customers with high FR report involving Enbridge late in the process.

Recommendation 3: Consider strategies to reduce customers taking advantage of the rebate for projects that are already fully decided upon. The program has established proactive marketing and engagement strategies in place to be involved early in the process with many of the largest customers, which helps mitigate this risk. Increasing efforts and resources in order to expand these efforts to the broader mid-size customers could be an option.

Outcome 3: Increasing proactive engagement approaches will reduce the percentage of free riders in the program and increase gross savings.

Utility Response: Enbridge has strong on-going relationships with many of its largest customers. These relationships provide deeper insight into project timing and the customer decision-making process. Broadly applying this one-on-one approach to mid-sized customers is more challenging due to the size of the population and the resources required to do so.

If Enbridge ESAs become aware of an energy savings project after the project has commenced, the project is not eligible for a DSM incentive. Enbridge makes best effort to not incent projects that are fully decided upon but must rely upon the customer to determine whether program incentives and support would be influential.

The free rider rate for Enbridge's custom commercial offering is 31%, which is comparable to similar DSM programs in North America. Enbridge remains committed to refining its approach, improving program effectiveness, and continuing to explore ways of engaging customers early in their project cycles.

NTG Finding 4: Return on Investment is mentioned consistently by customers and vendors as a key metric.

Recommendation 4: Continue emphasis on ROI effect of incentives with customers. Consider increasing efforts to quantify kWh, water, and other non-energy benefits of projects to sell projects that do not pass ROI on gas savings alone.

Outcome 4: Adding additional quantifiable impacts to sales pitches can help increase net savings, both through increased volume of gross savings and through more visible and memorable Enbridge support for making business case for DSM projects.

Utility Response: Enbridge's primary focus is quantifying gas savings but also works with its customers to quantify electricity, carbon, and water savings. As electricity impacts become more integral to DSM in Ontario, efforts to focus on electricity savings are expected to increase.

Enbridge confirms that it will continue to provide support on other elements such as ROI and non-energy benefits when making the business case for potential projects.

NTG Finding 5: Safety code requirements differ among commercial buildings can affect energy saving measures.

Recommendation 5: Consider reviewing safety code requirements for facilities likely to have higher than typical code. At least one participant referenced their measure as being required by code for their facility. Codes can vary across jurisdictions at different levels of government and may apply for some facilities and situations, but not others. Consider maintaining an internal tracker for situations where codes are higher and affect typical custom measures. Pipe insulation and steam trap jackets are two examples.

Outcome 5: Keeping an internal tracker of codes that affect projects can help the program avoid free-rider projects and identify measures that are ready to be sunset or limited in the programs.

Utility Response: Safety code in Ontario has a specific definition. Enbridge is committed to not incent projects required by safety codes, including codes related to pipe insulation and steam trap jackets. Prior to moving forward with a project, Enbridge ESAs must verify that execution of the project is not mandated by any regulations, safety concerns, or to maintain manufacturer's warranty. If there are instances where projects are required by safety code, it would be helpful to have the EC provide these specific examples.

NTG Finding 6: Reducing Carbon tax bills is a driver for some customers.

Recommendation 6: Consider ways to leverage Carbon tax and Carbon effects as part of the package to motivate customers to participate. Carbon tax was cited by at least one customer as a significant driver for reducing gas use at the participating facility. While this presents a free-ridership risk, Enbridge can also use Carbon tax effects as a lever in ROI conversations and for making the business case.

Outcome 6: Quantifying likely Carbon tax effects of DSM measures for customers can help grow the program and reduce free-ridership.

Utility Response: See response to NTG Study Finding 4.

NTG Finding 7: The Large Volume program has high free-ridership.

Recommendation 7a: Consider the high free-ridership within the context of the cost effectiveness of the program. High free rider programs can still deliver meaningful, cost-effective net savings.

Outcome 7a: The Large Volume program delivers significant net savings

Recommendation 7b: Conduct a process evaluation to improve Large Volume influence on customer projects

Outcome 7b: A process evaluation may uncover ways for Enbridge to drive net savings at Large Volume sites with less free-ridership.

Recommendation 7c: Consider limiting the measure types or payback periods that are eligible for Large Volume incentives. Continuous maintenance projects and projects where payback is single digit months are projects that will generally get priority without program funds. Eliminating high potential free-ridership projects will enable additional funds to be targeted toward projects that require funding to get done. From a customer service standpoint, it is difficult for utilities to deny

incentives to customers unless they have pre-established rules to point to. Clear rules can allow Enbridge to reject potentially poor projects without a large effect on customer satisfaction.

Outcome 7c: Reducing free-rider projects will increase net savings.

Utility Response: Enbridge agrees that the Large Volume program can still deliver meaningful, cost-effective net savings and notes that it met the maximum 200% achievement against the 2023 Large Volume scorecard natural gas savings target.

The Large Volume program is a direct access offering where customers access their own money for eligible projects. If they do not use their money, it becomes available to other customers. This program design is largely incompatible with the application of a free rider rate. While Enbridge can attempt to influence a customer by providing incentives and identifying/quantifying opportunities to save energy, the customer prioritizes projects depending on its own needs. If a project meets the eligibility criteria of the program, Enbridge will not refuse a customer access to its own money, restrict measures that save gas or impose limits on payback periods.

As filed in EB-2024-0198, Exhibit E, Tab 6, Schedule 1 pg 7, Enbridge is proposing an opt-out framework for the Large Volume Program starting in 2026. Enbridge will consider a process evaluation depending on OEB Decision on the program and its design.

OEB response: The OEB has an active application from Enbridge Gas for approval of a new multi-year DSM plan where program and offer-related recommendations can be considered.

NTG Finding 8: Vendor attribution increased program attribution significantly for the Enbridge Commercial and Multifamily Segments. Participants of all programs indicated vendor involvement at key decision-making junctures, suggesting that if Enbridge is able to influence vendor recommendations, there may be an opportunity to increase indirect influence on participants in all segments.

Recommendation 8: The utilities should consider what lessons can be learned from the Enbridge multifamily approach to market that is applicable to other segments. All segments may have opportunities to leverage third-party vendors. A process evaluation that includes vendor interviews might uncover specific opportunities and approaches that would help in transferring the Enbridge multifamily lessons to other segments.

Outcome 8: Effective leveraging of vendors could both increase FR-based attribution and program uptake.

Utility Response: Enbridge will consider including vendor surveys as part of an upcoming commercial process evaluation.

NTG Finding 9: Vendor attribution recruitment resulted in less completed interviews than desired.

Recommendation 9: Consider interviewing participating vendors independent of the participating customer sample and recruitment. The current evaluation practice is to interview vendors that are identified as influential on customers through the participant interview, which ties the vendor and customer responses together, but also creates a challenge in project delivery since the vendor interviews cannot be started until late in participant data collection. An alternative approach would be to have an independent sample of projects to ask vendors about that could be completed in parallel with participant data collection.

Outcome 9: Larger completed samples of vendors allowing for more robust estimates of Enbridge effect on vendor actions.

Utility Response: As noted in Table 7-3, this recommendation is not directed at Enbridge. However, Enbridge is supportive of expanding efforts to allow for a more robust estimate of Enbridge effect on vendor actions. This could include considering an incentive for their participation.

OEB response: The OEB appreciates this feedback and will take it into consideration as part of future evaluation activities.

NTG Finding 10: In the attribution scoring methodology, timing assumptions, specifically the number of years assumed for "never would have implemented" have a significant effect on FR-based attribution.

Recommendation 10: Consider studying the typical planning horizons for Ontario businesses in each segment. Currently, the two-year and four-year assumptions offered are based more on anecdotal evidence than on data. The assumed planning horizon for companies is used in the scoring to determine at what point the program receives full influence credit for accelerating a measure's implementation.

Outcome 10: More accuracy and confidence in free-ridership-based attribution results.

Utility Response: As noted in Table 7-3, this recommendation is not directed at Enbridge.

OEB response: The OEB will take this recommendation into consideration as part of its consideration for future evaluation activities.

NTG Finding 11: The sensitivity testing shows that the treatment of efficiency in the scoring has a relatively small effect on free-ridership-based attribution.

Recommendation 11: Consider simplifying the efficiency question sequence in future research to reduce survey length, while still capturing attribution.

Outcome 11: Reduced customer burden during interviews.

Utility Response: As noted in Table 7-3, this recommendation is not directed at Enbridge. However, Enbridge is supportive of reducing customer burden during interviews where possible.

OEB response: The OEB appreciates this feedback and will take it into consideration as part of future evaluation activities.

NTG Finding 12: A significant amount of spillover was found in the Agricultural segment.

Recommendation 12a: Consider replicating the agriculture go-to-market approach in segments where it may provide similar results. In other customer groups this might be a combination of customer segmentation and specific measure type focus to achieve similar market effect in different niches.

Recommendation 12b: Consider replicating the spillover study approach in segments where it may be applicable. Applicable segments include those with a strong program theory for market effects in a specific segment or segment-measure combination and those with known high market share for the program in an area.

Outcome 12: Increased savings through market effects.

Utility Response: Enbridge frequently updates its go-to-market approach for all customer segments and tries to land on an approach that works best for each segment. Enbridge is pleased with the significant amount of spillover found in the Agriculture segment and will explore study findings that can be applied to other segments.

Enbridge also strongly agrees that this spillover study should be replicated for its custom commercial and industrial offerings. Both offerings have an approach to market that includes vendors and customers more broadly, and should lead to market-wide participant and non-participant spillover.

OEB response: The OEB will take this recommendation into consideration as part of its consideration for future evaluation activities.

NTG Finding 13: Data collection for the Agricultural segment spillover study was successful, with some areas for improvement.

Recommendation 13a: The offered incentive and multi-modal survey approach led to higher than typical response rate for a general population study and should be considered for future research that includes non-participants.

Recommendation 13b: Attempting to collect sufficient detail for site specific energy savings calculations provided marginal value and should be reconsidered.

Recommendation 13c: Adding a question about why customers did not go through the program could provide additional value in future studies of this type.

Outcome 13: Improved value from future studies.

Utility Response: As noted in Table 7-3, this recommendation is not directed at Enbridge. However, Enbridge is supportive of updating the survey instrument with lessons learned for future spillover studies.

OEB response: The OEB will take this recommendation into consideration as part of its consideration for future evaluation activities.

NTG Finding 14: The spillover study found 14.96% annual m3 spillover and 11.21% lifetime CCM spillover. While the relative precision of the study showed high variability, this is a common feature of spillover studies generally and should not preclude applying the ratio to estimate net savings for the program.

Recommendation 14a: The spillover found in the study should be applied to the agricultural custom offering results using the percent of program savings ratios.

Recommendation 14b: The separate annual and lifetime ratios should be applied to calculate the annual and cumulative savings respectively.

Recommendation 14c: The spillover found in this study should replace the value found in the 2015 participant survey as this study covers both participant and non-participant spillover.

Outcome 14: Updated energy savings estimates for the program.

Utility Response: Enbridge has applied the study findings in the same manner as the EC.

OEB response: The OEB will apply the study findings consistent with these recommendations.

8 APPENDICES

APPENDIX A. Evaluation background

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 of spillover resulting from the implementation of custom projects during the 2013-2014 program years, completed in May 2018.[18]
- A study verifying savings from prescriptive projects implemented in the 2017 program year, completed in June 2019.[19]
- A study verifying custom boiler project savings that used Enbridge's eTools energy modelling software, completed in January 2023.[20]
- A study measuring the free-ridership based attribution and agricultural segment spillover within the custom projects[21] implemented in the 2023 program year, completed in November 2024.[22]
- A study verifying the custom project savings (CPSV) during the 2023 program year, completed in November 2024.[23]

[18] CPSV Participant Spillover Results, DNV for the Ontario Energy Board, May 23, 2018
[19] 2017 C&I Prescriptive Verification: Final Report – Measurement of NTG Factors and Gross Savings Verification, Itron for the Ontario Energy Board, June 7, 2019
[20] eTools Boiler Tool Validation Study, DNV for the Ontario Energy Board, January 31, 2023
[21] Low Income custom projects were not included in the NTG study.
[22] 2023 Natural Gas Demand Side Management NTG Evaluation, DNV for the Ontario Energy Board, November 8, 2024
[23] 2023 Natural Gas Demand Side Management Custom Savings Verification, DNV for the Ontario Energy Board, November 25, 2024

APPENDIX B. Metric verification activities

To verify the metric achievements, the EC conducted the activities outlined in Table B-1.The utilization of each activity depends on the "type" of measure being reviewed. DNV defined four different types of measures, listed below. A single program or offering 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.
- **Whole Home (W):** Whole home savings are savings calculated using home modelling software (HOT2000).
- **Other (O):** In addition to direct gas savings measures, the programs recognize additional metrics, such as the number of participants in an offering or the number of homes built.

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 applied from the TRM where appropriate (such as 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, eTools 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, eTools, 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 offerings.
  - *Other:* For scorecards with Other metrics, offering achievements such as participation and developer homes were evaluated using program records specific to each offering and metric.

Table B-1 identifies the measure types within each offering as well as the method used to evaluate that offering, corresponding with the measure type.

Table B-1. 2023 Annual verification activities by program

Program	Offering	Measure Types	Confirm Tracking	Apply Factors	Desk Review
Residential	Residential Whole Home	W	✓	✓	✓
	Residential Single Measure	No 2023 activity reported			
	Residential Smart Home	P	✓	✓	✓
Low-Income	Home Winterproofing	P W	✓	✓	✓
	Affordable Housing Multi-Residential	P C	✓	✓	
Commercial	Commercial Custom	C	✓	✓	
	Prescriptive Downstream	P	✓	✓	
	Direct Install	P	✓	✓	
	Prescriptive Midstream	P	✓	✓	
Industrial	Industrial Custom	C	✓	✓	
Large Volume	Direct Access	C	✓	✓	
Energy Performance	Whole Building Pay for Performance	O	✓		✓
Building Beyond Code	Residential Savings by Design	O	✓		✓
	Commercial Savings by Design	O	✓		✓
	Affordable Housing Savings by Design	O	✓		✓
	Commercial Air Tightness Testing	O	✓		✓

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 Residential Whole Home[24] and Home Winterproofing offerings. Table B-2 shows the number of projects for which the EC requested additional documentation.

Table B-2. Desk Review Sample

Program	Offering	Sample Requested
Residential	Residential Whole Home - Home Energy Conservation	50 Randomly Selected Homes
	Residential Whole Home - Home Efficiency Rebate Plus	50 Randomly Selected Homes
	Residential Smart Home	Ping Report
Low-Income	Home Winterproofing	50 Randomly Selected Homes
Energy Performance	Whole Building Pay for Performance	Census
Building Beyond Code	Residential Savings by Design	10 Randomly Selected Homes and ESNH report
	Commercial Savings by Design	10 Randomly Selected Sites
	Affordable Housing Savings by Design	10 Randomly Selected Sites
	Commercial Air Tightness Testing	Census of Participants and Agents

[24] The Residential Whole Home offering consisted of two separate sub-offerings in 2023: Home Energy Conservation, which Enbridge discontinued in April, and Home Efficiency Rebate Plus, which launched on January1st, 2023. Since the sub-offerings were slightly different, the EC requested distinct samples for each.

APPENDIX C. Changes from 2022 annual verification

As the first year of a new DSM framework, there are several changes between the 2022 and 2023 program year evaluations.

- **Metric targets**: In 2022, most metric targets were calculated based on the previous year's achievement, the previous year's budget and amount spent, the current year budget, and a target adjustment mechanism (TAM). In 2023, all metric targets are prescribed.
- **Primary savings metric**: In 2022, the primary savings metric was net cumulative natural gas savings. In 2023, the primary savings metric is net annual (first year) natural gas savings.
- **Weighted average measure life**: Beginning in 2023, the EC will calculate weighted average measure life (WAML) for the energy-saving measures across all programs and offerings (except for the Large Volume program). According to the DSM framework, WAML should exceed 14 years.
- **Maximum DSMSI**: In 2022, to achieve the maximum scorecard-level DSMSI, utility performance had to be 150% of the weighted metric score. In 2023, to achieve the maximum scorecard-level DSMSI, utility performance had to be 125% of the weighted metric score.
- Enbridge is eligible for a new $30 million End-of-Term Natural Gas Reduction Incentive if they achieve a total reduction in weather-normalized annual natural gas sales volumes of 1.5% over the three-year term.

Additionally, in moving from the previous framework to the current framework, offerings were either kept essentially unchanged, adapted into similar offerings, newly created, or eliminated.

APPENDIX D. Summary of verification adjustments

Table D-1 provides a combined summary of metrics for Enbridge offerings. This table show where the EC made adjustments of greater than 1% from the values identified in *tracking data*.

Table D-1. Metrics with verified value greater than 1% different from tracked

Scorecard	Program	Metrics	>1% Difference?
Residential	Residential Whole Home	Net Annual Gas Savings (m3)	
	Residential Single Measure	Net Annual Gas Savings (m3)	
	Residential Smart Home	Net Annual Gas Savings (m3)	✓
Low-Income	Home Winterproofing	Net Annual Gas Savings (m3)	
	Affordable Housing Multi-Residential	Net Annual Gas Savings (m3)	✓
Commercial	Commercial Custom	Net Annual Gas Savings (m3)	✓
	Prescriptive Downstream	Net Annual Gas Savings (m3)	
	Direct Install	Net Annual Gas Savings (m3)	
	Prescriptive Midstream	Net Annual Gas Savings (m3)	
Industrial	Industrial Custom	Net Annual Gas Savings (m3)	✓
Large Volume	Direct Access	Net Annual Gas Savings (m3)	✓
Energy Performance	Whole Building Pay for Performance	Participants	
Building Beyond Code	Residential Savings by Design	Energy Star Homes	
	Commercial Savings by Design	Participants	
	Affordable Housing Savings by Design	Participants	
	Commercial Air Tightness Testing	Participants	
		Qualified Agents	

APPENDIX E. Residential Program scorecard

This appendix describes the detailed processes used to verify the metrics for the Residential Program scorecard (Table E-1). The offerings addressed in this appendix are:

- Residential Whole Home Offering
- Residential Single Measure Offering
- Residential Smart Home Offering

Table E-1. 2023 Residential Program scorecard*[25]

Offering	Metric	Verified Achievement		Metric Target			Weight
		Offering-Level	Metric-Level	Lower Band	Target	Upper Band	
Residential Whole Home	Net Annual Gas Savings (m3)	15,379,280	22,808,759	16,601,933	22,135,911	27,669,889	100.00%
Residential Single Measure		-					
Residential Smart Home		7,429,479					

*Not all values may compute exactly due to rounding.

[25] Ontario Energy Board Decision and Order, EB-2021-0002, December 16, 2022, Schedule C

Residential Whole Home offering

Overview

Table E-2 shows the tracked and verified scorecard achievements for the 2023 Residential Whole Home offering with the metric of net annual gas savings. As a result of this review, the EC verifies 15,379,280 m3 (100.10% of tracked). Table E-2 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 E-2. Residential achievement: Residential Whole Home Offering metrics*

Metric	Achievement		Ratio
	Tracked	Verified	
Net Annual Gas Savings (m3)	15,363,477	15,379,280	100.10%

*Not all values may compute exactly due to rounding.

Documentation

The EC used the documentation shown in Table E-3 to verify the savings metric for the Residential Whole Home offering.

Table E-3. Documentation used to verify the Whole Home offering

Report Language	Description or Citation
Enbridge-Provided Documentation	
Tracking File	Excel spreadsheet tracking metrics for all 2023 DSM programs
Project Files	Various documents for each requested participant, supporting program metrics
ASHP Savings Adjustment Information	PDF and Excel files detailing algorithm, derivation, and application of the air source heat pump savings adjustment factor applied to specific participants
Documents Used by EC	
OEB Decision	OEB Decision and Order, EB-2021-0002, November 15, 2022 and OEB Revised Decision and Order, EB-2021-0002, December 16, 2022
Enbridge Plan	Multi-Year Demand Side Management Plan (2022-2027), EB-2021-0002

The Residential Whole Home offering consisted of two separate sub-offerings in 2023: Home Energy Conservation (HEC), which Enbridge discontinued in April, and Home Efficiency Rebate Plus (HER+), which launched on January 1st, 2023. Since the sub-offerings were slightly different, and since the EC requested distinct samples for each, results are presented separately for each.

Home Energy Conservation

Participant Selection

Enbridge provided the Tracking File listing 7,020 individual participants in the HEC sub-offering. To certify the scorecard metric, the EC randomly selected 50 participants for review, requested additional documentation, confirmed receipt of the correct files, and reviewed documents to verify participation and eligibility.

Received Files

The EC received the following documentation:

- Photographs of pre- and post-installation conditions

- HOT2000 Model input or “Simulation” Files (.h2k)
- HOT2000 Model Output Files (.xls) aggregated in one spreadsheet

Verify Tracked Savings

In calculating net annual gas 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 50 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 50 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 50 sampled homes, shown in Figure E-1 for the 2023 HEC verification. The process was necessary because the simulation mode (EnerGuide or Expert[26]) 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 (H2K) and output (XLS) files from the offering.
- 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 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.

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

Figure E-1. Overview of Gross Savings Verification for 2023 HEC Verification

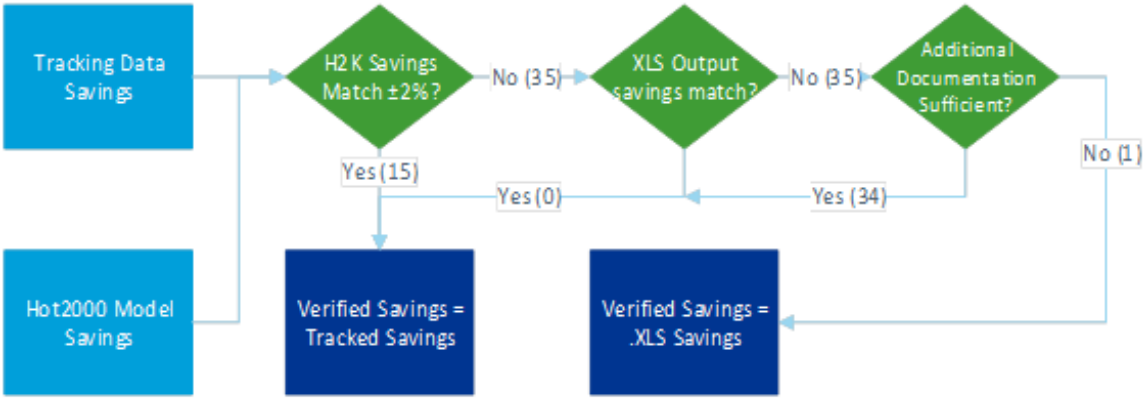


Table E-4 shows how many customers were verified in each evaluation step.

Table E-4. Overview of gross savings verification

Evaluation Step	# Verified
Simulation re-run (H2K) and compared to tracking, verified if ± 2%	15
Output files for (XLS) compared to tracking, verified if ± 2%	0
Additional Explanation request	34
Comparison to output file values	1
Total Verified	50

The gross savings realization rate (RR) is 100.41%, shown in Table E-5.

Table E-5. Enbridge HEC Realization Rate*

Numbers of Houses	Realization Rate	90% Confidence Interval			
		Absolute Precision	Lower Bound	Upper Bound	Relative Precision
50	100.41%	0.41%	100.00%	100.82%	0.67%

*Not all values may compute exactly due to rounding.

Home Energy Rebate Plus

Participant Selection

Enbridge provided the Tracking File listing 25,776 individual participants in the HER+ offering. To certify the scorecard metric, the EC randomly selected 50 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
- HOT2000 Model simulation or “Simulation” Files (.h2k)
- HOT2000 Model Output Files (.xls) aggregated in one spreadsheet

Participants Eligibility

Enbridge's DSM plan[27] stated that participation in the Whole Home offering will consist of three separate activities:

- *An initial home energy audit, called the pre-assessment, conducted by a Registered Energy Advisor through a Service Organization licensed by NRCan.*
- *Installation of at least two eligible measures.*
- *A final home energy audit, called the post-assessment, conducted by a Registered Energy Advisor through a Service Organization licensed by NRCan.*

Each sampled project contained pre- and post- project photos. 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 these requirements.

After the approval of Enbridge's DSM plan, the agreement between EGI and NRCan removed the two-measure requirement, but did specify that participants must install at least one qualifying measure or two if upgrading their thermostat or adding one of the resiliency measures (batteries connected to photovoltaic systems, roofing membrane, foundation waterproofing, or moisture proofing crawlspace floor, walls, and headers).[28] The EC confirmed that all participating homes met these criteria. The EC also identified 172 homes that had resiliency measures installed but no other measures, and all 172 homes correctly had no savings claimed in the tracking data. As a result of this review, the EC verifies that all 25,776 homes (100.00%) satisfy the requirements for participation.

For informational purposes, Table E-6 shows the measure types installed by the offering, broken out by the number of total measure types installed per customer. The most common measure type was an air source heat pump, with 13,127 homes.

Table E-6. Count of qualified measure types among verified projects and types per home*

Measure Type	Number of Measure Types by Customer								Total	% of Total Homes
	One	Two	Three	Four	Five	Six	Seven	Eight		
Air Source Heat Pump	10,545	1,853	562	129	32	5	0	1	13,127	51%
Windows / Sliding Door	3,336	3,334	1,473	465	153	40	7	3	8,811	34%
Attic Insulation	2,181	2,900	1,426	504	169	43	8	3	7,234	28%
Air Sealing	73	3,106	1,660	548	189	38	6	3	5,623	22%
Foundation Insulation	76	257	383	313	166	42	7	3	1,247	5%
Doors	7	392	437	232	85	25	8	3	1,189	5%
Exterior Wall Insulation	61	194	292	202	112	30	8	2	901	3%
Basement Header Insulation	2	53	124	168	110	29	5	3	494	2%
Domestic Hot Water Heat Pump	30	142	54	23	7	2	0	0	258	1%
Exposed Floor Insulation	5	32	42	28	11	4	2	1	125	0%
Basement Slab Insulation	1	4	8	14	14	8	2	1	52	0%
Ground Source Heat Pump	15	1	-	-	-	-	0	0	16	0%
Total Measure Types	**16,332**	**12,268**	**6,461**	**2,626**	**1,048**	**266**	**53**	**23**	**39,077**	**N/A**
Total Homes	**16,333**	**6,171**	**2,168**	**662**	**213**	**46**	**8**	**3**	**25,776**	**N/A**

*Not all values may compute exactly due to rounding.

27 Multi-Year Demand Side Management Plan (2022-2027), EB-2021-0002, Exhibit E, Tab 1 Schedule 2, Page 11 of 22
28 Enbridge Gas and NRCan Agreement Nov 24, 2022, Attachment 3, Page 11 of 21

Verify Tracked Savings

In calculating net annual gas savings, the EC first utilized 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.

During the 2023 program year, Enbridge discovered that the HOT2000 modelling software overestimated gas savings for participants originally with natural gas furnaces that installed a heat pump. Using a residential heat pump savings algorithm from New York TRM v11.0 as a basis, Enbridge created a weighted average adjustment factor of 40% to reduce the savings estimation for these specific participants. The EC reviewed and verified the New York TRM algorithm, including its assumptions and references, as well as Enbridge's calculation workbook which derived the 40% adjustment factor. Among the 13,127 HER+ participants installing an air source heat pump, the adjustment was applied to 12,714 participants. Through additional documentation provided by Enbridge, the EC verified that this adjustment factor was correctly applied.

The EC then reviewed documentation for the sample of 50 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 50 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

For the 2023 HER+ verification, the EC used a multi-step process to verify tracked energy savings for the sampled homes, shown in Figure E-2. The process was necessary because the simulation mode (EnerGuide or Expert[29]) 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.
- 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.

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

Figure E-2. Overview of gross savings verification for 2023 HER+ verification

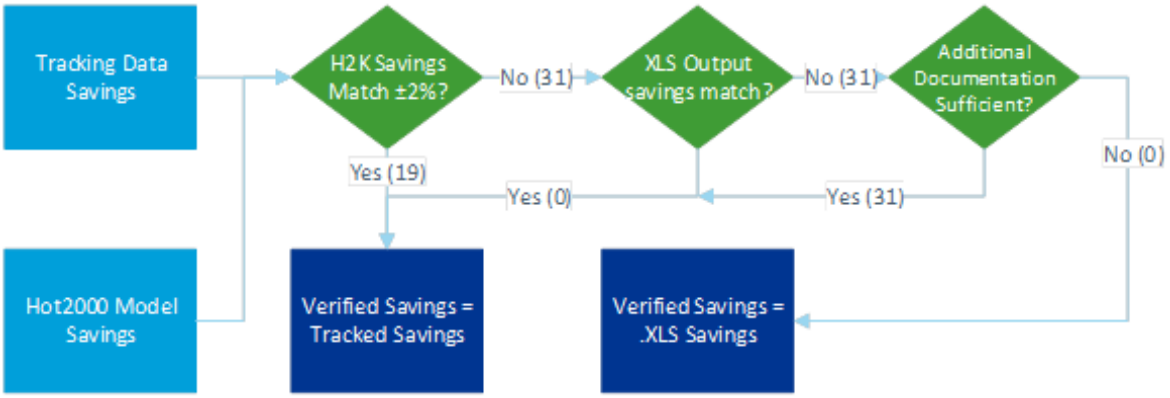


Table E-7 shows how many customers were verified in each evaluation step.

Table E-7. Overview of gross savings verification

Evaluation Step	# Verified
Simulation re-run (H2K) and compared to tracking, verified if ± 2%	19
Output files for (XLS) compared to tracking, verified if ± 2%	0
Additional Explanation request	31
Comparison to output file values	0
Total Verified	**50**

The EC produced verified savings for all 50 homes in the sample. The gross savings realization rate (RR) is 100.09%, shown in Table E-8.

Table E-8. HER+ realization rate*

Numbers of Houses	Realization Rate	90% Confidence Interval			
		Absolute Precision	Lower Bound	Upper Bound	Relative Precision
50	100.09%	0.86%	99.23%	100.95%	1.41%

*Not all values may compute exactly due to rounding.

Verification Result

As a result of this review, the EC confirms the total savings of 15,379,280 m3 for the Whole Home offering (100.10% of tracked).

Residential Single Measure offering

Enbridge reported no activity for this offering in 2023.

Residential Smart Home offering

Overview

Table E-9 shows the tracked and verified scorecard achievements for the 2023 Residential Smart Home offering, with the metric of net annual natural gas savings. As a result of this review, the EC verifies 7,429,479 m3 (102.11% of tracked). Table E-9 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 E-9. Residential Program achievement: Residential Smart Home offering m3 metric*

Metric	Achievement		Ratio
	Tracked	Verified	
Net Annual Gas Savings (m3)	7,276,203	7,429,479	102.11%

*Not all values may compute exactly due to rounding.

Documentation

The EC used documentation shown in Table E-10 to verify the metrics for the Residential Smart Home offering.

Table E-10. Documentation used to verify the Residential Smart Home offering

Report Language	Description or Citation
Enbridge-Provided Documentation	
Tracking File	Excel spreadsheet tracking metrics for all 2023 Enbridge DSM programs
Adaptive Thermostat Ping Report	2023 Adaptive Thermostats Ping Report
Documents Used by EC	
OEB Decision	OEB Decision and Order, EB-2021-0002, November 15, 2022 and OEB Revised Decision and Order, EB-2021-0002, December 16, 2022
Enbridge Plan	Multi-Year Demand Side Management Plan (2022-2027), EB-2021-0002
TRM 7.0	Natural Gas Demand Side Management Technical Resource Manual, Version 7.0

Verify Annual Natural Gas Savings

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

- Tracking File data, which reported 49,709 units
- TRM 7.0
- Adaptive Thermostat Ping Report, which reported 84.15% installation rate[30]

[30] The Residential Smart Home Offering provides participants with a point-of-sale instant discount for purchasing an adaptive thermostat. Ecobee supported Enbridge by "pinging" its devices claiming the offering's discount, allowing Ecobee to identify which purchased thermostats have been installed and connected to the internet. In early 2024, Ecobee pinged all Ecobee adaptive thermostats purchased online through the 2023 point-of-sale instant discount offer. If a device was determined to be online during at least one of eight pings, it was considered an installed device. An installation verification adjustment factor was determined using this information (installed devices / all devices pinged). The adjustment factor was applied to all adaptive thermostats purchased through the 2023 point-of-sale instant discount offer (including in-store Ecobee purchased devices and non-Ecobee devices). For Enbridge, 4,385 devices were determined to be installed out of 5,211 total devices pinged (84.15% installation rate).

The EC certified the tracked savings, for a savings ratio of 102.11%.[31]

Verification Result

As a result of this review, the EC confirms the savings of 7,429,479 m3 (102.11% of tracked) for the Residential Smart Home offering.

[31] The savings ratio is more than 100% because the program used a lower installation rate than the EC, so the EC verifies more than 100% of the savings reported by the program.

APPENDIX F. Low-Income Program scorecard

This appendix describes the detailed process used to verify the metrics for the Low-Income Program scorecard (Table F-1). The offerings addressed in this appendix are:

- Home Winterproofing
- Affordable Housing Multi-Residential

Table F-1. 2023 Low-Income Program scorecard[32]

Offering	Metric	Verified Achievement		Metric Target			Weight
		Offering-Level	Metric-Level	Lower Band	Target	Upper Band	
Home Winterproofing	Single Family Net Annual Gas Savings (m3)	3,247,883	3,247,883	2,155,134	2,873,511	3,591,889	50.00%
Affordable Housing Multi-Residential	Multi-Residential Net Annual Gas Savings (m3)	3,002,130	3,002,130	3,761,703	5,015,604	6,269,505	50.00%

[32] Ontario Energy Board Decision and Order, EB-2021-0002, December 16, 2022, Schedule C

Home Winterproofing offering

Overview

Table F-2 shows the tracked and verified scorecard achievements for the 2023 Home Winterproofing offering, with the metric of net annual gas savings. As a result of this review, the EC verifies 3,247,883 m3 (100.35% of tracked). Table F-2 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 F-2. Low-Income Program achievements: Home Winterproofing*

Metric	Achievement		Ratio
	Tracked	Verified	
Prescriptive Single Family Net Annual Gas Savings (m3)	1,151,292	1,153,191	100.16%
Whole Home Single Family Net Annual Gas Savings (m3)	2,085,309	2,094,693	100.45%
Total	**3,236,600**	**3,247,883**	**100.35%**

*Not all values may compute exactly due to rounding.

Documentation

The EC used the documentation shown in Table F-3 to verify the metrics for the Home Winterproofing offering.

Table F-3. Documentation used to verify the Home Winterproofing offering

Report Language	Description or Citation
Enbridge-Provided Documentation	
Tracking File	Excel spreadsheet tracking metrics for all 2023 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-2021-0002, November 15, 2022 and OEB Revised Decision and Order, EB-2021-0002, December 16, 2022
Enbridge Plan	Multi-Year Demand Side Management Plan (2022-2027), EB-2021-0002
TRM 7.0	Natural Gas Demand Side Management Technical Resource Manual, Version 7.0
TAPS Report	TAPS Verification Program 2012 Year End Research Report, Quadra Research. April 2013[33]
Prescriptive Showerheads	Showerhead Verification Among Rental Buildings, Ipsos Research, March 2012
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

Enbridge provided the tracking file listing 3,553 individual participant homes in the Winterproofing program. To certify the scorecard metric, the EC randomly selected 50 participants for review, requested additional documentation, confirmed receipt of the correct files, and reviewed documents to verify participation and eligibility.

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

Received Files

The typical file folder had the following information:

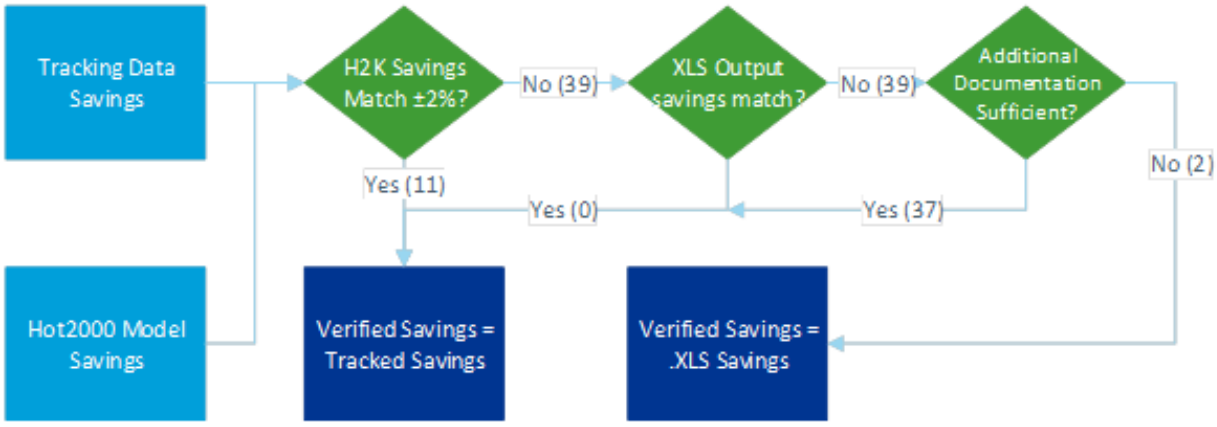
- Photographs of pre- and post-installation conditions
- HOT2000 Model simulation Files (.h2k)
- HOT2000 Model Output Files (.xls)

Calculate Realization Rate

The EC used a multi-step process to verify tracked energy savings for the 50 sampled homes, shown in Figure F-1 for the 2023 Winterproofing verification. The process was necessary because the simulation mode (EnerGuide or Expert[34]) 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 (H2K) and output (XLS) files from the offering
- 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 the output file values to the project documentation summary to determine whether they were consistent. If they were not consistent, the output file value was used as the verified value.

Figure F-1. Overview of gross simulation savings verification for 2023 Home Winterproofing



[34] "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 F-4 shows how many customers were verified in each evaluation step.

Table F-4. Overview of gross simulation savings verification

Evaluation Step	# Verified
Simulation re-run (H2K) and compared to tracking, verified if ± 2%	11
Output files for (XLS) compared to tracking, verified if ± 2%	0
Additional Explanation request	37
Comparison to output file values	2
Total Verified	**50**

The gross savings realization rate is 100.45%, shown in Table F-5.

Table F-5. Home Winterproofing realization rate

Numbers of Houses	Realization Rate	90% Confidence Interval			
		Absolute Precision	Lower Bound	Upper Bound	Relative Precision
50	100.45%	0.40%	100.05%	100.85%	0.66%

Prescriptive Savings

In calculating net annual gas savings, the EC reviewed natural gas savings for prescriptive measures from the Tracking File, using the procedures identified in APPENDIX O. The EC certified the tracked savings which resulted in a savings ratio of 100.16%, as shown in Table F-6.

Table F-6. Home Winterproofing achievement by measure group: prescriptive savings*

Measure Group	Measures	Achievement (m3)		Savings Ratio
		Tracked	Verified	
Bathroom Aerator	811	2,928	3,483	118.93%
Kitchen Aerator	844	5,808	6,855	118.01%
Pipe Insulation	2,059	23,592	23,592	100.00%
Showerhead	814	19,236	19,535	101.55%
Thermostat	5,855	1,099,727	1,099,727	100.00%
Total	**10,383**	**1,151,292**	**1,153,191**	**100.16%**

*Not all values may compute exactly due to rounding.

Verification Result

As a result of this review, the EC confirms the savings of 3,247,883 m3 (100.35%% of tracked) for the Home Winterproofing offering.

Affordable Housing Multi-Residential offering

Overview

Table F-7 shows the tracked and verified scorecard achievements for the 2023 Enbridge Affordable Housing Multi-Residential offering, with the metric of net annual gas savings. As a result of this review, the EC verifies 3,002,130 m3 for all program measures (97.75% of tracked). Table F-7 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 F-7. Low-Income Program achievements: Affordable Housing Multi-Residential*

Metric	Achievement		Ratio
	Tracked	Verified	
Prescriptive Multi-Residential Net Annual Gas Savings (m3)	184,625	184,625	100.00%
Custom Multi-Residential Net Annual Gas Savings (m3)	2,886,492	2,817,505	97.61%
Total	**3,071,117**	**3,002,130**	**97.75%**

*Not all values may compute exactly due to rounding.

Documentation

The EC used the documentation shown in Table F-8 to verify the metrics for the Affordable Housing Multi-Residential offering.

Table F-8. Documentation used to verify the Affordable Housing Multi-Residential offering

Report Language	Description or Citation
Enbridge-Provided Documentation	
Tracking File	Excel spreadsheet tracking metrics for all 2023 Enbridge DSM programs
Documents Used by EC	
OEB Decision	OEB Decision and Order, EB-2021-0002, November 15, 2022 and OEB Revised Decision and Order, EB-2021-0002, December 16, 2022
Enbridge Plan	Multi-Year Demand Side Management Plan (2022-2027), EB-2021-0002
TRM 7.0	Natural Gas Demand Side Management Technical Resource Manual, Version 7.0
2023 CPSV Report	2023 Natural Gas Demand Side Management Custom Savings Verification[35]
eTools Study	eTools Boiler Tool Validation Study[36]

Verify Prescriptive Savings

In calculating net annual gas savings, the EC reviewed natural gas savings for prescriptive measures from the Tracking File, using the procedures identified in APPENDIX O. The EC certified the tracked savings which resulted in a savings ratio of 100.00%, as shown in Table F-9.

[35] 2023 Natural Gas Demand Side Management Custom Savings Verification, DNV for the Ontario Energy Board, November 25, 2024

[36] eTools Boiler Tool Validation Study, DNV for the Ontario Energy Board, January 31, 2023

Table F-9. Affordable Housing Multi-Residential achievement by measure group: prescriptive savings*

Measure Group	Measures	Achievement (m3)		Savings Ratio
		Tracked	Verified	
Bathroom Aerator	2	13	13	100.00%
Energy Recovery Ventilation	220	130,898	130,898	100.00%
Heat Recovery Ventilation	1	2,463	2,463	100.00%
Kitchen Aerator	2	24	24	100.00%
Make-Up Air Unit	4	45,147	45,147	100.00%
Showerhead	62	1,922	1,922	100.00%
Water Heater	7	4,157	4,157	100.00%
Total	**298**	**184,625**	**184,625**	**100.00%**

*Not all values may compute exactly due to rounding.

Verify Custom Savings

The EC identified the custom savings totals from the Tracking File shown in Table F-10. The EC applied a gross realization rate from the 2023 CPSV Report for Low-Income and Multi-Residential Multi-Family of 97.61%. The EC also applied a realization rate of 84.00% from the eTools Study to boilers with savings estimated by eTools, which resulted in a combined realization rate of 81.99% for these measures.

Table F-10. Affordable Housing Multi-Residential achievement: custom savings*

Segment	eTools Boilers	Unverified Gross Savings (m3)**	CPSV RR	eTools RR	Att	Spillover	Adj	Verified Net Savings (m3)
Low-Income and Multi-Residential Multi-Family	✓	1,732,422	97.61%	84.00%	100.00%	0.00%	81.99%	1,420,454
		1,431,257	97.61%	100.00%	100.00%	0.00%	97.61%	1,397,050
Total		**3,163,680**					**89.06%**	**2,817,505**

*Not all values may compute exactly due to rounding.
**This value represents savings in the tracking data before any adjustments were made. This differs from tracked net savings, which do account for adjustments.

Verification Result

As a result of this review, the EC confirms the savings of 3,002,130 m3 (97.75% of tracked) for the Affordable Housing Multi-Residential offering.

Table F-11. Verified savings by market rate and social/assisted housing owners

Building Type	Measures	Verified Net Savings (m3)
Market Rate	129	1,702,898
Social and Assisted	374	1,299,231
Total	**503**	**3,002,130**

APPENDIX G. Commercial Program scorecard

This appendix describes the detailed process used to verify the metrics for the Commercial Program scorecard (Table G-1). The offerings addressed in this appendix are:

- Commercial Custom
- Prescriptive Downstream
- Direct Install
- Prescriptive Midstream

Table G-1. 2023 Commercial Program scorecard*[37]

Offering	Metric	Verified Achievement		Metric Target			Weight
		Offering-Level	Metric-Level	Lower Band	Target	Upper Band	
Commercial Custom	Large Customer Net Annual Gas Savings (m3)	16,005,301	17,820,262	11,534,064	15,378,752	19,223,439	50.00%
Prescriptive Downstream		1,332,830					
Direct Install		202,891					
Prescriptive Midstream		279,241					
Commercial Custom	Small Customer Net Annual Gas Savings (m3)	2,295,369	7,231,731	6,500,785	8,667,713	10,834,641	50.00%
Prescriptive Downstream		1,280,140					
Direct Install		2,733,591					
Prescriptive Midstream		922,630					

*Not all values may compute exactly due to rounding.

[37] Ontario Energy Board Decision and Order, EB-2021-0002, December 16, 2022, Schedule C

Commercial Custom offering

Overview

Table G-2 shows the tracked and verified scorecard achievements for the 2023 Commercial Custom offering, with the metric of net annual gas savings. As a result of this review, the EC verifies savings of 18,300,670 m3 (148.95% of tracked). Table G-2 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 G-2. Commercial Program achievement: Commercial Custom *

Metric	Achievement		Ratio
	Tracked	Verified	
Large Customer Net Annual Gas Savings (m3)	10,688,173	16,005,301	149.75%
Small Customer Net Annual Gas Savings (m3)	1,598,595	2,295,369	143.59%
Total	**12,286,768**	**18,300,670**	**148.95%**

*Not all values may compute exactly due to rounding.

Table G-3 includes these variables:

- Unverified Gross Savings: Gross first-year tracking savings for all customers in the Commercial Custom offering. This is the amount of savings before any adjustments (including free ridership and spillover) are applied.
- CPSV RR: Gross realization rate from the 2023 CSPV report.
- eTools RR: Gross realization rate adjustments from the eTools Boiler Tool Validation Study.
- Att: Attribution ratio (the complement of free ridership) from the 2023 NTG Report.
- Spillover: Spillover ratio from the 2013-2014 Spillover Study.
- Adj: Adjustment Ratio, the product of the CPSV RR, eTools RR, and the sum of the Att ratio and Spillover ratio

Equation 1: Adjustment Ratio

$$\boldsymbol{Adjustment\ Ratio = CPSV\ RR * eTools\ RR * (Att + Spillover)}$$

- Verified Net Savings: First-year unverified gross savings multiplied by the Adjustment Ratio

Equation 2: Verified Net Savings

$$Verified\ Net\ Savings = Unverified\ Gross\ Savings * Adjustment\ Ratio$$

Table G-3. Adjustment factors applied to Commercial Custom offering first-year gross savings*

Segment	eTools Boilers	Unverified Gross Savings (m3)	CPSV RR	eTools RR	Att	Spillover	Adj	Verified Net Savings (m3)
Commercial	✓	3,983,106	91.13%	84.00%	65.81%	1.03%	51.17%	2,037,976
		2,754,338	91.13%	100.00%	65.81%	1.03%	60.91%	1,677,703
Institutional	✓	14,031	91.13%	84.00%	73.55%	0.50%	56.68%	7,953
		11,053,753	91.13%	100.00%	73.55%	0.50%	67.48%	7,459,267
Multi-Residential	✓	6,849,901	97.61%	84.00%	65.74%	6.64%	59.35%	4,065,149
		4,320,760	97.61%	100.00%	65.74%	6.64%	70.65%	3,052,622
Total		**28,975,889**					**63.16%**	**18,300,670**

*Not all values may compute exactly due to rounding.

Documentation

The EC used the documentation shown in Table G-4 to verify the metrics for the Commercial Custom.

Table G-4. Documentation used to verify the Commercial Custom offering

Report Language	Description or Citation
Enbridge-Provided Documentation	
Tracking File	Excel spreadsheet tracking metrics for all 2023 Enbridge DSM programs
Documents Used by EC	
OEB Decision	OEB Decision and Order, EB-2021-0002, November 15, 2022 and OEB Revised Decision and Order, EB-2021-0002, December 16, 2022
Enbridge Plan	Multi-Year Demand Side Management Plan (2022-2027), EB-2021-0002
2023 CPSV Report	2023 Natural Gas Demand Side Management Custom Savings Verification[38]
2023 NTG Report	2023 Natural Gas Demand Side Management Net-to-Gross Evaluation[39]
2013-2014 Spillover Study	CPSV Participant Spillover Results[40]
eTools Study	eTools Boiler Tool Validation Study[41]

Verify Savings

Adjustment Values – Realization Rates

The 2023 CPSV Report conveyed gross realization rates by segment, as shown in Table G-5. The EC used the same segments to apply the relevant rates at the measure-level.

Table G-5. Verified gross realization rates for the Commercial Custom offering

Segment	Gross Realization Rate
Commercial	91.13%
Low-Income and Multi-Residential Multi-Family	97.61%

The eTools Study conveyed gross realization rates for eTools boiler savings. The realization rate for 2023 was 84.00%.

Adjustment Values – Attribution Ratios

The 2023 NTG Report conveyed free-ridership-based attribution ratios by segment, as shown in Table G-6. The EC used the same segments to apply the relevant rates at the measure-level.

Table G-6. Attribution ratios for the Commercial Custom offering

Segment	Free-ridership-based attribution
Commercial	65.81%
Institutional	73.55%
Market Rate Multi-Residential	65.74%

[38] 2023 Natural Gas Demand Side Management Custom Savings Verification, DNV for the Ontario Energy Board, November 25, 2024
[39] 2023 Natural Gas Demand Side Management NTG Evaluation, DNV for the Ontario Energy Board, November 8, 2024
[40] CPSV Participant Spillover Results, DNV for the Ontario Energy Board, May 23, 2018
[41] eTools Boiler Tool Validation Study, DNV for the Ontario Energy Board, January 31, 2023

Adjustment Values – Spillover Ratios

The 2013-2014 Spillover Study conveyed spillover ratios by segment for each rate zone, as shown in Table G-7.

Table G-7. 2013-2014 spillover ratios for the Commercial Custom offering

2013-2014 Spillover Domain		2013-2014 Spillover
Rate Zone	Segment	
LEG	Commercial	1.36%
	Multi-Residential	8.24%
LUG	Commercial and Multi-Family	0.00%

The EC used verified gross cumulative natural gas savings to calculate a weighted average of the 2013-2014 spillover ratios for each 2023 NTG segment composed of multiple 2013-2014 rate zone segments, as shown in Table G-8.

Table G-8. Weighted spillover ratios for the Commercial Custom offering

Segment	2013-2014 Spillover Domain	Verified Gross Lifetime Savings (m3)	2013-2014 Spillover	Weighted Spillover
Commercial	LEG Commercial	77,223,167	1.36%	1.03%
	LUG Commercial and Multi-Family	25,154,852	0.00%	
Institutional	LEG Commercial	66,053,763	1.36%	0.50%
	LUG Commercial and Multi-Family	113,544,922	0.00%	
Multi-Residential	LEG Multi-Residential	152,862,594	8.24%	6.64%
	LUG Commercial and Multi-Family	36,914,187	0.00%	

The EC used the same segments as conveyed in the 2023 NTG Report to apply the weighted spillover ratios at the measure-level, as shown in Table G-9.

Table G-9. Applied spillover ratios for the Commercial Custom offering

Segment	Weighted Spillover
Commercial	1.03%
Institutional	0.50%
Multi-Residential	6.64%

Verify Net Annual Natural Gas Savings

The offering-level adjustment factor shown in Table G-3 were built up from a measure-level application of the CPSV RR, eTools RR, Attribution, and Spillover ratios. Each measure was assigned a CPSV RR, Attribution, and Spillover ratio based on its segment. The eTools RR was only applicable to boilers with savings estimated by eTools. The EC calculated the measure-level net savings using Equation 1 and Equation 2, then summed the measure-level savings to produce offering-level savings. The EC calculated the offering-level adjustment ratio by dividing the offering-level net savings by the offering-level gross savings.

Verification Result

As a result of this review, the EC confirms the savings of 18,300,570 m3 (148.95% of tracked) for the Commercial Custom offering.

Prescriptive Downstream offering

Overview

Table G-10 shows the tracked and verified scorecard achievements for the 2023 Prescriptive Downstream offering, with the metric of net annual gas savings. As a result of this review, the EC verifies total savings of 2,612,970 m3 for large and small volume customers (100.00% of tracked). Table G-10 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.
- Ratio: Ratio of verified to tracked achievement. A value of 100.00% indicates that verified values match tracked values.

Table G-10. Commercial Program achievement: Prescriptive Downstream*

Metric	Achievement		Ratio
	Tracked	Verified	
Large Customer Net Annual Gas Savings (m3)	1,332,830	1,332,830	100.00%
Small Customer Net Annual Gas Savings (m3)	1,280,140	1,280,140	100.00%
Total	**2,612,970**	**2,612,970**	**100.00%**

*Not all values may compute exactly due to rounding.

Documentation

The EC used the documentation shown in Table G-11 to verify the metrics for the Prescriptive Downstream offering.

Table G-11. Documentation used to verify the Prescriptive Downstream offering

Report Language	Description or Citation
Enbridge-Provided Documentation	
Tracking File	Excel spreadsheet tracking metrics for all 2023 Enbridge DSM programs
Documents Used by EC	
OEB Decision	OEB Decision and Order, EB-2021-0002, November 15, 2022 and OEB Revised Decision and Order, EB-2021-0002, December 16, 2022
Enbridge Plan	Multi-Year Demand Side Management Plan (2022-2027), EB-2021-0002
TRM 7.0	Natural Gas Demand Side Management Technical Resource Manual, Version 7.0
C&I Prescriptive Verification Study	2017 C&I Prescriptive Study – Measure of NTG Factors and Gross Savings Verification, Itron, June 2019

Verify Net Annual Natural Gas Savings

In calculating net annual gas savings, the EC reviewed natural gas savings for prescriptive measures from the Tracking File, using the procedures identified in APPENDIX O. Table G-12 and Table G-13 show the results of the analysis.

Table G-12. Prescriptive Downstream achievement by measure group: large customers*

Measure Group	Measures	Achievement (m3)		Savings Ratio
		Tracked	Verified	
Air Curtain	12	29,976	29,976	100.00%
Demand Control Kitchen Ventilation	37	194,282	194,282	100.00%
Demand Control Ventilation	17	4,719	4,719	100.00%
Destratification Fan	2	5,260	5,260	100.00%
Dock Door Seals	528	556,392	556,392	100.00%

Measure Group	Measures	Achievement (m3)		Savings Ratio
		Tracked	Verified	
Energy Recovery Ventilation	73	317,374	317,374	100.00%
Heat Recovery Ventilation	7	17,397	17,397	100.00%
Make-Up Air Unit	3	13,461	13,461	100.00%
Ozone Laundry Tunnel Washer	1	1,486	1,486	100.00%
Ozone Laundry Washer Extractor	15	192,483	192,483	100.00%
Total	**695**	**1,332,830**	**1,332,830**	**100.00%**

*Not all values may compute exactly due to rounding.

Table G-13. Prescriptive Downstream achievement by measure group: small customers*

Measure Group	Measures	Achievement (m3)		Savings Ratio
		Tracked	Verified	
Air Curtain	22	59,525	59,525	100.00%
Demand Control Kitchen Ventilation	57	239,839	239,839	100.00%
Demand Control Ventilation	148	31,024	31,024	100.00%
Destratification Fan	8	17,824	17,824	100.00%
Dock Door Seals	359	453,113	453,113	100.00%
Energy Recovery Ventilation	1,498	356,214	356,214	100.00%
Heat Recovery Ventilation	119	40,052	40,052	100.00%
Make-Up Air Unit	1	7,425	7,425	100.00%
Ozone Laundry Washer Extractor	7	75,125	75,125	100.00%
Total	**2,219**	**1,280,140**	**1,280,140**	**100.00%**

*Not all values may compute exactly due to rounding.

Verification Result

As a result of this review, the EC confirms the savings of 1,280,140 m3 for small volume customers (100.00% of tracked) and 1,332,830 m3 for large volume customers (100.00% of tracked) for the Prescriptive Downstream offering.

Direct Install offering

Overview

Table G-14 shows the tracked and verified scorecard achievements for the 2023 Enbridge Direct Install offering, with the metric of net annual gas savings. As a result of this review, the EC verifies total savings of 2,936,481 m3 for large and small volume customers (100.00% of tracked). Table G-14 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 G-14. Commercial Program achievement: Direct Install m3 metric*

Metric	Achievement		Ratio
	Tracked	Verified	
Large Customer Net Annual Gas Savings (m3)	202,891	202,891	100.00%
Small Customer Net Annual Gas Savings (m3)	2,733,591	2,733,591	100.00%
Total	**2,936,481**	**2,936,481**	**100.00%**

*Not all values may compute exactly due to rounding.

Documentation

The EC used the documentation shown in Table G-15 to verify the metrics for the Direct Install offering.

Table G-15. Documentation used to verify the Direct Install offering

Report Language	Description or Citation
Enbridge-Provided Documentation	
Tracking File	Excel spreadsheet tracking metrics for all 2023 Enbridge DSM programs
Documents Used by EC	
OEB Decision	OEB Decision and Order, EB-2021-0002, November 15, 2022 and OEB Revised Decision and Order, EB-2021-0002, December 16, 2022
Enbridge Plan	Multi-Year Demand Side Management Plan (2022-2027), EB-2021-0002
TRM 7.0	Natural Gas Demand Side Management Technical Resource Manual, Version 7.0

Verify Net Annual Natural Gas Savings

In calculating net annual gas savings, the EC reviewed natural gas savings for prescriptive measures from the Tracking File, using the procedures identified in APPENDIX O. Table G-16 and Table G-17 show the results of the analysis.

Table G-16. Direct Install achievement by measure group: large customers*

Measure Group	Measures	Achievement (m3)		Savings Ratio
		Tracked	Verified	
Air Curtain	10	59,108	59,108	100.00%
Dock Door Seals	53	143,783	143,783	100.00%
Total	**63**	**202,891**	**202,891**	**100.00%**

*Not all values may compute exactly due to rounding.

Table G-17. Direct Install achievement by measure group: small customers*

Measure Group	Measures	Achievement (m3)		Savings Ratio
		Tracked	Verified	
Air Curtain	139	778,433	778,433	100.00%
Demand Control Kitchen Ventilation	47	326,383	326,383	100.00%
Dock Door Seals	648	1,628,775	1,628,775	100.00%
Total	**834**	**2,733,591**	**2,733,591**	**100.00%**

*Not all values may compute exactly due to rounding.

Verification Result

As a result of this review, the EC confirms the savings of 202,891 m3 for large volume customers (100.00% of tracked) and 2,733,591 m3 for small volume customers (100.00% of tracked) for Enbridge's Direct Install Offering.

Prescriptive Midstream offering

Overview

Table G-18 shows the tracked and verified scorecard achievements for the 2023 Enbridge Prescriptive Midstream offering, with the metric of net annual gas savings. As a result of this review, the EC verifies total savings of 1,201,871 m3 for large and small volume customers (100.00% of tracked). Table G-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 G-18. Commercial Program achievement: Prescriptive Midstream m3 metric*

Metric	Achievement		Ratio
	Tracked	Verified	
Large Customer Net Annual Gas Savings (m3)	279,241	279,241	100.00%
Small Customer Net Annual Gas Savings (m3)	922,630	922,630	100.00%
Total	**1,201,871**	**1,201,871**	**100.00%**

*Not all values may compute exactly due to rounding.

Documentation

The EC used the documentation shown in Table G-19 to verify the metrics for the Prescriptive Midstream offering.

Table G-19 Documentation used to verify the Prescriptive Midstream offering

Report Language	Description or Citation
Enbridge-Provided Documentation	
Tracking File	Excel spreadsheet tracking metrics for all 2023 Enbridge DSM programs
Documents Used by EC	
OEB Decision	OEB Decision and Order, EB-2021-0002, November 15, 2022 and OEB Revised Decision and Order, EB-2021-0002, December 16, 2022
Enbridge Plan	Multi-Year Demand Side Management Plan (2022-2027), EB-2021-0002
TRM 7.0	Natural Gas Demand Side Management Technical Resource Manual, Version 7.0

Verify Cumulative Natural Gas Savings

In calculating net annual gas savings, the EC reviewed natural gas savings for prescriptive measures from the Tracking File, using the procedures identified in APPENDIX O. Table G-20 and Table G-21 show the results of the analysis.

Table G-20. Prescriptive Midstream achievement by measure group: large customers*

Measure Group	Measures	Achievement (m3)		Savings Ratio
		Tracked	Verified	
Dishwasher	35	37,870	37,870	100.00%
Fryer	68	85,582	85,582	100.00%
Oven	144	128,978	128,978	100.00%
Steam Cooker	3	20,306	20,306	100.00%
Water Heater	14	6,503	6,503	100.00%
Total	**264**	**279,241**	**279,241**	**100.00%**

*Not all values may compute exactly due to rounding.

Table G-21. Prescriptive Midstream achievement by measure group: small customers*

Measure Group	Measures	Achievement (m3)		Savings Ratio
		Tracked	Verified	
Broiler	5	8,434	8,434	100.00%
Dishwasher	85	92,152	92,152	100.00%
Fryer	359	449,806	449,806	100.00%
Oven	331	279,062	279,062	100.00%
Steam Cooker	3	20,306	20,306	100.00%
Water Heater	158	72,870	72,870	100.00%
Total	**941**	**922,630**	**922,630**	**100.00%**

*Not all values may compute exactly due to rounding.

Verification Result

As a result of this review, the EC confirms the savings of 279,241 m3 for large volume customers (100.00% of tracked) and 922,630 m3 for small volume customers (100.00% of tracked) for the Prescriptive Midstream offering.

APPENDIX H. Industrial Program Scorecard

This appendix describes the detailed process used to verify the metrics for the Industrial Program scorecard (Table H-1). This appendix addresses the Industrial Custom offering.

Table H-1. Industrial Program scorecard[42]

Offering	Metric	Verified Achievement		Metric Target			Weight
		Offering-Level	Metric-Level	Lower Band	Target	Upper Band	
Industrial Custom	Net Annual Gas Savings (m3)	44,309,314	44,309,314	37,782,673	50,376,897	62,971,121	100.0%

[42] Ontario Energy Board Decision and Order, EB-2021-0002, December 16, 2022, Schedule C

Industrial Custom offering

Overview

Table H-2 shows the shows the tracked and verified scorecard achievements for the 2023 Industrial Custom offering, with the metric of net annual gas savings. As a result of this review, the EC verifies total savings of 44,309,314 m3 (157.84% of tracked). Table H-2 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 H-2. Industrial Program achievement: Industrial Custom

Metric	Achievement		Ratio
	Tracked	Verified	
Net Annual Gas Savings (m3)	28,072,730	44,309,314	157.84%

Table H-3 includes these variables:

- Unverified Gross Savings: Gross first-year tracking savings for all customers in the Industrial Custom offering. This is the amount of savings before any adjustments (including free ridership and spillover) are applied.
- CPSV RR: Gross realization rate from the 2023 CSPV report.
- Att: Attribution ratio (the complement of free ridership) from the 2023 NTG Report.
- Spillover: Spillover ratio from the 2013-2014 Spillover Study or 2023 NTG Report.
- Adj: Adjustment Ratio, the product of the CPSV RR and the sum of the Att ratio and Spillover ratio

Equation 3: Adjustment Ratio

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

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

Equation 4: Verified Net Savings

$$Verified\ Net\ Savings = Unverified\ Gross\ Savings * Adjustment\ Ratio$$

Table H-3. Adjustment factors applied to Industrial Custom offering first-year gross savings

Segment	Unverified Gross Savings (m3)	CPSV RR	Attribution	Spillover	Adj	Verified Net Savings (m3)
Agricultural	30,754,095	99.12%	62.52%	14.96%	76.80%	23,618,584
Industrial	32,772,861	96.52%	64.19%	1.22%	63.13%	20,690,730
Total	**63,526,956**				**69.75%**	**44,309,314**

Documentation

The EC used the documentation shown in Table H-4 to verify the metrics for the Industrial Custom offering.

Table H-4. Documentation used to verify the Industrial Custom offering

Report Language	Description or Citation
Enbridge-Provided Documentation	
Tracking File	Excel spreadsheet tracking metrics for all 2023 Enbridge DSM programs
Documents Used by EC	
OEB Decision	OEB Decision and Order, EB-2021-0002, November 15, 2022 and OEB Revised Decision and Order, EB-2021-0002, December 16, 2022
Enbridge Plan	Multi-Year Demand Side Management Plan (2022-2027), EB-2021-0002
2023 CPSV Report	2023 Natural Gas Demand Side Management Custom Savings Verification[43]
2023 NTG Report	2023 Natural Gas Demand Side Management Net-to-Gross Evaluation[44]
2013-2014 Spillover Study	CPSV Participant Spillover Results[45]

Verify Savings

Adjustment Values – Realization Rates

The 2023 CPSV Report conveyed gross realization rates by segment, as shown in Table H-5. The EC used the same segments to apply the relevant rates at the measure-level.

Table H-5. Verified gross savings rates for the Industrial Custom offering

Segment	Gross Realization Rate
Agricultural	99.12%
Industrial	96.52%

Adjustment Values – Attribution Ratios

The 2023 NTG Report conveyed free-ridership-based attribution ratios by segment, as shown in Table H-6. The EC used the same segments to apply the relevant ratios at the measure-level.

Table H-6. Attribution ratios for the Enbridge Industrial Custom offering

Segment	Free-ridership-based attribution
Agricultural	62.52%
Industrial	64.19%

Adjustment Values – Spillover Ratios

The EC used the same segments as conveyed in the 2023 NTG Report to apply spillover ratios at the measure-level, as shown in Table H-7. Since the 2023 NTG Report only conveyed spillover for the agricultural segment, the EC used spillover ratios conveyed by the 2013-2014 Spillover Study for the industrial segment.

Table H-7. Applied spillover ratios for the Industrial Custom offering

Segment	Spillover
Agricultural	14.96%
Industrial	1.22%

[43] 2023 Natural Gas Demand Side Management Custom Savings Verification, DNV for the Ontario Energy Board, November 25, 2024
[44] 2023 Natural Gas Demand Side Management Net-to-Gross Evaluation, DNV for the Ontario Energy Board, November 8, 2024
[45] CPSV Participant Spillover Results, DNV for the Ontario Energy Board, May 23, 2018

The 2013-2014 Spillover Study conveyed spillover ratios by sector for each rate zone, as shown in Table H-8.

Table H-8. 2013-2014 spillover ratios for the Industrial Custom offering

Rate Zone	Sector	Spillover
LEG	Industrial	1.45%
LUG	Industrial	0.89%

The EC used verified gross cumulative natural gas savings to calculate the weighted average of the 2013-2014 spillover ratios the industrial segment, as shown in Table H-9.

Table H-9. Weighted spillover ratios for the Industrial Custom offering

Segment	2013-2014 Spillover Domain	Verified Gross Lifetime Savings (m3)	2013-2014 Spillover	Weighted Spillover
Industrial	LEG Industrial	322,354,292	1.45%	1.22%
	LUG Industrial	228,630,361	0.89%	

Verify Net Annual Natural Gas Savings

The offering-level adjustment factor shown in Table H-3 was built up from a measure-level application of the CPSV RR, Attribution, and Spillover ratios. Each measure was assigned a ratio based on its segment. The EC calculated the measure-level net savings using Equation 3 and Equation 4, and then summed the measure-level savings to produce offering-level savings. The EC calculated the offering-level adjustment ratio by dividing the offering-level net savings by the offering-level gross savings.

Verification Result

As a result of this review, the EC confirms the savings of 44,309,314 m3 (157.84% of tracked) for the Industrial Custom offering.

APPENDIX I. Large Volume Program Scorecard

This appendix describes the detailed process used to verify the metrics for the Large Volume Program scorecard, shown in Table I-1. This appendix addresses the Direct Access offering.

Table I-1. 2023 Large Volume (Rate T2/Rate 100) Program scorecard*[46]

Offering	Metric	Verified Achievement		Metric Target			Weight
		Offering-Level	Metric-Level	Lower Band	Target	Upper Band	
Direct Access	Net Annual Gas Savings (m3)	22,726,895	22,726,895	6,975,000	9,300,000	11,625,000	100.00%

Overview

Table I-2 shows the tracked and verified scorecard achievements for the 2023 Direct Access offering, with the metric of net annual gas savings. As a result of this review, the EC verifies total savings of 22,726,895 m3 (184.29% of tracked). Table I-2 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 I-2. Large Volume achievement: Direct Access m3 metric*

Metric	Achievement		Ratio
	Tracked	Verified	
Net Annual Gas Savings (m3)	12,332,163	22,726,895	184.29%

*Not all values may compute exactly due to rounding.

Table I-3 includes these variables:

- Unverified Gross Savings: Gross first-year tracking savings for all customers in the Large Volume offering. This is the amount of savings before any adjustments (including free ridership and spillover) are applied.
- CPSV RR: Gross realization rate from the 2023 CSPV report.
- Att: Attribution ratio (the complement of free ridership) from the 2023 NTG Report.
- Spillover: Spillover ratio from the 2013-2014 Spillover Study.
- Adj: Adjustment Ratio, the product of the CPSV RR and the sum of the Att ratio and Spillover ratio

Equation 5: Adjustment Ratio

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

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

Equation 6: Verified Net Savings

$$Verified\ Net\ Savings = Unverified\ Gross\ Savings * Adjustment\ Ratio$$

Table I-3. Adjustment factors applied to Direct Access offering first-year gross savings*

Segment	Unverified Gross Savings (m3)	CPSV RR	Attribution	Spillover	Adj	Verified Net Savings (m3)
Large Volume	80,549,726	98.07%	27.95%	0.82%	28.21%	22,726,895

*Not all values may compute exactly due to rounding.
**This value represents savings in the tracking data before any adjustments were made. This differs from tracked net savings, which do account for adjustments.

[46] Ontario Energy Board Decision and Order, EB-2021-0002, December 16, 2022, Schedule C

Documentation

The EC used the documentation shown in Table I-4 to verify the metrics for the Large Volume offering.

Table I-4. Documentation used to verify the Direct Access offering

Report Language	Description or Citation
Enbridge-Provided Documentation	
Tracking File	Excel spreadsheet tracking metrics for all 2023 Enbridge DSM programs
Documents Used by EC	
OEB Decision	OEB Decision and Order, EB-2021-0002, November 15, 2022 and OEB Revised Decision and Order, EB-2021-0002, December 16, 2022
Enbridge Plan	Multi-Year Demand Side Management Plan (2022-2027), EB-2021-0002
2023 CPSV Report	2023 Natural Gas Demand Side Management Custom Savings Verification[47]
2023 NTG Report	2023 Natural Gas Demand Side Management Net-to-Gross Evaluation[48]
2013-2014 Spillover Study	CPSV Participant Spillover Results[49]

Verify Savings

Adjustment Values – RR

The 2023 CPSV Report conveyed a gross realization rate of 98.07% for the offering.

Adjustment Values – Att Ratios

The 2023 CPSV Report conveyed free-ridership-based attribution of 27.95% for the offering.

Adjustment Values – Spillover Ratios

The 2013-2014 Spillover Study conveyed spillover of 0.82% for the offering.

Verify Annual Natural Gas Savings

The EC calculated the measure-level net savings using Att: Attribution ratio (the complement of free ridership) from the 2023 NTG Report.

- Spillover: Spillover ratio from the 2013-2014 Spillover Study.
- Adj: Adjustment Ratio, the product of the CPSV RR and the sum of the Att ratio and Spillover ratio

Equation 5 and Equation 6, then summed the measure-level savings to produce offering-level savings. The EC calculated the offering-level adjustment ratio by dividing the offering-level net savings by the offering-level gross savings.

Verification Result

As a result of this review, the EC confirms total savings of 22,726,895 m3 (184.29% of net tracked) for the Large Volume (Rate T2/Rate 100) offering.

[47] 2023 Natural Gas Demand Side Management Custom Savings Verification, DNV for the Ontario Energy Board, November 25, 2024
[48] 2023 Natural Gas Demand Side Management Net-to-Gross Evaluation, DNV for the Ontario Energy Board, November 8, 2024
[49] CPSV Participant Spillover Results, DNV for the Ontario Energy Board, May 23, 2018

APPENDIX J. Energy Performance Program Scorecard

This appendix describes the detailed process used to verify the metrics for the Energy Performance Program Scorecard (Table J-1). The offering addressed in this appendix is Whole Building Pay for Performance (P4P).

Table J-1. 2023 Energy Performance Program scorecard[50]

Offering	Metric	Verified Achievement		Metric Target			Weight
		Offering-Level	Metric-Level	Lower Band	Target	Upper Band	
Whole Building Pay for Performance	Number of Participants	26	26	19	25	31	100.00%

[50] Ontario Energy Board Decision and Order, EB-2021-0002, December 16, 2022, Schedule C

Whole Building Pay for Performance Offering

Overview

Table J-2 shows the tracked and verified scorecard achievements for the 2023 Whole Building Pay for Performance offering, with the metric of Participants. As a result of this review, the EC verifies 26 participants (100.00% of tracked). Table J-2 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 J-2. Energy Performance achievement: Whole Building Pay for Performance*

Metric	Achievement		Ratio
	Tracked	Verified	
Number of Participants	26	26	100.00%

*Not all values may compute exactly due to rounding.

Documentation

The EC used the documentation shown in Table J-3 to verify the metrics for the Whole Building Pay for Performance offering.

Table J-3. Documentation used to verify the Whole Building Pay for Performance offering

Report Language	Description or Citation
Enbridge-Provided Documentation	
Tracking File	Excel spreadsheet tracking metrics for all 2023 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-2021-0002, November 15, 2022 and OEB Revised Decision and Order, EB-2021-0002, December 16, 2022
Enbridge Plan	Multi-Year Demand Side Management Plan (2022-2027), EB-2021-0002

Participant Selection

Enbridge first provided the Tracking File listing Project/Application Names, Account Legal Name and Project Numbers. The EC requested full documentation for a census of participants.

Received Files

The EC received PDF application form documents, identified by Project number, as well as baseline reports and signed implementation workshop reports. The EC first confirmed the documents received matched the IDs requested, and that documents for all participants had been received.

Verify Eligibility

To begin, Enbridge's plan[51] offers the following as the offering objective:

[51] Multi-Year Demand Side Management Plan (2022-2027), EB-2021-0002, Exhibit E, Tab 2, Schedule 1, Page 2 of 10

The Whole Building P4P offering applies a holistic, multi-year approach to energy management designed to engage and support customers in driving deeper savings year-over-year. The offering leverages metered and building data to establish building baselines, set performance targets to achieve 20% above the baseline, and assess all capital, operational and/or behavioural opportunities within a building over a defined period.

The EC confirmed documentation supports this objective for all participants.

Enbridge's plan outlines the following criteria to be eligible for the offering:

- *Must be an Enbridge Gas Commercial customer.*
- *The participating building must have existing Enbridge Gas meter that is compatible with pulse interval metering equipment or already has an Automatic Meter Reader (AMR) that allows Enbridge Gas and its approved third-party delivery agent the required access to the building's interval data.*
- *The building must have been operational without having undergone any capital retrofit upgrades between the start of the baseline period up to the start of the P4P Period.*
- *Participant sites cannot participate in other commercial offers simultaneously during the duration of the offer (inclusive of Start-Up Period & three P4P Periods).*

The EC used the Project Files to confirm the eligibility of the participants. The files confirmed that participants were Enbridge commercial customers, had appropriate metering equipment, and had no capital upgrades during the baseline period up to the start of the P4P period. While there had initially been 30 participants in the offering, Enbridge flagged and removed four participants, one before the EC's review and three after the draft Annual Verification report had been submitted, that had installed capital upgrades and thus disqualified themselves from participation. Finally, the EC also cross-referenced all other offerings in the 2023 tracking data to look for participating sites, and did not find any P4P participants participating in any other offerings simultaneously. As a results of these activities, all participants were deemed eligible.

Verify Participation

Furthermore, Enbridge's plan stated that an eligible participant is claimed upon completion of the following:

- *Baseline model completed & summarized in report approved by Enbridge Gas*
- *Interval meter data active & being collected (daily granularity)*
- *Workshop completed with report summarizing site opportunities*
- *Signed Application Form from customer*

Project files confirmed that all participants completed a baseline model, collected interval meter data, participated in a workshop, and signed the application forms.

Verification Result

As a result of this review, the EC confirms that:

- Documentation confirmed the participants met the eligibility definition
- Documentation confirmed the participants met the participation definition

The EC confirms the scorecard metric of 26 participants (100.00% of tracked) for the Enbridge Whole Building Pay for Performance offering.

APPENDIX K. Building Beyond Code Program Scorecard

This appendix describes the detailed process used to verify the metrics for the Building Beyond Code Scorecard programs for Enbridge (Table K-1). The offerings addressed in this appendix are:

- Residential Savings By Design
- Commercial Savings By Design
- Affordable Housing Savings By Design
- Commercial Air Tightness Testing

Table K-1. 2023 Building Beyond Code Program scorecard[52]

Offering	Metric	Verified Achievement		Metric Target			Weight
		Offering-Level	Metric-Level	Lower Band	Target	Upper Band	
Residential Savings By Design	Energy Star Homes	698	698	1,088	1,450	1,813	30.00%
303Commercial Savings By Design	Participants	24	24	21	28	35	30.00%
Affordable Housing Savings By Design	Participants	21	21	14	18	23	30.00%
Commercial Air Tightness Testing	Participants	5	5	4	5	6	5.00%
	Qualified Agents	31	31	8	10	13	5.00%

[52] Ontario Energy Board Decision and Order, EB-2021-0002, December 16, 2022, Schedule C

Residential Savings by Design Offering

Overview

Table K-2 shows the tracked and verified scorecard achievements for the 2023 Residential Savings by Design offering, with the metric of Energy Star Homes built. As a result of this review, the EC verifies 698 Energy Star Homes (100.00% of tracked). Table K-2 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 K-2. Building Beyond Code achievement: Residential Savings by Design metrics*

Metric	Achievement		Ratio
	Tracked	Verified	
Number of Energy Star Homes	698	698	100.00%

*Not all values may compute exactly due to rounding.

Documentation

The EC used the documentation shown in Table K-3 to verify the metrics for the Residential Savings by Design offering.

Table K-3. Documentation used to verify the Residential Savings by Design offering

Report Language	Description or Citation
Enbridge-Provided Documentation	
Tracking File	Excel spreadsheet tracking metrics for all 2023 Enbridge DSM programs
Project Files	Files documenting participation and eligibility for selected homes as well as municipality eligibility
Documents Used by EC	
OEB Decision	OEB Decision and Order, EB-2021-0002, November 15, 2022 and OEB Revised Decision and Order, EB-2021-0002, December 16, 2022
Enbridge Plan	Multi-Year Demand Side Management Plan (2022-2027), EB-2021-0002

Participant Selection

Enbridge first provided the Tracking File listing Project Number (unique ID), Enrolment Year, Signed Commitment (date), and Inspection date. The spreadsheet identified 41 builders and 698 homes. The EC randomly selected 10 from the full list for document review. The EC requested all supporting information, including documentation that supports eligibility and participation criteria.

Received Files

Enbridge provided three types of files to support participation:

- Project Application
- Air Test or Building Leakage Report
- Model Output Files

In addition, the EC received a list of eligible municipalities, including if an eligible municipality has established a Green Development Standard (GDS), to confirm that each home claimed was located in an eligible municipality.

Verify Participation

For offering details, the EC looked to Enbridge's Plan which identified:[53]

- *The ESNH or equivalent path will focus on limiting lost opportunities by motivating builders building in eligible municipalities to construct new homes to at least ESNH Version 17 or modelled equivalent performance (at least 20% better than OBC SB12 2017).*
- *Builders can participate in workshops that provide technical guidance on building to the ESNH standard and an overview of the participation requirements…Builders (inclusive of all subsidiaries) will only be able to participate once per year and receive incentives of up to a maximum of 50 homes built in eligible municipalities.*

The Enbridge-provided documentation, including building leakage reports and model output files, for all 10 randomly selected homes demonstrated modelled as-built energy consumption 20% or greater above 2017 OBC. Additionally, the EC confirmed that no builders had more than 50 homes count towards the metric.

Verify Eligibility

To determine eligibility, the EC looked first to the OEB Decision, which approved the Enbridge Plan[54] stating: *"Residential Savings by Design that focuses on limiting lost opportunities in new construction building and supports the building community in striving to design and build to a net zero energy ready standard."*

For further eligibility details, the EC looked to Enbridge's Plan which identified:[55]

- *Homes must be built in eligible municipalities, defined as municipalities within the Enbridge Gas franchise area that have historic 3-year penetration levels of ESNH builds not more than 15%, updated as described below.*
  - *A list of eligible municipalities will be developed in the first year of the offering, leveraging internal business intelligence data in conjunction with industry new construction data to establish an ESNH built and verified report ("ESNH Report"). Once a municipality has been deemed to be eligible to participate in the offering, it will remain eligible for at least the first three-year period of the offering. The reason for this is that once engaged, builders tend to plan on a multi-year basis, and if the offering is to attract significant interest it needs to operate in alignment with existing builder planning practices.*
  - *The only instance where a municipality that qualified to be included in the ESNH Report would be removed is if they were to adopt a GDS that mandates ESNH or similar equivalent performance standards for new residential builds in that municipality.*

The EC compared the municipalities of the 10 selected homes with Enbridge's ESNH report, finding that all 10 were constructed in eligible municipalities. Therefore, all projects met the eligibility criteria.

Verification Result

As a result of this review, the EC confirms the scorecard metric of 698 homes (100.00% of tracked) for the Enbridge Residential Savings by Design offering.

[53] Multi-Year Demand Side Management Plan (2022-2027), EB-2021-0002, Exhibit E, Tab 2, Schedule 2, Page 12 of 33
[54] OEB Decision and Order, EB-2021-0002, November 15, 2022, Page 46
[55] Multi-Year Demand Side Management Plan (2022-2027), EB-2021-0002, Exhibit E, Tab 2, Schedule 2, Page 13-14 of 33

Commercial Savings by Design Offering

Overview

Table K-4 shows the tracked and verified scorecard achievements for the 2023 Enbridge Commercial Savings by Design offering, with the metric of Participants. As a result of this review, the EC verifies 24 participants (100.00% of tracked). Table K-4 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 K-4. Beyond Building Code achievement: Commercial Savings by Design participants metric*

Metric	Achievement		Ratio
	Tracked	Verified	
Number of Participants	24	24	100.00%

*Not all values may compute exactly due to rounding.

Documentation

The EC used the documentation shown in Table K-5 to verify the metrics for the Commercial Savings by Design offering.

Table K-5. Documentation used to verify the Commercial Savings by Design offering

Report Language	Description or Citation
Enbridge-Provided Documentation	
Tracking File	Excel spreadsheet tracking metrics for all 2023 Enbridge DSM programs
Project Files	PDF documents
Documents Used by EC	
OEB Decision	OEB Decision and Order, EB-2021-0002, November 15, 2022 and OEB Revised Decision and Order, EB-2021-0002, December 16, 2022
Enbridge Plan	Multi-Year Demand Side Management Plan (2022-2027), EB-2021-0002

Participant Selection

Enbridge provided the Tracking File listing Project Number (unique ID), program year, install date, and commissioning date. As tracking data indicated that all 24 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 two types of documents in response to this request:

- Application form, including terms and conditions
- IDP report

The EC first confirmed that the documentation received matched the IDs requested. The EC confirmed that the dates on the IDP report matched the install and commission dates in the tracking file.

Verify Eligibility

To determine the definition of Participants, the EC looked first to the OEB Decision, which approved the Enbridge Plan:[56] Stating that the OEB approved the following proposed offering:

Commercial Savings by Design that prepares the commercial building community for future code advancements through a combination of support initiatives to increase the number of buildings designed to achieve 25% above existing Ontario Building Code standards.

Beyond these details, the plan stated the following eligibility criteria:

- *Commercial or multi-residential building to be built subject to OBC Part 3, Part 10 or Part 11 building types*
- *Affordable Housing projects are excluded from participating in this program offering based on their ability to participate in the Affordable Housing New Construction program offering which targets these projects*
- *Building must be in the design phase or earlier in the development process to qualify for consideration*
- *Minimum threshold of 25,000 square feet contemplated per building as per application form*

The EC used the Application Forms and IDP Reports to determine if the projects met these criteria.

Table K-6. Enbridge Commercial Savings by Design eligibility criteria, project satisfaction, and explanation

Identified Criteria	Satisfied?	Explanation
Commercial, multi-residential or industrial buildings	Yes	IDP Reports
25,000 ft^2 minimum project size	Yes	Application Form
Design phase or earlier	Yes	IDPs performed to prior to construction

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

Verify Participation

Relevant offering details for participant are described in Enbridge's Plan [57]:

Participants will be guided through a series of activities to support the adoption of higher efficiency building designs, including:

- *Visioning Session between the design team and IDP workshop facilitator;*
- *Energy Modelling to create a baseline energy model to use during the IDP workshop and help set the IDP Efficiency Target, details included below under IDP Efficiency Targets;*
- *IDP Workshop followed by an IDP workshop report that summarizes key outcomes for the design team*

The IDP *Efficiency Targets mentioned in the second bullet point are as follows:*

- *IDP efficiency performance targets will reflect the achievement of Thermal Energy Demand Intensity ("TEDI") and Total Energy Use Intensity ("TEUI") levels that result in the achievement of 25% above existing OBC, SB-10. Toronto's Green Development Standards, known as Toronto Green Standards ("TGS"), for commercial and mid-to high rise residential buildings has established TEDI and TEUI levels consistent with the achievement of 25% above code and will be leveraged as a basis for setting TEDI and TEUI targets*

[56] Ontario Energy Board Decision and Order, EB-2021-0002, November 15, 2022, Page 46
[57] Enbridge's Proposed 2022-2027 DSM Plan, EB-2021-0002, Exhibit E, Tab 2, Schedule 2, Page 18 of 33

- *It is anticipated that the City of Toronto will advance their TGS sometime within the plan term. If and/or when this occurs, Enbridge Gas will adjust efficiency targets exclusively for the City of Toronto to achieve 10% above TGS minimum performance requirements. Efficiency targets for all other cities across Ontario will remain unchanged at 25% above code, unless the city has a Green Development Standard in place that requires the achievement equivalent to or above 25% above code, in which case, a target of 10% above the city's required efficiency performance level would be applied.*
- *In the case a participant's baseline design prior to the IDP workshop is above code and/or any mandatory efficiency level set by the municipality, a target to achieve the higher of 10% above the baseline or 25% above code will be set. For example, if the baseline building achieves a 20% above code efficiency level, the target efficiency level for the customer will be the achievement of at least 30% above code. Conversely, if the baseline building achieves a 10% above code efficiency level, the standard 25% above code Commercial Savings by Design IDP target will stand.*

The EC used the Application Forms and IDP Reports to determine if the projects met these criteria. The EC noted that the IDPs submitted for the 10 developments cited an average savings of 38% improvement against the OBC code, with a range of 25.6% to 52.6% savings. The average square footage was 176,211 ft^2 with a range of 28,512 ft^2 to 429,988 ft^2.

Table K-7. Enbridge Commercial Savings by Design participation criteria, project satisfaction, and explanation

Identified Criteria	Satisfied?	Explanation
Undertaking Enbridge approved IDP process for each participant	Yes	IDP Reports included in documentation
IDP includes energy model	Yes	IDP Reports identify EnergyPlus v9.3, 9.6 & 9.8, IES VE 2022, or eQuest v3.65[58]
Sufficient energy savings achieved	Yes	See below
-IDP demonstrates how to achieve 25% energy savings over building code or 10% more than baseline building at 25% requirements defined in IDP Efficiency Targets	Yes	All IDP reports states savings 25% over OBC
Project must be at least 25,000 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 25,000 ft^2	Yes	Projects of one or multiple buildings all greater than 25,000 ft^2

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

Verification Result

As a result of this review:

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

As a result of this review, the EC confirms the scorecard metric of 24 participants (100.00% of tracked) for the Enbridge Commercial Savings by Design offering.

[58] ASHRAE 90.1-2013 section 11 as modified by Supplementary Standard SB10-2017 Division 3, Chapter 2, were followed in generating reference and baseline models

Affordable Housing Savings by Design Offering

Overview

Table K-8 shows the tracked and verified scorecard achievement for the 2023 Enbridge Affordable Housing Savings by Design offering, with the metric of Participants. As a result of this review, the EC verifies 21 New Developments (100.00% of tracked). Table K-8 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 K-8. Beyond Building Code achievement: Affordable Housing Savings by Design participants metric*

Metric	Achievement		Ratio
	Tracked	Verified	
Number of Participants	21	21	100.00%

*Not all values may compute exactly due to rounding.

Documentation

The EC used the documentation shown in Table K-9 to verify the metrics for the Affordable Housing Savings by Design offering.

Table K-9. Documentation used to verify the Affordable Housing Savings by Design offering

Report Language	Description or Citation
Enbridge-Provided Documentation	
Tracking File	Excel spreadsheet tracking metrics for all 2023 Enbridge DSM programs
Project Files	PDF documents
Documents Used by EC	
OEB Decision	OEB Decision and Order, EB-2021-0002, November 15, 2022 and OEB Revised Decision and Order, EB-2021-0002, December 16, 2022
Enbridge Plan	Multi-Year Demand Side Management Plan (2022-2027), EB-2021-0002

Participant Selection

Enbridge provided the Tracking File listing Project Number (unique ID), program year, install date, and commissioning date. As tracking data indicated that all 21 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 two types of documents in response to this request:

- Application form, including terms and conditions
- IDP report

The EC first confirmed that the documentation received matched the IDs requested. The EC confirmed that the signature dates on the application form matched the date in the tracking file, and that the date on the IDP report matched the date recorded in the tracking file as well.

Verify Eligibility

To determine the definition of Participants, the EC looked first to the OEB Decision, which approved the Enbridge Plan:[59] Stating that the OEB approved the following proposed offering:

Affordable Housing Savings by Design that enables and supports affordable housing projects with better energy performance than required by the Ontario Building Code.

Beyond these details, the plan stated the following eligibility criteria:

- *New construction housing and multi-residential projects to be built subject to OBC Part 3, Part 9, Part 10, or Part 11*
- *Project construction intended to be completed within five years of signing the application form for multi-family projects, or within three years of signing the application form for single family projects*
- *Must be in the design phase or earlier in the development process*
- *Projects must qualify as Affordable Housing, by virtue of falling under one of the following classifications: Housing being built by Social Housing Providers as defined below:*
  Social and Assisted Housing, for the purposes of DSM programming includes:
  - *Non-profit providers of social or assisted housing under a federal, provincial or municipally funded program, and includes, without limitation, non-profit corporations governed by the Housing Services Act, 2011 (as amended or any successor legislation);*
  - *Public housing corporations owned by municipalities directly or through local housing corporations;*
  - *Non-profit housing co-operatives as defined in the Co-operative Corporations Act;*
  - *Non-profit housing corporations that manage or own residential (including multi-residential) buildings developed under the "Affordable Housing program"; and*
  - *Non-profit organizations, or municipal or provincial governments that manage or own residential (including multi-residential) supportive housing, shelters and hostels.*

  OR

  Privately-owned multi-residential housing where the applicant has declared that at least 30% of units are intended to be affordable.

The EC used the Application Forms and IDP Reports to determine if the projects met these criteria. All but one of the select sites were Part 3 buildings, while one was Part 9.

Table K-10. Affordable Housing Savings by Design eligibility criteria, project satisfaction, and explanation

Identified Criteria	Satisfied?	Explanation
Part 3, 9, 10, or 11 buildings	Yes	Applications and IDP Reports included in documentation
Affordable Housing	Yes	Declaration with Applications
Built within 5 years of application form date	Yes	IDP Reports included in documentation
Design phase or earlier	Yes	IDPs performed to prior to construction

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

[59] Ontario Energy Board Decision and Order, EB-2021-0002, November 15, 2022, Page 46

Verify Participation

Relevant offering details for participant are described in Enbridge's Plan[60]:

Participants will be guided through a series of activities to support the adoption of higher efficiency building designs, including:

- *Visioning Session between the design team and IDP workshop facilitator*
- *Energy Modelling to create a baseline energy model to use during the IDP workshop and help set the energy performance target – details as outlined below under energy performance targets*
- *IDP Workshop followed by an IDP workshop report that summarizes key outcomes for the design team*

The *Energy Performance Targets mentioned in the second bullet point are explained as follows:*

- *The energy performance targets will reflect the achievement of at least 20% better energy efficiency than required by the 2017 OBC.*
- *In the case that a project will be constructed in a municipality that imposes a GDS requiring the achievement equal to or above 20% better than OBC, an incremental performance target of 5% above the respective GDS target would be applied.*
- *In the case a participant's baseline design prior to the IDP workshop is above code and/or any mandatory efficiency level set by the municipality, a performance target equivalent to the higher of 5% above the baseline or 20% above code will be set. For example, if the baseline project already achieves a 20% above code efficiency level, the target efficiency level for the participant will be the achievement of at least 25% above code. Conversely, if the baseline project already achieves a 10% above code efficiency level, the standard 20% above code Savings by Design Affordable Housing IDP target will stand.*

The EC used the Application Forms and IDP Reports to determine if the projects met these criteria. The EC noted that the IDPs submitted for the 10 developments cited an average savings of 39% improvement against the OBC code.

Table K-11. Affordable Housing Savings by Design participation criteria, project satisfaction, and explanation

Identified Criteria	Satisfied?	Explanation
Undertaking Enbridge approved IDP process for each participant	Yes	IDP Reports included in documentation
IDP includes energy model	Yes	IDP Reports identify EnergyPlus v9.6, IES VE 2022 & 2023, eQuest v3.65, or HOT2000 v11.11
Sufficient energy savings achieved	Yes	See below
- IDP demonstrates how to achieve 20% energy savings over building code either 5% or 10% more than baseline building requirements as defined in Energy Performance Targets	Yes	All IDP reports states savings 20% over OBC or 5 or 10% increments over 20% requirement
Project must qualify as affordable housing	Yes	Applications and IDP Reports included in documentation
Project must be built within 5 years of application form date	Yes	Applications and IDP Reports included in documentation

As a result, the EC confirms that the submitted projects met the criteria as a participant for the Affordable Housing Savings by Design offering.

[60] Enbridge's Proposed 2022-2027 DSM Plan, EB-2021-0002, Exhibit E, Tab 2, Schedule 2, Page 18 of 33

Verification Result

As a result of this review:

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

The EC confirms the scorecard metric of 21 participants (100.00% of tracked) for the Enbridge Affordable Housing Savings by Design program.

Commercial Air Tightness Testing Offering

Overview

Table K-12 shows the tracked and verified scorecard achievements for the 2023 Enbridge Commercial Air Tightness Testing (CATT) offering, with the metrics of participants and qualified agents. As a result of this review, the EC verifies 5 participants and 31 qualified agents (both 100.00% of tracked). Table K-12 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 K-12. Building Beyond Code achievement: Commercial Ait Tightness Testing metrics*

Metric	Achievement		Ratio
	Tracked	Verified	
Number of Participants	5	5	100.00%
Number of Qualified Agents	31	31	100.00%

*Not all values may compute exactly due to rounding.

Documentation

The EC used the documentation shown in Table K-13 to verify the metrics for the Commercial Air Tightness Testing offering

Table K-13. Documentation used to verify the Commercial Air Tightness Testing offering

Report Language	Description or Citation
Enbridge-Provided Documentation	
Tracking File	Excel spreadsheet tracking metrics for all 2023 Enbridge DSM programs
Project Files	PDF documents, Contact files
Documents Used by EC	
OEB Decision	OEB Decision and Order, EB-2021-0002, November 15, 2022 and OEB Revised Decision and Order, EB-2021-0002, December 16, 2022
Enbridge Plan	Multi-Year Demand Side Management Plan (2022-2027), EB-2021-0002

Participants Metric

Participant Selection

Enbridge provided the Tracking File listing Project Number (unique ID), Customer Legal Name, and Address. As this is the first time that this offering is being verified, the EC requested additional information for a census of all 5 participants. The EC requested all supporting documentation, including documentation that supports eligibility and participation criteria.

Received Files

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

- Application form, including terms and conditions
- Proposal
- Test report
- Invoice

The EC first confirmed that the documentation received matched the IDs requested. The EC confirmed that the information on the application matched the legal name and address in the tracking file, and that the legal name and address on the test report matched the legal name and address recorded in the tracking file.

Verify Participant Eligibility

Enbridge's Plan, approved by the OEB, further identifies eligibility criteria. As stated in Enbridge's Plan:[61]

"Eligibility criteria include the following:

- *Commercial or multi-residential projects to be built subject to OBC Part 3, Part 10 or Part 11 building types.*
- *Project enclosure must be in a state to perform air tightness testing by Q3 of 2023.*
- *Minimum threshold of 25,000 ft^2 contemplated per project as per application form."*

Table K-14. Enbridge Commercial Air Tightness Participant eligibility criteria, project satisfaction, and explanation

Identified Criteria	Criteria Satisfied?	Explanation
Part 3, 10, or 11 commercial or multi-residential buildings	Yes	Application Form
Test completed by Q3 of 2023	Yes	Test Report
25,000 ft^2 minimum project size	Yes	Application Form and Test Report

After reviewing the stated eligibility criteria and Project Files, the EC confirms the 5 projects all 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 further criteria for eligibility

The EC confirms the scorecard metric of 5 participants (100.00% of tracked) for the Enbridge Commercial Air Tightness Testing offering.

Qualified Agents Metric

Qualified Agents Selection

Enbridge provided the Tracking File listing Project Number (unique ID) and Customer Legal Name. As this is the first time that this offering is being verified, the EC requested additional information for a census of all 31 qualified agents. The EC requested all supporting documentation, including documentation that supports eligibility criteria and contact information.

Received Files

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

- Certification form
- Contact information
- Knowledge check test

[61] Enbridge's Proposed Multi-Year Demand Side Management Plan (2022-2027), EB-2021-0002, Exhibit E, Tab 2, Schedule 2, Page 32 of 33

The EC first confirmed that the documentation received matched the IDs requested. The EC confirmed that the legal name on the certificate matched the legal name in the tracking file.

Verify Qualified Agents Eligibility

Enbridge's Plan states that "Qualified agents targeted for the offering include engineering firms and building scientists." Enbridge's 2023 DSM Annual Report expanded upon this statement by defining eligibility criteria as:

The offering is best suited for those with building envelope or building commissioning interest or experience, with an educational background in subjects including building enclosure, energy modelling, architecture, building sustainability, structural engineering, energy auditing, and general contracting.

The EC reviewed all documentation to confirm certificates matched the legal name of each agent as listed in the tracking data. Contact information included each agent's company name and any current education or certificates that align with the eligibility criteria. The EC confirmed that all 31 qualified agents are eligible for offering participation.

Qualified Agents Survey

Enbridge's Plan defines the metric as "the number of qualified air tightness testing practitioners recruited and trained through the offering." Enbridge's 2023 DSM Annual Report further states, "to be considered a Qualified Agent, participant must attend the workshop and complete the knowledge check testing."

For each participant, Enbridge provided a certification form attesting the agent's participation in an air tightness testing workshop with an accompanying list of the topics covered.

In addition to reviewing this documentation, the EC conducted a survey of agents via the online survey platform Qualtrics in October 2024. The EC attempted a census of agents, with 14 of 31 agents successfully completing the survey. All 14 agents confirmed their participation and topics covered during their in-person workshop. This confirmation of workshop attendance, coupled with the provided documentation, gave the EC confidence to verify the tracking data.

In addition to questions verifying workshop participation and details, respondents were asked several additional questions to gather information about these agents. First, agents were asked if, before the workshop, they performed air tightness testing in commercial buildings with any regularity. Only one of 14 respondents answered affirmatively. Additionally, three respondents reported conducting air tightness testing on at least one commercial building prior to the workshop. The EC also asked the respondents how knowledgeable they were on commercial air tightness testing before and after the workshop, using a five-point scale in which five meant "extremely knowledgeable." Just one agent said they were at least "very knowledge" (corresponding to a 4 on the scale) before attending the workshop. Comparatively, nine agents said they felt either "very" or "extremely" knowledgeable after the workshop. These results suggest that this offering is forwarding its objective of advancing the adoption of commercial air tightness testing and facilitating market adoption by building capacity for qualified agents.

Verification Result

As a result of this review:

- The EC confirms proper documentation for the requested agents
- Project files for the submitted agents meet criteria for eligibility
- All surveyed agents confirmed workshop participation

The EC confirms the scorecard metric of 31 qualified agents (100.00% of tracked) for the Enbridge Commercial Air Tightness Testing offering.

APPENDIX L. Review of Metric Targets

This With the beginning of the new Natural Gas Demand Side Management Framework[62], targets for each applicable metric were prescribed for 2023. Future evaluations will utilize calculations to define targets. Table L-1 provides the targets for all 2023 metrics.

Table L-1. Enbridge Metric Targets – 2023

Program	Offering	Metric(s)	Target(s)
Residential	Residential Whole Home	Net Annual Gas Savings (m^3)	22,135,911
	Residential Single Measure		
	Residential Smart Home		
Low-Income	Home Winterproofing	Net Annual Gas Savings (m^3)	2,873,511
	Affordable Housing Multi-Residential	Net Annual Gas Savings (m^3)	5,015,604
Commercial	Commercial Custom	Large Customer Net Annual Gas Savings (m^3)	15,378,752
	Prescriptive Downstream		
	Direct Install	Small Customer Net Annual Gas Savings (m^3)	8,667,713
	Prescriptive Midstream		
Industrial	Industrial Custom	Net Annual Gas Savings (m^3)	50,376,897
Large Volume	Direct Access	Net Annual Gas Savings (m^3)	9,300,000
Energy Performance	Whole Building Pay for Performance	Number of Participants	25
Building Beyond Code	Residential Savings by Design	Number of Energy Star Homes	1,450
	Commercial Savings by Design	Number of Participants	28
	Affordable Housing Savings by Design	Number of Participants	18
	Commercial Air Tightness Testing	Number of Participants	5

[62] EB-2021-0002

APPENDIX M. Review of DSM Shareholder Incentive, Lost Revenue, and Weighted Average Measure Life Calculations

This appendix describes the EC team's review of the demand side management shareholder incentive, lost revenue, and weighted average measure life calculations.

DSM shareholder incentive calculations

The 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 scorecard, a simple diagram is not possible.

DNV independently calculated DSM shareholder incentive values. The following sections describe the calculation methodology and inputs used.

DSM shareholder incentive: verification savings values

The verified net annual savings used for the DSM shareholder incentive calculation represent the savings values leveraged during the program planning process, while the verified net annual savings used in the lost revenue calculation represent the best available information at the time of the verification.

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.

If the achieved metric is less than or equal to the 2023 Lower Band, the Metric Score is calculated as:

$$Metric\ Score = \frac{0.75 * achieved\ metric}{lower\ band}$$

If the achieved metric is greater than the 2023 Lower Band and less than or equal to the 2023 Target, the Metric Score is calculated as:

$$Metric\ Score = \ 1 - \frac{0.25 * (target\ metric - achieved\ metric)}{(target\ metric - lower\ band)}$$

If the achieved metric is greater than the 2023 Target, the Metric Score is calculated as:

$$Metric\ Score = \ 1 + \frac{0.25 * (achieved\ metric - target\ metric)}{(upper\ band - target\ metric)}$$

DSM shareholder incentive: weighted metric score

The weighted metric score is determined by multiplying the metric score by its corresponding weight. Each metric is weighted. The sum of the weights within each scorecard equals 100.00%. Per the OEB Decision and Order, the OEB approved maximum and minimum achievement limits per metric of 200% and 0%, respectively.[63] As a result, all Metric

[63] OEB Decision and Order, EB-2021-0002, November 15, 2022, page 69

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:

$$Weighted\ Scorecard\ Achievement = \sum_{Scorecard} (Weight * Metric\ Score)$$

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 M-1.

Table M-1. Calculation to determine shareholder incentive

WSA Value	Incentive
< 0.75	0
0.75 ≤ WSA < 1	$(40\%\ x\ Max\ Incentive)\frac{(WSA - 0.75)}{0.25}$
1 ≤ WSA < 1.25	$(40\%\ Max\ Incentive) + (60\%\ Max\ Incentive) * \frac{(WSA - 1)}{0.25}$
1.25 ≤ WSA	Max Incentive

The shareholder incentives for each scorecard are summed to calculate the total incentive:

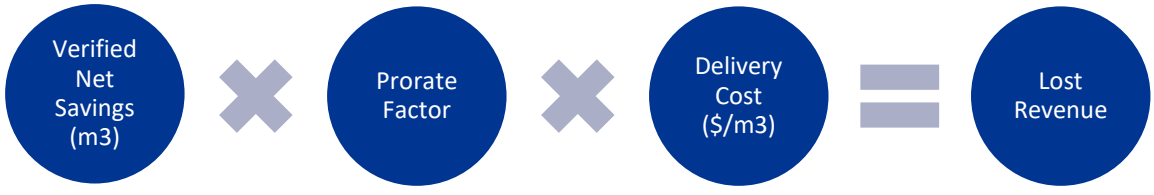
$$Total\ Incentive = \sum Scorecard\ Incentive$$

Lost revenue calculations

The basic approach to the lost revenue calculation is illustrated in Figure M-1. The calculation is based on the following factors:

- The verified net first-year natural gas savings (in 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 M-1. 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 for the utility.

The applicable rate classes for the EGD and Union rate zones are shown in Table M-2. Values specific to these rates for the evaluated year are included in APPENDIX N.

Table M-2. Rate classes for lost revenue calculation

EGD Rate Zone	Union Rate Zone
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 M are described in the following sections.

Lost revenue: Verified Net Savings

The lost revenue calculation first utilizes verified net first-year savings, calculated using best available inputs and assumptions at the time of the verification. For prescriptive program savings, this is currently the April 2024 update to the TRM. This differs from the savings used for the DSM shareholder incentive calculation, which leverage the inputs and assumptions at the time of program planning.

Lost revenue: Prorate Factor Calculation

The prorate factor is simply the proportion of the net first-year savings that will be included in the lost revenue calculation, based on the number of months the gas-saving measure was installed. Table M-3 shows the prorate factors for each installation month. Prorated savings are calculated by multiplying the measure's net first-year savings by the ratio for the month it was installed.

Table M-3. 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

*Not all values may compute exactly due to rounding.

For example, the calculation assigns 12 months of savings to measures installed in January and one month of savings to measures installed in December.

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 is calculated by summing the lost revenue across all applicable rate classes:

$$Total\ Lost\ Revenue = \sum_{Rate\ Class}^{Rate\ Zone} \sum_{Measure}^{Rate\ Class} Lost\ Revenue$$

Weighted average measure life calculation

With the approval of Enbridge Gas's proposed change in the primary scorecard metric from net cumulative natural gas savings to net annual natural gas savings, the OEB directed that Enbridge Gas's WAML should not fall below 14 years across its portfolio of programs, excluding the Large Volume program, to ensure the approved DSM plan maintains sufficient longer-term benefits.[64]

The portfolio WAML is calculated as the sum of the program year's net cumulative natural gas savings divided by the sum of that program year's net annual natural gas savings, as shown in the formula below.

$$WAML = \frac{\sum Net\ Cumulative\ Natural\ Gas\ Savings}{\sum Net\ Annual\ Natural\ Gas\ Savings}$$

It is worth noting that the 14-year WAML threshold was calculated using a first-year NTG assumption to represent both first-year and lifetime NTG. With an overall NTG ratio for first-year savings of 77.86% applied to both the numerator and denominator of the equation above, this would result in a WAML of 18.10 years.

However, some custom measures have different values for first-year and lifetime NTG. Because it is a more accurate representation of the net savings, the EC used these savings-specific values for first-year NTG and lifetime NTG in its WAML calculation. Using an overall (including all non-Large Volume prescriptive and custom measures) NTG ratio for first-year savings of 77.86% applied to the denominator and an overall NTG ratio for lifetime savings of 73.67% applied to the numerator results in a verified WAML of 17.05 years.

Example calculations

DSM shareholder incentive

The first step is to determine the correct formula based on whether the verified achievement for the scorecard metric was less than or equal to the lower band, greater than the lower band and less than or equal to the target, or greater than the annual target. In the example in Table M-4, the verified achievement for the first Scorecard A m^3 metric was greater than the 2023 lower band and less than the 2023 target, so the formula for achievement greater than the lower band and less than or equal to the target is used to determine the metric score. The verified achievement for the second Scorecard A m^3 metric was less than the 2023 lower band, so the formula for achievement less than or equal to the lower band is used to determine the metric score. The verified achievement for participants was greater than the 2023 target, so the formula for achievement greater than the target is used. Each formula is illustrated below.

[64] OEB Decision and Order, EB-2021-0002, November 15, 2022, page 67

Table M-4. Example metric score*

Scorecard	Metric	Verified Achievement	Lower Band	2022 Target	Upper Band	Metric Score
Scorecard A	m^3 1	9,000,000	7,500,000	10,000,000	12,500,000	0.90
	m^3 2	6,000,000	7,500,000	10,000,000	12,500,000	0.60
	Participants	300	150	200	250	1.50

*Not all values may compute exactly due to rounding.

$$m3\ 1\ Metric\ Score = 1 - \frac{0.25 * (10{,}000{,}000 - 9{,}000{,}000)}{(10{,}000{,}000 - 7{,}500{,}000)} = 1 - 0.1 = 0.9$$

$$m3\ 2\ Metric\ Score = \frac{0.75 * 6{,}000{,}000}{7{,}500{,}000} = 0.6$$

$$Participant\ Metric\ Score = 1 + \frac{0.25 * (300 - 200)}{(250 - 200)} = 1 + 0.5 = 1.5$$

The metric score for each metric is then multiplied by the applicable weight. In this example, both m3 savings metrics are weighted at 45% and the participant metric is weighted at 10%. The weighted metric scores are summed for the weighted scorecard achievement.

Table M-5. Example scorecard weighted score (WSA)*

Scorecard	Metric	Metric Score	Weight	Weighted Metric Score	Weighted Scorecard Achievement
Scorecard A	m3 1	0.90	45%	0.4050	0.8250
	m3 2	0.60	45%	0.2700	
	Participants	1.50	10%	0.1500	

*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 0.8250 would result in an incentive of $8,000, as demonstrated below.

$$(40\%\ x\ \$100{,}000)\frac{(0.8250 - .75)}{0.25} = \$40{,}000\ x\ \frac{(0.0750)}{0.25} = \$40{,}000\ x\ 0.30 = \$12{,}000$$

Lost revenue

As an example, a widget carries a net first-year lost revenue verified savings value of 500 m^3 (first-year, net savings). If that unit was installed in January, 500 m^3 (500 x 1.000) would be verified for lost revenue. If that same unit were installed in July, 250 m^3 (500 x 0.500) would be verified and if installed in November, 83.33 m^3 (500 x .1667). Table M-6 shows the prorated total savings for all widgets with one installed per month, in 1000 m^3.

Table M-6. Example lost revenue savings total for single rate class with monthly widget installation*

Month	Ratio (12-Month+1)/12	Units Installed	Lost Revenue Net First-Year 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 M-7, 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 m^3. All applicable rate class lost revenue are then summed for total lost revenue.

Table M-7. 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.

APPENDIX N. DSM Shareholder Incentive, Lost Revenue, and Weighted Average Measure Life: Detailed Tables

DSM shareholder incentive

Table N-1. 2023 Residential Program scorecard targets, achievements, and incentive*

Metric	Target	Verified Achievement	Weight	Metric Score	Weighted Metric Score
Net Annual Gas Savings (m3)	22,135,911	22,808,759	100.00%	103.04%	103.04%
Verified Total Weighted Scorecard Achieved					103.04%
Maximum Scorecard Incentive					$4,598,000
Verified Scorecard Incentive Achieved					**$2,174,628**

*Not all values may compute exactly due to rounding.

Table N-2. 2023 Low-Income Program scorecard targets, achievements, and incentive*

Metric	Target	Verified Achievement	Weight	Metric Score	Weighted Metric Score
Single Family Net Annual Gas Savings (m3)	2,873,511	3,247,883	50.00%	113.03%	56.51%
Multi-Residential Net Annual Gas Savings (m3)	5,015,604	3,002,130	50.00%	59.86%	29.93%
Verified Total Weighted Scorecard Achieved					86.44%
Maximum Scorecard Incentive					$4,598,000
Verified Scorecard Incentive Achieved					**$841,771**

*Not all values may compute exactly due to rounding.

Table N-3. 2023 Commercial Program scorecard targets, achievements, and incentive*

Metric	Target	Verified Achievement	Weight	Metric Score	Weighted Metric Score
Large Customer Net Annual Gas Savings (m3)	15,378,752	17,820,262	50.00%	115.88%	57.94%
Small Customer Net Annual Gas Savings (m3)	8,667,713	7,231,731	50.00%	83.43%	41.72%
Verified Total Weighted Scorecard Achieved					99.65%
Maximum Scorecard Incentive					$4,598,000
Verified Scorecard Incentive Achieved					**$1,813,776**

*Not all values may compute exactly due to rounding.

Table N-4. 2023 Industrial Program scorecard targets, achievements, and incentive*

Metric	Target	Verified Achievement	Weight	Metric Score	Weighted Metric Score
Net Annual Gas Savings (m3)	50,376,897	44,309,314	100.00%	87.96%	87.96%
Verified Total Weighted Scorecard Achieved					87.96%
Maximum Scorecard Incentive					$4,598,000
Verified Scorecard Incentive Achieved					**$953,119**

*Not all values may compute exactly due to rounding.

Table N-5. 2023 Large Volume Program scorecard targets, achievements, and incentive*

Metric	Target	Verified Achievement	Weight	Metric Score	Weighted Metric Score
Net Annual Gas Savings (m3)	9,300,000	22,726,895	100.00%	200.00%	200.00%
Verified Total Weighted Scorecard Achieved					200.00%
Maximum Scorecard Incentive					$627,000
Verified Scorecard Incentive Achieved					**$627,000**

*Not all values may compute exactly due to rounding.

Table N-6. 2023 Energy Performance Program scorecard targets, achievements, and incentive*

Metric	Target	Verified Achievement	Weight	Metric Score	Weighted Metric Score
Number of Participants	25	26	100.00%	104.00%	104.00%
Verified Total Weighted Scorecard Achieved					104.00%
Maximum Scorecard Incentive					$209,000
Verified Scorecard Incentive Achieved					**$103,664**

*Not all values may compute exactly due to rounding.

Table N-7. 2023 Building Beyond Code Program scorecard targets, achievements, and incentive*

Offering	Metric	Target	Verified Achievement	Weight	Metric Score	Weighted Metric Score
Residential Savings By Design	Number of Energy Star Homes	1,450	698	30.00%	48.14%	14.44%
Commercial Savings By Design	Number of Participants	28	24	30.00%	85.71%	25.71%
Affordable Housing Savings By Design	Number of Participants	18	21	30.00%	116.67%	35.00%
Commercial Air Tightness Testing	Number of Participants	5	5	5.00%	100.00%	5.00%
	Number of Qualified Agents	10	31	5.00%	200.00%	10.00%
Verified Total Weighted Scorecard Achieved						90.16%
Maximum Scorecard Incentive						$1,672,000
Verified Scorecard Incentive Achieved						**$405,444**

*Not all values may compute exactly due to rounding.

Lost revenue

Table N-8. Lost revenue volumes (10^3 m^3) by rate class, prorated by month*

Rate Zone	Rate Class	Savings Volume (1,000 m^3)												
		Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Total
EGD	Rate 110	232	1,057	1,007	951	788	39	2	1,053	364	130	89	-	**5,713**
	Rate 115	-	-	-	19	-	-	936	-	-	-	-	-	**955**
	Rate 135	-	-	41	240	97	25	15	-	9	89	13	-	**529**
	Rate 145	-	-	-	-	3	-	-	-	-	30	-	-	**33**
	Rate 170	223	-	-	-	-	-	-	252	-	10	-	-	**486**
Union South	Rate M4	3,256	592	33	58	127	63	38	40	18	474	8	29	**4,739**
	Rate M5	-	122	-	19	-	8	55	-	-	-	6	-	**209**
	Rate M7	9,241	1,349	435	1,211	415	1,089	53	671	907	17	312	75	**15,774**
	Rate T1	502	113	25	7	-	5	-	-	-	20	-	-	**672**
	Rate T2	5,556	-	131	430	2,622	1,042	1,295	10	1,032	6	7	-	**12,131**
Union North	Rate 20	167	-	128	-	-	160	133	-	230	10	90	-	**917**
	Rate 100	52	-	-	-	815	1,824	272	-	-	-	-	-	**2,963**
Total		**19,230**	**3,232**	**1,799**	**2,934**	**4,867**	**4,255**	**2,801**	**2,027**	**2,559**	**787**	**525**	**104**	**45,121**

*Not all values may compute exactly due to rounding.

Table N-9. Lost revenue volumes (10^3 m^3), delivery rates, and revenue impact by rate class*

Rate Zone	Rate Class	Savings Volume (1,000 m^3)	Delivery Rate ($/1,000 m^3)	Revenue Impact ($)
EGD	Rate 110	5,713	$6.82	$38,979
	Rate 115	955	$3.15	$3,009
	Rate 135	529	$21.15	$11,195
	Rate 145	33	$56.63	$1,859
	Rate 170	486	$2.08	$1,009
Union South	Rate M4	4,739	$20.01	$94,808
	Rate M5	209	$32.15	$6,724
	Rate M7	15,774	$4.44	$69,983
	Rate T1	672	$1.68	$1,131
	Rate T2	12,131	$0.42	$5,095
Union North	Rate 20	917	$7.64	$7,010
	Rate 100	2,963	$2.87	$8,504
Total		**45,121**		**$249,306**

*Not all values may compute exactly due to rounding.

Weighted average measure life

Table N-10. Weighted Average Measure Life Results*

Metric	Value
Verified Net Cumulative Natural Gas Savings (m3)**	1,678,539,668
Verified Net Annual Natural Gas Savings (m3)**	98,420,079
Weighted Average Measure Life	17.05

*Not all values may compute exactly due to rounding.
**Excludes the Large Volume Program

APPENDIX O. Prescriptive Savings Verification

This appendix describes the detailed process used to verify the reported (tracked) prescriptive and quasi-prescriptive savings for Enbridge program offerings.

Data sources

Verification of prescriptive measures relies on several data sources provided by Enbridge.

Tracking file

The EC received the tracking data from Enbridge in a single Excel file. The tracking data includes prescriptive measures and non-prescriptive measures.

TRM

The EC used the November 2022 TRM (TRM 7.0) 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 8.0[65].

Other supporting documentation

The TRM did not contain all of the necessary detail to verify the savings for all measures. For example, gross realization rates and net-to-gross factors were not included in TRM 7.0. 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.

- Prescriptive Showerheads, Enbridge, “Showerhead Verification Among Rental Buildings”, Ipsos Research, March 2012
- C&I Prescriptive Verification Study, “2017 C&I Prescriptive Study – Measure of NTG Factors and Gross Savings Verification”, Itron, June 7, 2019
- “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
- “TAPS Report”, TAPS Verification Program 2012 Year End Research Report, Study CR-604, Quadra Research, April 3, 2013
- “Adaptive Thermostat Ping Report”, 2023 Adaptive Thermostat Ping Report

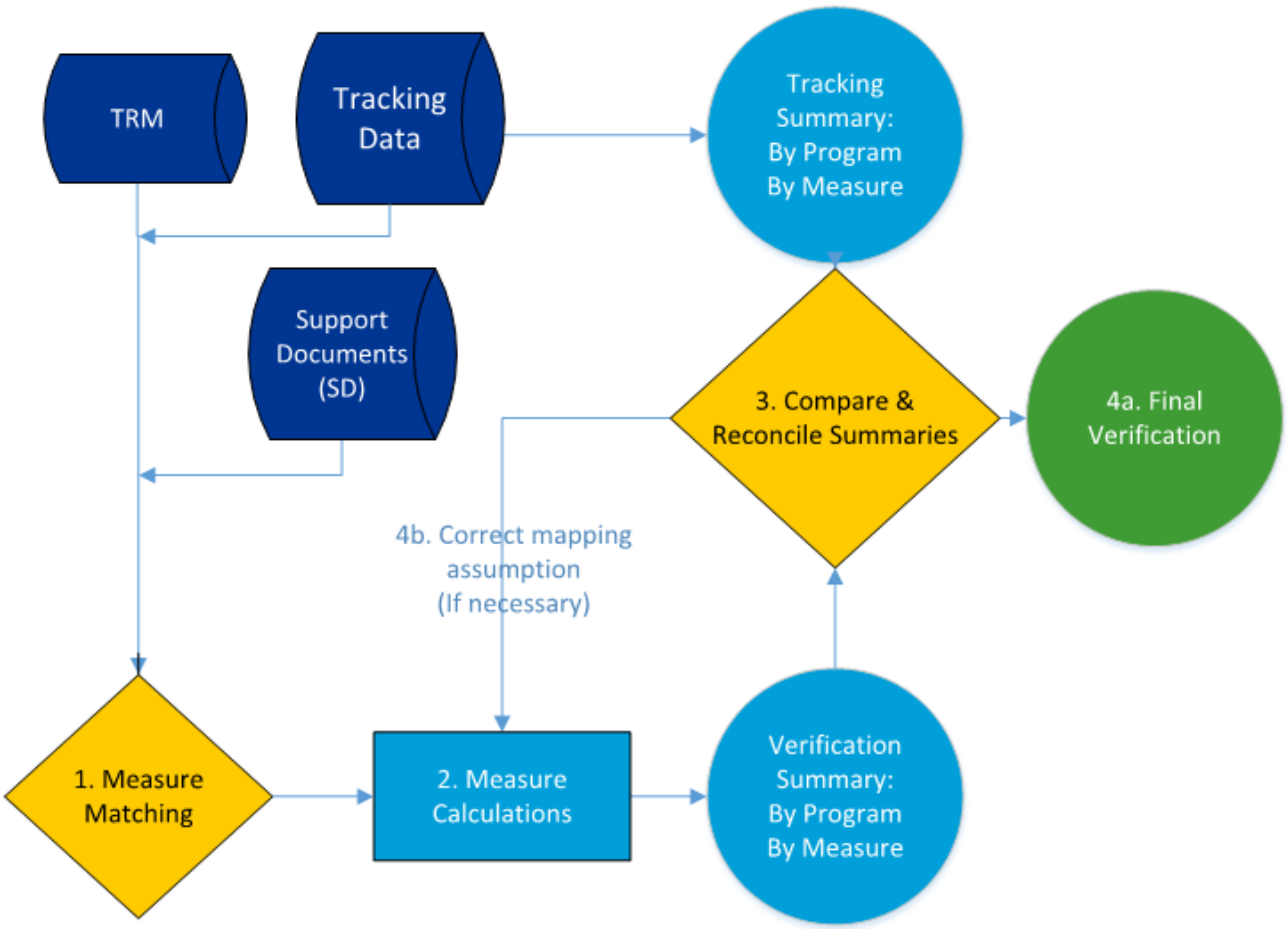
Ultimately, the EC utilized the eTRM+, an electronic version of the TRM that also incorporates information not found in the TRM; namely, installation, gross realization, and free-ridership rates, in conjunction with the tracking data to verify gross and net annual and lifetime savings. If inconsistencies arise between the TRM, source documents, and the eTRM+, the TRM and source documents take precedence. In these instances, the eTRM+ is updated to reflect the TRM and source documents and changes are tracked in a change log within the eTRM+.

[65] Natural Gas Demand Side Management Technical Resource Manual Version 7.0

Overall methodology

The EC used a straightforward process to consistently verify prescriptive savings for Enbridge, summarized in Figure O-1.

Figure O-1. Savings verification process



The process includes the following high-level steps. Additional detail is presented below.

1. Manually match individual project measure savings against the TRM and Support Documents (SD) values, as contained in the eTRM+, 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 O-1 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 the eTRM+, TRM, and SD values for the verified savings calculations.

Table O-1. Tracking variables used for prescriptive savings verification

Tracking Variable	Used In		
	Verification/ Summary	Tracking Summary	Compare & Reconcile Summaries
Scorecard	X		X
Program	X		X
Offering	X		X
Measure Name	X		X
Decision Type (New Construction, Retrofit, etc.)	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		X	X
Net Annual Natural Gas Savings		X	X
Gross Cumulative Natural Gas Savings		X	X
Net Cumulative Natural Gas Savings		X	X

5. Measure matching

The EC manually mapped measures into groups. Measures were filtered by name to assign them to a group, then matched against the eTRM+, TRM, and SD measures to identify the correct savings values. For each measure, 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 list all tracked measure groups and their corresponding savings values and TRM and SD sources for Enbridge.

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 O-2 summarizes the differences between the two types.

Table O-2. 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	Annual Net * Measure Life	

The EC used Excel macros to identity 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 list 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, offering, 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.

6. 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.

Table O-3. Enbridge measure savings calculation values*

Offering	Measure	Source	Annual Natural Gas Savings per Quantity Unit (m3)	Quantity Unit	Annual Natural Gas Savings per Size Unit (m3)	Size Unit	EUL	Gross Realization Rate	Installation Factor	Free Ridership
Direct Install	Air Curtain – Dock-In – 10 x 10	TRM Version 7.0	5,517.00	unit	-		15	100.00%	100.00%	5.00%
Direct Install	Air Curtain – Dock-In – 8 x 10	TRM Version 7.0	4,941.00	unit	-		15	100.00%	100.00%	5.00%
Direct Install	Air Curtain – Dock-In – 8 x 8	TRM Version 7.0	4,713.00	unit	-		15	100.00%	100.00%	5.00%
Direct Install	Air Curtain – Dock-In – 8 x 9	TRM Version 7.0	4,845.00	unit	-		15	100.00%	100.00%	5.00%
Direct Install	Air Curtain – Drive-In – 10 x 10	TRM Version 7.0	4,844.00	unit	-		15	100.00%	100.00%	5.00%
Direct Install	Air Curtain – Drive-In – 12 x 12	TRM Version 7.0	5,753.00	unit	-		15	100.00%	100.00%	5.00%
Direct Install	Air Curtain – Drive-In – 14 x 14	TRM Version 7.0	6,504.00	unit	-		15	100.00%	100.00%	5.00%
Direct Install	Air Curtain – Drive-In – 16 x 16	TRM Version 7.0	7,081.00	unit	-		15	100.00%	100.00%	5.00%
Direct Install	Air Curtain – Drive-In – 18 x 18	TRM Version 7.0	7,459.00	unit	-		15	100.00%	100.00%	5.00%
Direct Install	Air Curtain – Drive-In – 20 x 20	TRM Version 7.0	7,605.00	unit	-		15	100.00%	100.00%	5.00%
Direct Install	DCKV- Retrofit/TNR – 10,001 to 15,000 cfm	TRM Version 7.0	17,529.00	unit	-		15	100.00%	100.00%	5.00%
Direct Install	DCKV- Retrofit/TNR – 5,001 to 10,000 cfm	TRM Version 7.0	10,517.00	unit	-		15	100.00%	100.00%	5.00%
Direct Install	DCKV- Retrofit/TNR – 5,001 to 10,000 cfm	TRM Version 7.0	10,517.00	unit	-		15	100.00%	100.00%	5.00%
Direct Install	DCKV- Retrofit/TNR – Up to 5,000 cfm	TRM Version 7.0	4,207.00	unit	-		15	100.00%	100.00%	5.00%
Direct Install	DCKV- Retrofit/TNR – Up to 5,000 cfm	TRM Version 7.0	4,207.00	unit	-		15	100.00%	100.00%	5.00%
Direct Install	Dock Door Seals – Compression (8x8 – 8x10)	TRM Version 7.0	2,041.00	unit	-		10	100.00%	100.00%	5.00%
Direct Install	Dock Door Seals – Compression (8x8 – 8x10)	TRM Version 7.0	5,087.00	unit	-		10	100.00%	100.00%	5.00%
Direct Install	Dock Door Seals – Compression (8x8 – 8x10)	TRM Version 7.0	1,977.00	unit	-		10	100.00%	100.00%	5.00%
Direct Install	Dock Door Seals – Compression (8x8 – 8x10)	TRM Version 7.0	1,897.00	unit	-		10	100.00%	100.00%	5.00%

Offering	Measure	Source	Annual Natural Gas Savings per Quantity Unit (m3)	Quantity Unit	Annual Natural Gas Savings per Size Unit (m3)	Size Unit	EUL	Gross Realization Rate	Installation Factor	Free Ridership
Direct Install	Dock Door Seals – Compression (8x8 – 8x10)	TRM Version 7.0	4,988.00	unit	-		10	100.00%	100.00%	5.00%
Direct Install	Dock Door Seals – Compression (8x8 – 8x10)	TRM Version 7.0	4,853.00	unit	-		10	100.00%	100.00%	5.00%
Direct Install	Dock Door Seals – Shelter (10x10)	TRM Version 7.0	1,736.00	unit	-		10	100.00%	100.00%	5.00%
Direct Install	Dock Door Seals – Shelter (10x10)	TRM Version 7.0	4,501.00	unit	-		10	100.00%	100.00%	5.00%
Direct Install	Dock Door Seals – Shelter (10x10)	TRM Version 7.0	1,977.00	unit	-		10	100.00%	100.00%	5.00%
Prescriptive Downstream	Air Curtain – 7 x 6 Door	TRM Version 7.0, 2017 C&I Prescriptive Verification Study	1,690.00	unit	-		15	100.00%	100.00%	50.00%
Prescriptive Downstream	Air Curtain – Dock-In – 10 x 10	TRM Version 7.0, 2017 C&I Prescriptive Verification Study	5,517.00	unit	-		15	100.00%	100.00%	50.00%
Prescriptive Downstream	Air Curtain – Dock-In – 8 x 10	TRM Version 7.0, 2017 C&I Prescriptive Verification Study	4,941.00	unit	-		15	100.00%	100.00%	50.00%
Prescriptive Downstream	Air Curtain – Dock-In – 8 x 8	TRM Version 7.0, 2017 C&I Prescriptive Verification Study	4,713.00	unit	-		15	100.00%	100.00%	50.00%
Prescriptive Downstream	Air Curtain – Drive-In – 10 x 10	TRM Version 7.0, 2017 C&I Prescriptive Verification Study	4,844.00	unit	-		15	100.00%	100.00%	50.00%
Prescriptive Downstream	Air Curtain – Drive-In – 12 x 12	TRM Version 7.0, 2017 C&I Prescriptive Verification Study	5,753.00	unit	-		15	100.00%	100.00%	50.00%
Prescriptive Downstream	Air Curtain – Drive-In – 14 x 14	TRM Version 7.0, 2017 C&I Prescriptive Verification Study	6,504.00	unit	-		15	100.00%	100.00%	50.00%
Prescriptive Downstream	Air Curtain – Drive-In – 16 x 16	TRM Version 7.0, 2017 C&I Prescriptive Verification Study	7,081.00	unit	-		15	100.00%	100.00%	50.00%
Prescriptive Downstream	Air Curtain – Drive-In – 18 x 18	TRM Version 7.0, 2017 C&I Prescriptive Verification Study	7,459.00	unit	-		15	100.00%	100.00%	50.00%
Prescriptive Downstream	Air Curtain – Drive-In – 20 x 20	TRM Version 7.0, 2017 C&I Prescriptive Verification Study	7,605.00	unit	-		15	100.00%	100.00%	50.00%
Prescriptive Downstream	Air Curtain Ambient – w/ Vestibule – 7x3	TRM Version 7.0, 2017 C&I Prescriptive Verification Study	541.00	unit	-		15	100.00%	100.00%	50.00%

Offering	Measure	Source	Annual Natural Gas Savings per Quantity Unit (m3)	Quantity Unit	Annual Natural Gas Savings per Size Unit (m3)	Size Unit	EUL	Gross Realization Rate	Installation Factor	Free Ridership
Prescriptive Downstream	Air Curtain Ambient – w/ Vestibule – 7x6	TRM Version 7.0, 2017 C&I Prescriptive Verification Study	1,082.00	unit	-		15	100.00%	100.00%	50.00%
Prescriptive Downstream	DCKV- NC – 10,001 to 15,000 cfm	TRM Version 7.0, 2017 C&I Prescriptive Verification Study	17,529.00	unit	-		15	102.74%	100.00%	38.00%
Prescriptive Downstream	DCKV- NC – 5,001 to 10,000 cfm	TRM Version 7.0, 2017 C&I Prescriptive Verification Study	10,517.00	unit	-		15	102.74%	100.00%	38.00%
Prescriptive Downstream	DCKV- NC – Up to 5,000 cfm	TRM Version 7.0, 2017 C&I Prescriptive Verification Study	4,207.00	unit	-		15	102.74%	100.00%	38.00%
Prescriptive Downstream	DCKV- Retrofit/TNR – 10,001 to 15,000 cfm	TRM Version 7.0, 2017 C&I Prescriptive Verification Study	17,529.00	unit	-		15	102.74%	100.00%	38.00%
Prescriptive Downstream	DCKV- Retrofit/TNR – 10,001 to 15,000 cfm	TRM Version 7.0, 2017 C&I Prescriptive Verification Study	17,529.00	unit	-		15	102.74%	100.00%	38.00%
Prescriptive Downstream	DCKV- Retrofit/TNR – 5,001 to 10,000 cfm	TRM Version 7.0, 2017 C&I Prescriptive Verification Study	10,517.00	unit	-		15	102.74%	100.00%	38.00%
Prescriptive Downstream	DCKV- Retrofit/TNR – 5,001 to 10,000 cfm	TRM Version 7.0, 2017 C&I Prescriptive Verification Study	10,517.00	unit	-		15	102.74%	100.00%	38.00%
Prescriptive Downstream	DCKV- Retrofit/TNR – Up to 5,000 cfm	TRM Version 7.0, 2017 C&I Prescriptive Verification Study	4,207.00	unit	-		15	102.74%	100.00%	38.00%
Prescriptive Downstream	DCKV- Retrofit/TNR – Up to 5,000 cfm	TRM Version 7.0, 2017 C&I Prescriptive Verification Study	4,207.00	unit	-		15	102.74%	100.00%	38.00%
Prescriptive Downstream	DCV	TRM Version 7.0, 2017 C&I Prescriptive Verification Study	-		0.1120	sq ft	15	104.14%	100.00%	92.00%
Prescriptive Downstream	DCV	TRM Version 7.0, 2017 C&I Prescriptive Verification Study	-		1.4840	sq ft	15	104.14%	100.00%	92.00%
Prescriptive Downstream	DCV	TRM Version 7.0, 2017 C&I Prescriptive Verification Study	-		0.3920	sq ft	15	104.14%	100.00%	92.00%
Prescriptive Downstream	DCV	TRM Version 7.0, 2017 C&I Prescriptive Verification Study	-		0.3920	sq ft	15	104.14%	100.00%	92.00%

Offering	Measure	Source	Annual Natural Gas Savings per Quantity Unit (m3)	Quantity Unit	Annual Natural Gas Savings per Size Unit (m3)	Size Unit	EUL	Gross Realization Rate	Installation Factor	Free Ridership
Prescriptive Downstream	DCV	TRM Version 7.0, 2017 C&I Prescriptive Verification Study	-		1.0430	sq ft	15	104.14%	100.00%	92.00%
Prescriptive Downstream	Destratification Fan – 20ft	TRM Version 7.0	2,029.00	fan	-		15	100.00%	100.00%	10.00%
Prescriptive Downstream	Destratification Fan – 24ft	TRM Version 7.0	2,922.00	fan	-		15	100.00%	100.00%	10.00%
Prescriptive Downstream	Dock Door Seals – Compression (8x8 – 8x10)	TRM Version 7.0, 2017 C&I Prescriptive Verification Study	2,041.00	unit	-		10	100.00%	100.00%	50.00%
Prescriptive Downstream	Dock Door Seals – Compression (8x8 – 8x10)	TRM Version 7.0, 2017 C&I Prescriptive Verification Study	1,977.00	unit	-		10	100.00%	100.00%	50.00%
Prescriptive Downstream	Dock Door Seals – Compression (8x8 – 8x10)	TRM Version 7.0, 2017 C&I Prescriptive Verification Study	1,897.00	unit	-		10	100.00%	100.00%	50.00%
Prescriptive Downstream	Dock Door Seals – Compression (8x8 – 8x10)	TRM Version 7.0, 2017 C&I Prescriptive Verification Study	4,853.00	unit	-		10	100.00%	100.00%	50.00%
Prescriptive Downstream	Dock Door Seals – Compression (8x8 – 8x10)	TRM Version 7.0, 2017 C&I Prescriptive Verification Study	4,988.00	unit	-		10	100.00%	100.00%	50.00%
Prescriptive Downstream	Dock Door Seals – Compression (8x8 – 8x10)	TRM Version 7.0, 2017 C&I Prescriptive Verification Study	5,087.00	unit	-		10	100.00%	100.00%	50.00%
Prescriptive Downstream	Dock Door Seals – Compression (8x8 – 8x10)	TRM Version 7.0, 2017 C&I Prescriptive Verification Study	1,736.00	unit	-		10	100.00%	100.00%	50.00%
Prescriptive Downstream	Dock Door Seals – Shelter (10x10)	TRM Version 7.0, 2017 C&I Prescriptive Verification Study	1,736.00	unit	-		10	100.00%	100.00%	50.00%
Prescriptive Downstream	Dock Door Seals – Shelter (10x10)	TRM Version 7.0, 2017 C&I Prescriptive Verification Study	4,501.00	unit	-		10	100.00%	100.00%	50.00%
Prescriptive Downstream	Energy Recovery Ventilator (ERV)-GTE 55% Sensible Heat Recovery	TRM Version 7.0, 2017 C&I Prescriptive Verification Study	-		2.5100	CFM	14	99.55%	100.00%	70.00%
Prescriptive Downstream	Energy Recovery Ventilator (ERV)-GTE 55% Sensible Heat Recovery	TRM Version 7.0, 2017 C&I Prescriptive Verification Study	-		1.6000	CFM	14	99.55%	100.00%	70.00%
Prescriptive Downstream	Energy Recovery Ventilator (ERV)-GTE 55% Sensible Heat Recovery	TRM Version 7.0, 2017 C&I Prescriptive Verification Study	-		1.6000	CFM	14	99.55%	100.00%	70.00%

Offering	Measure	Source	Annual Natural Gas Savings per Quantity Unit (m3)	Quantity Unit	Annual Natural Gas Savings per Size Unit (m3)	Size Unit	EUL	Gross Realization Rate	Installation Factor	Free Ridership
Prescriptive Downstream	Energy Recovery Ventilator (ERV)-GTE 65% Sensible Heat Recovery	TRM Version 7.0, 2017 C&I Prescriptive Verification Study	-		1.9100	CFM	14	99.55%	100.00%	70.00%
Prescriptive Downstream	Energy Recovery Ventilator (ERV)-GTE 65% Sensible Heat Recovery	TRM Version 7.0, 2017 C&I Prescriptive Verification Study	-		1.9100	CFM	14	99.55%	100.00%	70.00%
Prescriptive Downstream	Energy Recovery Ventilator (ERV)-GTE 65% Sensible Heat Recovery	TRM Version 7.0, 2017 C&I Prescriptive Verification Study	-		5.3700	CFM	14	99.55%	100.00%	70.00%
Prescriptive Downstream	Energy Recovery Ventilator (ERV)-GTE 65% Sensible Heat Recovery	TRM Version 7.0, 2017 C&I Prescriptive Verification Study	-		5.3700	CFM	14	99.55%	100.00%	70.00%
Prescriptive Downstream	Energy Recovery Ventilator (ERV)-GTE 65% SHR – In-Suite	TRM Version 7.0, 2017 C&I Prescriptive Verification Study	-		5.3700	CFM	14	99.55%	100.00%	70.00%
Prescriptive Downstream	Energy Recovery Ventilator (ERV)-GTE 65% SHR – In-Suite	TRM Version 7.0, 2017 C&I Prescriptive Verification Study	-		5.3700	CFM	14	99.55%	100.00%	70.00%
Prescriptive Downstream	Energy Recovery Ventilator (ERV)-GTE 75% Sensible Heat Recovery	TRM Version 7.0, 2017 C&I Prescriptive Verification Study	-		2.2100	CFM	14	99.55%	100.00%	70.00%
Prescriptive Downstream	Energy Recovery Ventilator (ERV)-GTE 75% Sensible Heat Recovery	TRM Version 7.0, 2017 C&I Prescriptive Verification Study	-		2.2100	CFM	14	99.55%	100.00%	70.00%
Prescriptive Downstream	Energy Recovery Ventilator (ERV)-GTE 75% Sensible Heat Recovery	TRM Version 7.0, 2017 C&I Prescriptive Verification Study	-		6.2200	CFM	14	99.55%	100.00%	70.00%
Prescriptive Downstream	Energy Recovery Ventilator (ERV)-GTE 75% Sensible Heat Recovery	TRM Version 7.0, 2017 C&I Prescriptive Verification Study	-		6.2200	CFM	14	99.55%	100.00%	70.00%
Prescriptive Downstream	Energy Recovery Ventilator (ERV)-GTE 75% SHR – In-Suite	TRM Version 7.0, 2017 C&I Prescriptive Verification Study	-		6.2200	CFM	14	99.55%	100.00%	70.00%
Prescriptive Downstream	Energy Recovery Ventilator (ERV)-GTE 85% Sensible Heat Recovery	TRM Version 7.0, 2017 C&I Prescriptive Verification Study	-		2.5100	CFM	14	99.55%	100.00%	70.00%
Prescriptive Downstream	Energy Recovery Ventilator (ERV)-GTE 85% Sensible Heat Recovery	TRM Version 7.0, 2017 C&I Prescriptive Verification Study	-		7.0700	CFM	14	99.55%	100.00%	70.00%
Prescriptive Downstream	Energy Recovery Ventilator (ERV)-GTE 85% Sensible Heat Recovery	TRM Version 7.0, 2017 C&I Prescriptive Verification Study	-		2.5100	CFM	14	99.55%	100.00%	70.00%

Offering	Measure	Source	Annual Natural Gas Savings per Quantity Unit (m3)	Quantity Unit	Annual Natural Gas Savings per Size Unit (m3)	Size Unit	EUL	Gross Realization Rate	Installation Factor	Free Ridership
Prescriptive Downstream	Energy Recovery Ventilator (ERV)-GTE 85% Sensible Heat Recovery	TRM Version 7.0, 2017 C&I Prescriptive Verification Study	-		7.0700	CFM	14	99.55%	100.00%	70.00%
Prescriptive Downstream	Energy Recovery Ventilator (ERV)-Incremental-GTE 65% Sensible Heat Recovery	TRM Version 7.0, 2017 C&I Prescriptive Verification Study	-		0.3000	CFM	14	99.55%	100.00%	70.00%
Prescriptive Downstream	Energy Recovery Ventilator (ERV)-Incremental-GTE 75% Sensible Heat Recovery	TRM Version 7.0, 2017 C&I Prescriptive Verification Study	-		0.6100	CFM	14	99.55%	100.00%	70.00%
Prescriptive Downstream	Energy Recovery Ventilator (ERV)-Incremental-GTE 75% Sensible Heat Recovery	TRM Version 7.0, 2017 C&I Prescriptive Verification Study	-		1.7000	CFM	14	99.55%	100.00%	70.00%
Prescriptive Downstream	Energy Recovery Ventilator (ERV)-Incremental-GTE 85% Sensible Heat Recovery	TRM Version 7.0, 2017 C&I Prescriptive Verification Study	-		0.9100	CFM	14	99.55%	100.00%	70.00%
Prescriptive Downstream	Heat Recovery Ventilator (HRV)-GTE 55% Sensible Heat Recovery	TRM Version 7.0	-		1.3600	CFM	14	100.00%	100.00%	5.00%
Prescriptive Downstream	Heat Recovery Ventilator (HRV)-GTE 55% Sensible Heat Recovery	TRM Version 7.0	-		3.8400	CFM	14	100.00%	100.00%	5.00%
Prescriptive Downstream	Heat Recovery Ventilator (HRV)-GTE 55% Sensible Heat Recovery	TRM Version 7.0	-		1.3600	CFM	14	100.00%	100.00%	5.00%
Prescriptive Downstream	Heat Recovery Ventilator (HRV)-GTE 55% SHR – In-Suite	TRM Version 7.0	-		3.8400	CFM	14	100.00%	100.00%	5.00%
Prescriptive Downstream	Heat Recovery Ventilator (HRV)-GTE 65% Sensible Heat Recovery	TRM Version 7.0	-		1.6100	CFM	14	100.00%	100.00%	5.00%
Prescriptive Downstream	Heat Recovery Ventilator (HRV)-GTE 65% Sensible Heat Recovery	TRM Version 7.0	-		1.6100	CFM	14	100.00%	100.00%	5.00%
Prescriptive Downstream	Heat Recovery Ventilator (HRV)-GTE 65% Sensible Heat Recovery	TRM Version 7.0	-		4.5400	CFM	14	100.00%	100.00%	5.00%
Prescriptive Downstream	Heat Recovery Ventilator (HRV)-GTE 75% Sensible Heat Recovery	TRM Version 7.0	-		1.8600	CFM	14	100.00%	100.00%	5.00%
Prescriptive Downstream	Heat Recovery Ventilator (HRV)-GTE 75% SHR – In-Suite	TRM Version 7.0	-		5.2400	CFM	14	100.00%	100.00%	5.00%

Offering	Measure	Source	Annual Natural Gas Savings per Quantity Unit (m3)	Quantity Unit	Annual Natural Gas Savings per Size Unit (m3)	Size Unit	EUL	Gross Realization Rate	Installation Factor	Free Ridership
Prescriptive Downstream	Heat Recovery Ventilator (HRV)-Incremental-GTE 65% Sensible Heat Recovery	TRM Version 7.0	-		0.2500	CFM	14	100.00%	100.00%	5.00%
Prescriptive Downstream	Make-Up Air Unit (MUA) – Constant Speed	TRM Version 7.0	-		0.9190	CFM	20	100.00%	100.00%	5.00%
Prescriptive Downstream	Make-Up Air Unit (MUA) – VFD	TRM Version 7.0	-		2.0300	CFM	20	100.00%	100.00%	5.00%
Prescriptive Downstream	Ozone Laundry – Tunnel Washer 75% LTO	TRM Version 7.0	-		0.0295	lbs/yr	15	100.00%	100.00%	8.00%
Prescriptive Downstream	Ozone Laundry – Washer Extractor	TRM Version 7.0	-		0.0376	lbs/yr	15	100.00%	100.00%	8.00%
Prescriptive Downstream	Ozone Laundry – Washer Extractor 75% Costs LTO	TRM Version 7.0	-		0.0376	lbs/yr	15	100.00%	100.00%	8.00%
Prescriptive Downstream	Ozone Laundry – Washer Extractor 75% Costs LTO	TRM Version 7.0	-		0.0376	lbs/yr	15	100.00%	100.00%	8.00%
Prescriptive Midstream	Commercial Energy Star Combi Oven	TRM Version 7.0	1,186.00	unit	-		12	100.00%	100.00%	20.00%
Prescriptive Midstream	Commercial Energy Star Convection Oven	TRM Version 7.0	954.00	unit	-		12	100.00%	100.00%	20.00%
Prescriptive Midstream	Commercial Energy Star Conveyor Oven greater or equal 1520in	TRM Version 7.0	1,519.00	unit	-		12	100.00%	100.00%	20.00%
Prescriptive Midstream	Commercial Energy Star Conveyor Oven less than 1520in	TRM Version 7.0	562.00	unit	-		12	100.00%	100.00%	20.00%
Prescriptive Midstream	Commercial Energy Star Double Rack Oven	TRM Version 7.0	1,187.00	unit	-		12	100.00%	100.00%	20.00%
Prescriptive Midstream	Commercial Energy Star Fryer	TRM Version 7.0	1,466.00	unit	-		12	100.00%	100.00%	20.00%
Prescriptive Midstream	Commercial Energy Star Fryer – Large Vat	TRM Version 7.0	1,709.00	unit	-		12	100.00%	100.00%	20.00%
Prescriptive Midstream	Commercial Energy Star Fryer – Large Vat – LTO	TRM Version 7.0	1,709.00	unit	-		12	100.00%	100.00%	20.00%
Prescriptive Midstream	Commercial Energy Star Fryer LTO	TRM Version 7.0	1,466.00	unit	-		12	100.00%	100.00%	20.00%
Prescriptive Midstream	Commercial Energy Star Steam Cooker	TRM Version 7.0	8,461.00	unit	-		12	100.00%	100.00%	20.00%
Prescriptive Midstream	Commercial Energy Star Steam Cooker – LTO	TRM Version 7.0	8,461.00	unit	-		12	100.00%	100.00%	20.00%
Prescriptive Midstream	Commercial Under-Fired Broiler	TRM Version 7.0	1,757.00	unit	-		12	100.00%	100.00%	20.00%
Prescriptive Midstream	Commercial Under-Fired Broiler	TRM Version 7.0	2,636.00	unit	-		12	100.00%	100.00%	20.00%

Offering	Measure	Source	Annual Natural Gas Savings per Quantity Unit (m3)	Quantity Unit	Annual Natural Gas Savings per Size Unit (m3)	Size Unit	EUL	Gross Realization Rate	Installation Factor	Free Ridership
Prescriptive Midstream	Commercial Under-Fired Broiler – LTO	TRM Version 7.0	2,636.00	unit	-		12	100.00%	100.00%	20.00%
Prescriptive Midstream	Condensing Tankless Water Heater – GT 75 & LT 200 kBTU/hr	TRM Version 7.0	212.00	unit	1.7900	kBtu/hr input capacity	20	100.00%	100.00%	2.00%
Prescriptive Midstream	Condensing Tankless WH- GT 75 & LT 200 kBTU/hr 2022 LTO	TRM Version 7.0	212.00	unit	0.7900	kBtu/hr input capacity	20	100.00%	100.00%	2.00%
Prescriptive Midstream	Condensing Tankless WH- GT 75 & LT 200 kBTU/hr 2022 LTO	TRM Version 7.0	212.00	unit	1.7900	kBtu/hr input capacity	20	100.00%	100.00%	2.00%
Prescriptive Midstream	Condensing Tankless WH- GT 75 & LT 200 kBTU/hr 2022 LTO	TRM Version 7.0	212.00	unit	1.2900	kBtu/hr input capacity	20	100.00%	100.00%	2.00%
Prescriptive Midstream	Condensing Tankless WH- GTE 200 kBTU/hr 2022 LTO	TRM Version 7.0	212.00	unit	1.2900	kBtu/hr input capacity	20	100.00%	100.00%	2.00%
Prescriptive Midstream	Dishwasher-Stationary Single Tank Door-High Temperature	TRM Version 7.0	1,262.00	unit	-		15	100.00%	100.00%	20.00%
Prescriptive Midstream	Dishwasher-Stationary Single Tank Door-Low Temperature	TRM Version 7.0	2,846.00	unit	-		15	100.00%	100.00%	20.00%
Affordable Housing Multi-Residential	Bathroom Aerator	TRM Version 7.0	6.65	unit	-		10	100.00%	100.00%	0.00%
Affordable Housing Multi-Residential	Condensing Storage Water Heater – GT 75 & LTE 250 kBTU/Hr	TRM Version 7.0	-		3.0900	kBtu/hr input capacity	15	100.00%	100.00%	0.00%
Affordable Housing Multi-Residential	Condensing Tankless Water Heater – GTE 200 kBTU/hr	TRM Version 7.0	326.00	unit	1.7900	kBtu/hr input capacity	20	100.00%	100.00%	0.00%
Affordable Housing Multi-Residential	Energy Recovery Ventilator (ERV)-GTE 55% Sensible Heat Recovery-LI	TRM Version 7.0	-		4.5200	CFM	14	100.00%	100.00%	0.00%
Affordable Housing Multi-Residential	Energy Recovery Ventilator (ERV)-GTE 55% SHR – In-Suite-LI	TRM Version 7.0	-		4.5200	CFM	14	100.00%	100.00%	0.00%
Affordable Housing Multi-Residential	Energy Recovery Ventilator (ERV)-GTE 65% Sensible Heat Recovery-LI	TRM Version 7.0	-		5.3700	CFM	14	100.00%	100.00%	0.00%
Affordable Housing Multi-Residential	Energy Recovery Ventilator (ERV)-GTE 65% SHR – In-Suite-LI	TRM Version 7.0	-		5.3700	CFM	14	100.00%	100.00%	0.00%

Offering	Measure	Source	Annual Natural Gas Savings per Quantity Unit (m3)	Quantity Unit	Annual Natural Gas Savings per Size Unit (m3)	Size Unit	EUL	Gross Realization Rate	Installation Factor	Free Ridership
Affordable Housing Multi-Residential	Energy Recovery Ventilator (ERV)-GTE 75% Sensible Heat Recovery-LI	TRM Version 7.0	-		6.2200	CFM	14	100.00%	100.00%	0.00%
Affordable Housing Multi-Residential	Heat Recovery Ventilator (HRV)-GTE 75% Sensible Heat Recovery-LI	TRM Version 7.0	-		5.2400	CFM	14	100.00%	100.00%	0.00%
Affordable Housing Multi-Residential	Kitchen Aerator	TRM Version 7.0	12.00	unit	-		10	100.00%	100.00%	0.00%
Affordable Housing Multi-Residential	Make-Up Air Unit (MUA) – Constant Speed	TRM Version 7.0	-		0.9190	CFM	20	100.00%	100.00%	0.00%
Affordable Housing Multi-Residential	Make-Up Air Unit (MUA) – VFD	TRM Version 7.0	-		3.0000	CFM	20	100.00%	100.00%	0.00%
Affordable Housing Multi-Residential	Showerhead Replacement 1.5 GPM Handheld	TRM Version 7.0	31.00	unit	-		10	100.00%	100.00%	0.00%
Affordable Housing Multi-Residential	Showerhead Replacement 1.5 GPM Standard	TRM Version 7.0	31.00	unit	-		10	100.00%	100.00%	0.00%
Home Winterproofing	Bathroom Aerator	TRM Version 7.0, Low-Income Kits Verification Study, TAPS Report	6.65	unit	-		10	100.00%	64.58%	0.00%
Home Winterproofing	Kitchen Aerator	TRM Version 7.0, Low-Income Kits Verification Study, TAPS Report	12.00	unit	-		10	100.00%	67.68%	0.00%
Home Winterproofing	Pipe Insulation	TRM Version 7.0, Low-Income Kits Verification Study	3.72	ft	-		15	100.00%	93.90%	0.00%
Home Winterproofing	Showerhead Replacement 1.25 GPM	TRM Version 7.0, Low-Income Kits Verification Study, Showerhead Verification Study Among Rental Buildings	28.20	unit	-		10	100.00%	85.10%	0.00%
Home Winterproofing	Smart Thermostats	TRM Version 7.0	173.00	unit	-		15	100.00%	100.00%	0.00%
Home Winterproofing	Smart Thermostats	TRM Version 7.0	217.00	unit	-		15	100.00%	100.00%	0.00%

Offering	Measure	Source	Annual Natural Gas Savings per Quantity Unit (m3)	Quantity Unit	Annual Natural Gas Savings per Size Unit (m3)	Size Unit	EUL	Gross Realization Rate	Installation Factor	Free Ridership
Home Winterproofing	Smart Thermostats	TRM Version 7.0	173.00	unit	-		15	100.00%	100.00%	0.00%
Home Winterproofing	Smart Thermostats	TRM Version 7.0	217.00	unit	-		15	100.00%	100.00%	0.00%
Residential Smart Home	Smart Thermostats	TRM Version 7.0, Adaptive Thermostat Ping Report	185.00	unit	-		15	100.00%	84.15%	4.00%
Residential Smart Home	Smart Thermostats	TRM Version 7.0	173.00	unit	-		15	100.00%	100.00%	4.00%
Residential Smart Home	Smart Thermostats - $100 LTO	TRM Version 7.0, Adaptive Thermostat Ping Report	185.00	unit	-		15	100.00%	84.15%	4.00%
Residential Smart Home	Smart Thermostats - $100 LTO	TRM Version 7.0	173.00	unit	-		15	100.00%	100.00%	4.00%

*Not all values may compute exactly due to rounding.

Savings calculation measure totals

Table O-4. Enbridge measure savings, tracked and verified, by annual and cumulative, gross and net*

Offering	Measure	Tracked				Verified			
		Annual		Cumulative		Annual		Cumulative	
		Gross	Net	Gross	Net	Gross	Net	Gross	Net
Direct Install	Air Curtain – Dock-In – 10 x 10	44,136	41,929	662,040	628,938	44,136	41,929	662,040	628,938
Direct Install	Air Curtain – Dock-In – 8 x 10	29,646	28,164	444,690	422,456	29,646	28,164	444,690	422,456
Direct Install	Air Curtain – Dock-In – 8 x 8	28,278	26,864	424,170	402,962	28,278	26,864	424,170	402,962
Direct Install	Air Curtain – Dock-In – 8 x 9	4,845	4,603	72,675	69,041	4,845	4,603	72,675	69,041
Direct Install	Air Curtain – Drive-In – 10 x 10	87,192	82,832	1,307,880	1,242,486	87,192	82,832	1,307,880	1,242,486
Direct Install	Air Curtain – Drive-In – 12 x 12	293,403	278,733	4,401,045	4,180,993	293,403	278,733	4,401,045	4,180,993
Direct Install	Air Curtain – Drive-In – 14 x 14	305,688	290,404	4,585,320	4,356,054	305,688	290,404	4,585,320	4,356,054
Direct Install	Air Curtain – Drive-In – 16 x 16	28,324	26,908	424,860	403,617	28,324	26,908	424,860	403,617
Direct Install	Air Curtain – Drive-In – 18 x 18	37,295	35,430	559,425	531,454	37,295	35,430	559,425	531,454
Direct Install	Air Curtain – Drive-In – 20 x 20	22,815	21,674	342,225	325,114	22,815	21,674	342,225	325,114
Direct Install	DCKV- Retrofit/TNR – 10,001 to 15,000 cfm	17,529	16,653	262,935	249,788	17,529	16,653	262,935	249,788
Direct Install	DCKV- Retrofit/TNR – 5,001 to 10,000 cfm	220,857	209,814	3,312,855	3,147,212	220,857	209,814	3,312,855	3,147,212
Direct Install	DCKV- Retrofit/TNR – Up to 5,000 cfm	105,175	99,916	1,577,625	1,498,744	105,175	99,916	1,577,625	1,498,744
Direct Install	Dock Door Seals – Compression (8x8 – 8x10)	1,589,060	1,509,607	15,890,600	15,096,070	1,589,060	1,509,607	15,890,600	15,096,070
Direct Install	Dock Door Seals – Shelter (10x10)	276,790	262,951	2,767,900	2,629,505	276,790	262,951	2,767,900	2,629,505
Prescriptive Downstream	Air Curtain – 7 x 6 Door	5,070	2,535	76,050	38,025	5,070	2,535	76,050	38,025
Prescriptive Downstream	Air Curtain – Dock-In – 10 x 10	5,517	2,759	82,755	41,378	5,517	2,759	82,755	41,378
Prescriptive Downstream	Air Curtain – Dock-In – 8 x 10	19,764	9,882	296,460	148,230	19,764	9,882	296,460	148,230
Prescriptive Downstream	Air Curtain – Dock-In – 8 x 8	4,713	2,357	70,695	35,348	4,713	2,357	70,695	35,348
Prescriptive Downstream	Air Curtain – Drive-In – 10 x 10	4,844	2,422	72,660	36,330	4,844	2,422	72,660	36,330
Prescriptive Downstream	Air Curtain – Drive-In – 12 x 12	34,518	17,259	517,770	258,885	34,518	17,259	517,770	258,885
Prescriptive Downstream	Air Curtain – Drive-In – 14 x 14	65,040	32,520	975,600	487,800	65,040	32,520	975,600	487,800
Prescriptive Downstream	Air Curtain – Drive-In – 16 x 16	14,162	7,081	212,430	106,215	14,162	7,081	212,430	106,215
Prescriptive Downstream	Air Curtain – Drive-In – 18 x 18	7,459	3,730	111,885	55,943	7,459	3,730	111,885	55,943
Prescriptive Downstream	Air Curtain – Drive-In – 20 x 20	15,210	7,605	228,150	114,075	15,210	7,605	228,150	114,075
Prescriptive Downstream	Air Curtain Ambient – w/ Vestibule – 7x3	541	271	8,115	4,058	541	271	8,115	4,058
Prescriptive Downstream	Air Curtain Ambient – w/ Vestibule – 7x6	2,164	1,082	32,460	16,230	2,164	1,082	32,460	16,230
Prescriptive Downstream	DCKV- NC – 10,001 to 15,000 cfm	18,009	11,166	270,139	167,486	18,009	11,166	270,139	167,486
Prescriptive Downstream	DCKV- NC – 5,001 to 10,000 cfm	54,026	33,496	810,387	502,440	54,026	33,496	810,387	502,440

Offering	Measure	Tracked				Verified			
		Annual		Cumulative		Annual		Cumulative	
		Gross	Net	Gross	Net	Gross	Net	Gross	Net
Prescriptive Downstream	DCKV- NC – Up to 5,000 cfm	38,900	24,118	583,507	361,774	38,900	24,118	583,507	361,774
Prescriptive Downstream	DCKV- Retrofit/TNR – 10,001 to 15,000 cfm	198,102	122,823	2,971,534	1,842,351	198,102	122,823	2,971,534	1,842,351
Prescriptive Downstream	DCKV- Retrofit/TNR – 5,001 to 10,000 cfm	162,077	100,488	2,431,162	1,507,321	162,077	100,488	2,431,162	1,507,321
Prescriptive Downstream	DCKV- Retrofit/TNR – Up to 5,000 cfm	229,080	142,030	3,436,206	2,130,448	229,080	142,030	3,436,206	2,130,448
Prescriptive Downstream	DCV	446,783	35,743	6,701,743	536,139	446,783	35,743	6,701,743	536,139
Prescriptive Downstream	Destratification Fan – 20ft	8,116	7,304	121,740	109,566	8,116	7,304	121,740	109,566
Prescriptive Downstream	Destratification Fan – 24ft	17,532	15,779	262,980	236,682	17,532	15,779	262,980	236,682
Prescriptive Downstream	Dock Door Seals – Compression (8x8 – 8x10)	1,743,818	871,909	17,438,180	8,719,090	1,743,818	871,909	17,438,180	8,719,090
Prescriptive Downstream	Dock Door Seals – Shelter (10x10)	275,191	137,596	2,751,910	1,375,955	275,191	137,596	2,751,910	1,375,955
Prescriptive Downstream	Energy Recovery Ventilator (ERV)-GTE 55% Sensible Heat Recovery	109,772	32,932	1,536,809	461,043	109,772	32,932	1,536,809	461,043
Prescriptive Downstream	Energy Recovery Ventilator (ERV)-GTE 65% Sensible Heat Recovery	600,753	180,226	8,410,548	2,523,164	600,753	180,226	8,410,548	2,523,164
Prescriptive Downstream	Energy Recovery Ventilator (ERV)-GTE 65% SHR – In-Suite	151,902	45,571	2,126,627	637,988	151,902	45,571	2,126,627	637,988
Prescriptive Downstream	Energy Recovery Ventilator (ERV)-GTE 75% Sensible Heat Recovery	646,447	193,934	9,050,257	2,715,077	646,447	193,934	9,050,257	2,715,077
Prescriptive Downstream	Energy Recovery Ventilator (ERV)-GTE 75% SHR – In-Suite	360,839	108,252	5,051,751	1,515,525	360,839	108,252	5,051,751	1,515,525
Prescriptive Downstream	Energy Recovery Ventilator (ERV)-GTE 85% Sensible Heat Recovery	313,355	94,007	4,386,972	1,316,091	313,355	94,007	4,386,972	1,316,091
Prescriptive Downstream	Energy Recovery Ventilator (ERV)-Incremental-GTE 65% Sensible Heat Recovery	7,018	2,105	98,256	29,477	7,018	2,105	98,256	29,477
Prescriptive Downstream	Energy Recovery Ventilator (ERV)-Incremental-GTE 75% Sensible Heat Recovery	33,201	9,960	464,814	139,444	33,201	9,960	464,814	139,444
Prescriptive Downstream	Energy Recovery Ventilator (ERV)-Incremental-GTE 85% Sensible Heat Recovery	22,007	6,602	308,100	92,430	22,007	6,602	308,100	92,430
Prescriptive Downstream	Heat Recovery Ventilator (HRV)-GTE 55% Sensible Heat Recovery	17,628	16,747	246,798	234,458	17,628	16,747	246,798	234,458
Prescriptive Downstream	Heat Recovery Ventilator (HRV)-GTE 55% SHR – In-Suite	902	857	12,634	12,002	902	857	12,634	12,002

Offering	Measure	Tracked				Verified			
		Annual		Cumulative		Annual		Cumulative	
		Gross	Net	Gross	Net	Gross	Net	Gross	Net
Prescriptive Downstream	Heat Recovery Ventilator (HRV)-GTE 65% Sensible Heat Recovery	10,269	9,756	143,769	136,580	10,269	9,756	143,769	136,580
Prescriptive Downstream	Heat Recovery Ventilator (HRV)-GTE 75% Sensible Heat Recovery	5,654	5,372	79,162	75,204	5,654	5,372	79,162	75,204
Prescriptive Downstream	Heat Recovery Ventilator (HRV)-GTE 75% SHR – In-Suite	25,938	24,641	363,132	344,975	25,938	24,641	363,132	344,975
Prescriptive Downstream	Heat Recovery Ventilator (HRV)-Incremental-GTE 65% Sensible Heat Recovery	80	76	1,124	1,067	80	76	1,124	1,067
Prescriptive Downstream	Make-Up Air Unit (MUA) – Constant Speed	10,109	9,604	202,180	192,071	10,109	9,604	202,180	192,071
Prescriptive Downstream	Make-Up Air Unit (MUA) – VFD	11,876	11,282	237,510	225,635	11,876	11,282	237,510	225,635
Prescriptive Downstream	Ozone Laundry – Tunnel Washer 75% LTO	1,615	1,486	24,227	22,289	1,615	1,486	24,227	22,289
Prescriptive Downstream	Ozone Laundry – Washer Extractor	55,375	50,945	830,625	764,175	55,375	50,945	830,625	764,175
Prescriptive Downstream	Ozone Laundry – Washer Extractor 75% Costs LTO	235,504	216,664	3,532,558	3,249,953	235,504	216,664	3,532,558	3,249,953
Prescriptive Midstream	Commercial Energy Star Combi Oven	250,246	200,197	3,002,952	2,402,362	250,246	200,197	3,002,952	2,402,362
Prescriptive Midstream	Commercial Energy Star Convection Oven	169,812	135,850	2,037,744	1,630,195	169,812	135,850	2,037,744	1,630,195
Prescriptive Midstream	Commercial Energy Star Conveyor Oven greater or equal 1520in	7,595	6,076	91,140	72,912	7,595	6,076	91,140	72,912
Prescriptive Midstream	Commercial Energy Star Conveyor Oven less than 1520in	12,364	9,891	148,368	118,694	12,364	9,891	148,368	118,694
Prescriptive Midstream	Commercial Energy Star Double Rack Oven	70,033	56,026	840,396	672,317	70,033	56,026	840,396	672,317
Prescriptive Midstream	Commercial Energy Star Fryer	2,932	2,346	35,184	28,147	2,932	2,346	35,184	28,147
Prescriptive Midstream	Commercial Energy Star Fryer – Large Vat	6,836	5,469	82,032	65,626	6,836	5,469	82,032	65,626
Prescriptive Midstream	Commercial Energy Star Fryer – Large Vat – LTO	297,366	237,893	3,568,392	2,854,714	297,366	237,893	3,568,392	2,854,714
Prescriptive Midstream	Commercial Energy Star Fryer LTO	362,102	289,682	4,345,224	3,476,179	362,102	289,682	4,345,224	3,476,179
Prescriptive Midstream	Commercial Energy Star Steam Cooker	33,844	27,075	406,128	324,902	33,844	27,075	406,128	324,902
Prescriptive Midstream	Commercial Energy Star Steam Cooker – LTO	16,922	13,538	203,064	162,451	16,922	13,538	203,064	162,451
Prescriptive Midstream	Commercial Under-Fired Broiler	7,907	6,326	94,884	75,907	7,907	6,326	94,884	75,907

Offering	Measure	Tracked				Verified			
		Annual		Cumulative		Annual		Cumulative	
		Gross	Net	Gross	Net	Gross	Net	Gross	Net
Prescriptive Midstream	Commercial Under-Fired Broiler – LTO	2,636	2,109	31,632	25,306	2,636	2,109	31,632	25,306
Prescriptive Midstream	Condensing Tankless Water Heater – GT 75 & LT 200 kBTU/hr	1,140	1,117	22,793	22,337	1,140	1,117	22,793	22,337
Prescriptive Midstream	Condensing Tankless WH- GT 75 & LT 200 kBTU/hr 2022 LTO	78,052	76,491	1,561,033	1,529,813	78,052	76,491	1,561,034	1,529,813
Prescriptive Midstream	Condensing Tankless WH- GTE 200 kBTU/hr 2022 LTO	1,801	1,765	36,024	35,303	1,801	1,765	36,024	35,303
Prescriptive Midstream	Dishwasher-Stationary Single Tank Door-High Temperature	142,606	114,085	2,139,090	1,711,272	142,606	114,085	2,139,090	1,711,272
Prescriptive Midstream	Dishwasher-Stationary Single Tank Door-Low Temperature	19,922	15,938	298,830	239,064	19,922	15,938	298,830	239,064
Affordable Housing Multi-Residential	Bathroom Aerator	13	13	133	133	13	13	133	133
Affordable Housing Multi-Residential	Condensing Storage Water Heater – GT 75 & LTE 250 kBTU/Hr	2,435	2,435	36,524	36,524	2,435	2,435	36,524	36,524
Affordable Housing Multi-Residential	Condensing Tankless Water Heater – GTE 200 kBTU/hr	1,722	1,722	34,448	34,448	1,722	1,722	34,448	34,448
Affordable Housing Multi-Residential	Energy Recovery Ventilator (ERV)-GTE 55% Sensible Heat Recovery-LI	4,972	4,972	69,608	69,608	4,972	4,972	69,608	69,608
Affordable Housing Multi-Residential	Energy Recovery Ventilator (ERV)-GTE 55% SHR – In-Suite-LI	37,290	37,290	522,060	522,060	37,290	37,290	522,060	522,060
Affordable Housing Multi-Residential	Energy Recovery Ventilator (ERV)-GTE 65% Sensible Heat Recovery-LI	34,690	34,690	485,663	485,663	34,690	34,690	485,663	485,663
Affordable Housing Multi-Residential	Energy Recovery Ventilator (ERV)-GTE 65% SHR – In-Suite-LI	48,099	48,099	673,387	673,387	48,099	48,099	673,387	673,387
Affordable Housing Multi-Residential	Energy Recovery Ventilator (ERV)-GTE 75% Sensible Heat Recovery-LI	5,847	5,847	81,855	81,855	5,847	5,847	81,855	81,855
Affordable Housing Multi-Residential	Heat Recovery Ventilator (HRV)-GTE 75% Sensible Heat Recovery-LI	2,463	2,463	34,479	34,479	2,463	2,463	34,479	34,479
Affordable Housing Multi-Residential	Kitchen Aerator	24	24	240	240	24	24	240	240
Affordable Housing Multi-Residential	Make-Up Air Unit (MUA) – Constant Speed	13,647	13,647	272,943	272,943	13,647	13,647	272,943	272,943
Affordable Housing Multi-Residential	Make-Up Air Unit (MUA) – VFD	31,500	31,500	630,000	630,000	31,500	31,500	630,000	630,000
Affordable Housing Multi-Residential	Showerhead Replacement 1.5 GPM Handheld	1,333	1,333	13,330	13,330	1,333	1,333	13,330	13,330

Offering	Measure	Tracked				Verified			
		Annual		Cumulative		Annual		Cumulative	
		Gross	Net	Gross	Net	Gross	Net	Gross	Net
Affordable Housing Multi-Residential	Showerhead Replacement 1.5 GPM Standard	589	589	5,890	5,890	589	589	5,890	5,890
Home Winterproofing	Bathroom Aerator	2,928	2,928	29,285	29,285	3,483	3,483	34,829	34,829
Home Winterproofing	Kitchen Aerator	5,808	5,808	58,084	58,084	6,855	6,855	68,546	68,546
Home Winterproofing	Pipe Insulation	23,592	23,592	353,877	353,877	23,592	23,592	353,877	353,877
Home Winterproofing	Showerhead Replacement 1.25 GPM	19,236	19,236	192,361	192,361	19,535	19,535	195,345	195,345
Home Winterproofing	Smart Thermostats	1,099,727	1,099,727	16,495,905	16,495,905	1,099,727	1,099,727	16,495,905	16,495,905
Residential Smart Home	Smart Thermostats	4,074,195	3,911,227	61,112,920	58,668,403	4,159,461	3,993,083	62,391,918	59,896,241
Residential Smart Home	Smart Thermostats - $100 LTO	3,505,183	3,364,976	52,577,745	50,474,635	3,579,579	3,436,396	53,693,691	51,545,943

*Not all values may compute exactly due to rounding.

Savings verification notes

Table O-5. Enbridge measure verification notes

Offering	Measure	Issue	Resolution	Annual Natural Gas Savings			
				Tracked		Verified	
				Gross	Net	Gross	Net
Prescriptive Downstream	DCKV- Retrofit/TNR – Up to 5,000 cfm	Decision type indicated in tracked measure name in conflict with tracked decision type.	Confirmed decision type through follow-up with EGI.	229,080	142,030	229,080	142,030
Prescriptive Downstream	DCV	Tracked building type did not clearly map to building types in TRM.	Confirmed building type through follow-up with EGI.	446,783	35,743	446,783	35,743
Prescriptive Downstream	Energy Recovery Ventilator (ERV)-GTE 55% Sensible Heat Recovery	Tracked building type did not clearly map to building types in TRM.	Confirmed building type through follow-up with EGI.	109,772	32,932	109,772	32,932
Prescriptive Downstream	Energy Recovery Ventilator (ERV)-GTE 65% Sensible Heat Recovery	Tracked building type did not clearly map to building types in TRM.	Confirmed building type through follow-up with EGI.	600,753	180,226	600,753	180,226
Prescriptive Downstream	Energy Recovery Ventilator (ERV)-GTE 75% Sensible Heat Recovery	Tracked building type did not clearly map to building types in TRM.	Confirmed building type through follow-up with EGI.	646,447	193,934	646,447	193,934
Prescriptive Downstream	Energy Recovery Ventilator (ERV)-Incremental-GTE 75% Sensible Heat Recovery	Tracked building type did not clearly map to building types in TRM.	Confirmed building type through follow-up with EGI.	33,201	9,960	33,201	9,960
Prescriptive Downstream	Heat Recovery Ventilator (HRV)-GTE 55% Sensible Heat Recovery	Tracked building type did not clearly map to building types in TRM.	Confirmed building type through follow-up with EGI.	17,628	16,747	17,628	16,747
Prescriptive Downstream	Heat Recovery Ventilator (HRV)-GTE 65% Sensible Heat Recovery	Tracked building type did not clearly map to building types in TRM.	Confirmed building type through follow-up with EGI.	10,269	9,756	10,269	9,756
Prescriptive Downstream	Ozone Laundry – Tunnel Washer 75% LTO	Tracking data insufficient to determine efficient equipment pounds per load.	Confirmed pounds per load through follow-up with EGI.	1,615	1,486	1,615	1,486
Prescriptive Downstream	Ozone Laundry – Washer Extractor	Tracking data insufficient to determine efficient equipment pounds per load.	Confirmed pounds per load through follow-up with EGI.	55,375	50,945	55,375	50,945
Prescriptive Downstream	Ozone Laundry – Washer Extractor 75% Costs LTO	Tracking data insufficient to determine efficient equipment pounds per load.	Confirmed pounds per load through follow-up with EGI.	235,504	216,664	235,504	216,664

Offering	Measure	Issue	Resolution	Annual Natural Gas Savings			
				Tracked		Verified	
				Gross	Net	Gross	Net
Prescriptive Midstream	Commercial Under-Fired Broiler	Tracking data insufficient to determine efficient equipment size.	Confirmed size through follow-up with EGI.	7,907	6,326	7,907	6,326
Prescriptive Midstream	Commercial Under-Fired Broiler – LTO	Tracking data insufficient to determine efficient equipment size.	Confirmed size through follow-up with EGI.	2,636	2,109	2,636	2,109
Prescriptive Midstream	Condensing Tankless WH- GTE 200 kBTU/hr 2022 LTO	Capacity indicated in tracked measure name in conflict with tracked capacity.	Confirmed capacity through follow-up with EGI.	1,801	1,765	1,801	1,765
Affordable Housing Multi-Residential	Bathroom Aerator	Tracking data did not specify efficient technology GPM.	Confirmed efficient technology GPM through follow-up with EGI.	13	13	13	13
Affordable Housing Multi-Residential	Kitchen Aerator	Tracking data did not specify efficient technology GPM.	Confirmed efficient technology GPM through follow-up with EGI.	24	24	24	24
Home Winterproofing	Bathroom Aerator	Tracking data did not specify efficient technology GPM. Tracked installation rate is simple average of LEG and LUG installation rates.	Confirmed efficient technology GPM through follow-up with EGI. Installation rate updated to equal weighted average of LEG and LUG installation rates.	2,928	2,928	3,483	3,483
Home Winterproofing	Kitchen Aerator	Tracking data did not specify efficient technology GPM. Tracked installation rate is simple average of LEG and LUG installation rates.	Confirmed efficient technology GPM through follow-up with EGI. Installation rate updated to equal weighted average of LEG and LUG installation rates.	5,808	5,808	6,855	6,855
Home Winterproofing	Showerhead Replacement 1.25 GPM	Tracked installation rate is simple average of LEG and LUG installation rates.	Installation rate updated to equal weighted average of LEG and LUG installation rates.	19,236	19,236	19,535	19,535
Residential Smart Home	Smart Thermostats	Tracking data does not always correctly distinguish between instant rebate and contractor installed. Tracked installation rate does not reflect most recent ping report.	Confirmed instant rebate versus contractor installed through follow-up with EGI. Installation rate updated to reflect most recent ping report.	4,074,195	3,911,227	4,159,461	3,993,083
Residential Smart Home	Smart Thermostats - $100 LTO	Tracked installation rate does not reflect most recent ping report.	Installation rate updated to reflect most recent ping report.	3,505,183	3,364,976	3,579,579	3,436,396

APPENDIX P. Program Spending

Table P-1. Enbridge 2023 approved and spent budget*

Scorecard/Program	OEB-Approved Budget	Utility Spending	Difference	
			$	%
Residential Program	**$70,378,564**	**$64,103,929**	**-$6,274,634**	**-9%**
Residential Whole Home	$60,000,000	$55,316,708	-$4,683,292	-8%
Residential Single Measure	$4,617,424	$14,600	-$4,602,824	-100%
Residential Smart Home	$3,977,235	$7,563,752	$3,586,517	90%
Residential Administration	$1,783,905	$1,208,869	-$575,036	-32%
Commercial Program	**$25,262,775**	**$20,859,883**	**-$4,402,892**	**-17%**
Commercial Administration	$3,743,608	$3,765,349	$21,741	1%
Large Commercial	$11,939,228	$8,999,728	-$2,939,500	-25%
Commercial Custom	$9,516,664	$6,813,566	-$2,703,098	-28%
Commercial Prescriptive	$1,461,742	$1,494,158	$32,416	2%
Commercial Direct Install	$476,598	$227,192	-$249,406	-52%
Commercial Midstream	$484,223	$464,812	-$19,411	-4%
Small Commercial	$9,579,939	$8,094,806	-$1,485,133	-16%
Commercial Custom	$2,379,166	$1,580,302	-$798,864	-34%
Commercial Prescriptive	$974,495	$1,571,899	$597,404	61%
Commercial Direct Install	$4,289,385	$3,517,827	-$771,557	-18%
Commercial Midstream	$1,936,894	$1,424,778	-$512,116	-26%
Industrial Program	**$17,828,114**	**$13,289,021**	**-$4,539,093**	**-25%**
Industrial Custom	$13,872,000	$9,637,297	-$4,234,703	-31%
Industrial Administration	$3,956,114	$3,651,725	-$304,389	-8%
Large Volume Program	**$2,766,624**	**$2,684,891**	**-$81,733**	**-3%**
Direct Access	$2,550,000	$2,493,024	-$56,976	-2%
Large Volume Administration	$216,624	$191,867	-$24,757	-11%
Low-Income Program	**$22,987,685**	**$23,844,021**	**$856,336**	**4%**
Home Winterproofing	$14,375,115	$17,551,495	$3,176,380	22%
Affordable Housing Multi-Residential	$7,138,928	$5,124,136	-$2,014,792	-28%
Low-Income Administration	$1,473,642	$1,168,390	-$305,252	-21%
Energy Performance Program	**$1,221,656**	**$1,464,037**	**$242,381**	**20%**
Whole Building Pay for Performance	$1,117,500	$1,426,609	$309,109	28%
Energy Performance Administration	$104,156	$37,428	-$66,728	-64%
Building Beyond Code Program	**$8,437,503**	**$6,385,860**	**-$2,051,643**	**-24%**
Savings by Design Residential	$4,057,500	$2,536,834	-$1,520,666	-37%
Savings by Design Commercial	$1,236,000	$754,061	-$481,939	-39%
Affordable Housing Savings By Design	$2,138,000	$1,983,683	-$154,317	-7%
Air Tightness	$483,432	$325,307	-$158,125	-33%
Building Beyond Code Administration	$522,571	$785,975	$263,404	50%
Portfolio Costs	**$18,360,000**	**$12,089,820**	**-$6,270,180**	**-34%**
Administration	$11,252,522	$7,402,706	-$3,849,815	-34%
Evaluation and Regulatory	$3,876,000	$1,791,287	-$2,084,713	-54%
Research and Development	$3,231,478	$2,895,827	-$335,652	-10%
Enbridge Total	**$167,242,921**	**$144,721,463**	**-$22,521,458**	**-13%**

*Not all values may compute exactly due to rounding.

APPENDIX Q. Cost Effectiveness Methodology

Cost effectiveness overview

The OEB's new 2023 Natural Gas Demand Side Management Framework, effective January 1, 2023, guides 2023 – 2025 DSM annual verification activities and was applied to this year's evaluation. The OEB requires utilities to deliver portfolios that are cost-effective at the "program" level, and cost-effectiveness testing is performed at both the program and overall portfolio levels. The 2023 evaluation marks the first year that cost-effectiveness results were calculated and reported for Enbridge Gas only. The two legacy utilities (Enbridge and Union) amalgamated following OEB approval in 2018[66] but continued to report separately as per the 2015 – 2020 DSM Framework through 2022.

Cost effectiveness results are calculated at the portfolio, scorecard and offering level for all offerings that have natural gas savings metrics. The offerings included within each scorecard are shown in Table Q-1.

Table Q-1: 2023 Scorecards and offerings in cost effectiveness analysis

Scorecard	Offering
Residential Program	Residential Whole Home
	Residential Single Measure
	Residential Smart Home
Low-Income Program	Home Winterproofing
	Affordable Housing Multi-Residential
Commercial Program	Commercial Custom
	Commercial Prescriptive*
Industrial Program	Industrial Custom
Large Volume Program	Direct Access

*For Cost Effectiveness calculations, the Downstream, Midstream, and Prescriptive offerings are rolled into Commercial Prescriptive.

The 2023 DSM Framework only requires cost-effectiveness screening using the Total Resource Cost-Plus (TRC-Plus) test. OEB requested that the Program Administrator Cost (PAC) test continue to be applied during the 2023 – 2025 term to allow comparison with past program years. Both are included here. Under the Framework, a program must achieve a TRC-Plus benefit/cost ratio of 1.0 or greater to be deemed cost-effective. The exception is Low Income DSM programs, which continue to be screened using a lower threshold of 0.7 to recognize important benefits not captured by the TRC-Plus test. The 2023 DSM Framework does not include stated cost-effectiveness thresholds for the PAC test, so the same thresholds as for the TRC-Plus test have been used, consistent with the previous framework.

To calculate cost-effectiveness, the EC used an updated version of the cost-effectiveness model that has been applied in previous years, using Enbridge's verified savings and reflecting the 2023 DSM Framework. The EC model adjusts gross savings using realization rates, free ridership and spillover from the annual savings verification activities.

The main goal of the cost-effectiveness analysis is the application of 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 under the current DSM Framework. The EC cost-effectiveness model applied uses the new 2023 DSM Framework and as such differs in some ways from the methodologies of previous years. Key elements and differences are described below.

[66] Decision And Order EB-2017-0306 And Eb-2017-0307 Union Gas Limited and Enbridge Gas Distribution Inc. Enbridge Gas Distribution Inc. and Union Gas Limited Application for Amalgamation and Rate-Setting Mechanism

The key inputs used to calculate the TRC-Plus and PAC tests are shown in the table below.

Table Q-2: Key inputs used in the TRC-Plus and PAC tests

Input	Description	TRC-Plus	PAC
Administration Costs	Salaries and employee expenses for staff who work on DSM activities, including fixed/overhead costs (support staff) and variable costs (operations staff).	✓	✓
Utility Incentives	Utility-provided customer incentives to encourage adoption of efficiency measures.		✓
Development and Start-up Costs	Costs incurred during early DSM program stages, such as for staff training.	✓	✓
Promotion Costs	Variable expenditures to promote and market programs, as well as provide customer education on DSM programs and energy conservation measures.	✓	✓
Discount Rate	The discount rate is used to weight long-term versus short-term benefits provided by the utilities. A real discount rate of 4%, and nominal discount rate of 10.24%, is applied.[67]	✓	✓
Participant Cost	The incremental cost to the participant after subtracting any program rebates.	✓	
Net Savings	Savings net of free ridership and spillover effects.	✓	✓
Avoided Costs	Utility-avoided costs related to the generation and distribution of energy from natural gas lines, as well as the benefits of other resources saved through the DSM program such as electricity and water.	✓ *Gas, water, electricity and carbon*	✓ *Gas and carbon only*
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. It is not applied to carbon benefits.	✓	
Cost of Carbon	The avoided costs of carbon expressed as dollars per m3 based on established annual carbon pricing increases of $15/tonne from 2023 to 2030. Beyond 2030, a 6% inflation rate for remaining years.	✓	✓

Despite the move away from reporting results for legacy Enbridge and legacy Union, two sets of natural gas avoided costs were applied in the model, representing the Enbridge Gas Distribution (former Enbridge territory) rate zone and the Union Gas (former Union territory) rate zone. These were developed and provided by Enbridge to account for differences in avoided costs between each rate zone.

In December 2020, a federal regulatory update[68] established annual carbon pricing increases of $15/tonne from 2023 to 2030. The updated federal prices are $65/tCO2e in 2023 and $170/tCO2e in 2030. Beyond 2030, a 6% inflation rate for the remaining years (i.e., year 20 to 30) is applied. To accurately reflect the impact of carbon pricing in the TRC-Plus calculations, a weighting is used to produce an adjusted carbon price by rate class that applies to programs that include larger customers that are exempt.

The 15% non-energy benefit (NEB) adder is applied to gas, electricity, and water avoided costs; it is not applied to carbon costs, which are included as part of avoided costs. This is consistent with the 2022 evaluation and the new DSM Framework. The cost of carbon and NEB adder are applied in the TRC-Plus. The PAC test includes carbon and natural gas

[67] Inflation was calculated in accordance with the OEB's 2022 DSM Framework (Section 11.1 – Inflation Rate, p. 33) as the four-quarter moving inflation rate based on the Gross Domestic Product Implicit Price Index for Final Domestic Demand, based on the most recently available information. While the resulting 6% inflation rate is anomalous and not representative of Bank of Canada or other forecasts of future inflation (which are closer to 2% per year), the 6% rate gets applied to the entire life of energy efficiency measures. The cost-effectiveness analysis uses a real discount rate of 4% per the DSM Framework requirement (consistent with the 2015 DSM framework) with the inflation rate of 6% for a nominal discount rate of 10.24%.

[68] Update to the Pan-Canadian Approach to Carbon Pollution Pricing 2023-2030. Accessed at https://www.canada.ca/en/environment-climate-change/services/climate-change/pricing-pollution-how-it-will-work/carbon-pollution-pricing-federal-benchmark-information/federal-benchmark-2023-2030.html#toc3

resources only (i.e., there are no electricity and water benefits) and it does not include the NEB adder. In tables later in this section, the EC has reported avoided costs provided by Enbridge but has not verified these figures.

In previous years, negative resource savings (i.e., increases to natural gas, electricity, water and/or carbon) were included as negative benefits under the TRC-Plus – and the NEB adder was applied. This year, to be consistent with the TRC-Plus ratio calculation included in OEB's Decision and Order EB-2021-0002[69], such resource increases are counted as positive costs – and the NEB adder does not apply.

A variety of costs are incurred by Enbridge to deliver programs and how they are allocated at various levels (measure, program, scorecard, and portfolio) can impact their perceived economic benefits. As stated in the 2023 DSM Framework, DSM program costs relevant to the TRC-Plus include: Development and Start-up, Promotion, Delivery, EM&V and Monitoring, and Administration. Of these, Development, some Evaluation costs, Monitoring costs and Administration costs are considered at the portfolio level in cost effective testing, and not at the program and scorecard levels; all other costs apply at the program and/or scorecard levels. Per the 2023 DSM Framework, costs that are not assigned to an identified program are accounted for at the portfolio level. The National Standards Practice Manual[70] provides guidance on how to properly allocate overhead & administrative (O&A) costs (see text box below).

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, portfolio) and costs that are largely fixed at a particular level be excluded. Including fixed costs at the wrong level may results 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. These are shown below:

- **Measure level**: 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., 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 be included in portfolio-level analysis.

[69] Decision and Order EB-2021-0002 Enbridge Gas Inc. Application for Multi-Year Natural Gas Demand Side Management Plan (2022 to 2027), November 15, 2022.

[70] The National Efficiency Screening Project. 2017. National Standards Practice Manual. Accessed at https://www.nationalenergyscreeningproject.org/the-national-standard-practice-manual-for-energy-efficiency/

Summary of results

Table Q-3 shows summary results for the TRC-Plus (DSM Framework-required) and PAC (OEB-requested) tests. The end of this section contains tables with more detailed results. Enbridge's portfolio of DSM programs did not meet the cost effectiveness threshold of 1.0 using the TRC-Plus test, achieving a ratio of 0.93. It exceeded the 1.0 threshold using the PAC test with a ratio of 3.44. All of Enbridge's scorecard programs met the TRC-Plus test cost effectiveness thresholds of 0.7 (Low Income) or 1.0 (all others) except for the Residential Program, which had a ratio of 0.50. The Residential Program was cost effective under the PAC test with a ratio of 2.36.

Table Q-3. Enbridge summary of cost effectiveness ratio results*

Scorecard	Final Verified Ratio		Final Verified Net Present Value (M$)	
	TRC-Plus	PAC	TRC-Plus	PAC
Residential Program	0.50**	2.19	-171.04**	76.54
Low Income Program	1.60	1.54	16.04	12.79
Commercial Program	1.19	5.03	19.23	84.02
Industrial Program	2.90	10.40	101.04	124.97
Large Volume Program	3.28	4.38	9.37	9.07
Total	**0.93**	**3.15**	**-37.46**	**295.30**

*Not all values may compute exactly due to rounding.
**Please see discussion below for more information about the cost effectiveness of this program.

The 2023 program year marks the first time that a program (as defined in the current framework) and the portfolio overall have not reached the threshold for the TRC-Plus cost effectiveness test. The EC confirmed that the method to determine the cost effectiveness results followed the framework and past practice consistently and correctly; however, some key assumptions in 2023 do not match the reality of the current market. Specifically, three things individually biased the portfolio result downward enough to drive it below 1.0. First, an outlier inflation value of 6%[71] artificially devalues savings and benefits above more reasonable inflation forecasts while having no effect on costs, which are incurred in the first year. Second, an unusual measure mix within Enbridge's joint HER+ offering with Natural Resources Canada included a high proportion of cost inefficient measures. Third, the approach to measure costs for some of the measures in the HER+ offering was conservatively high. While these three concerns will persist into the 2024 program year, the EC expects them to be short-term and not representative of the long-term performance of the portfolio.[72] Each factor is explained in more detail below.

Inflation

The TRC-Plus test uses one measure of inflation throughout the full analysis timeframe of 30 years. As stated in the footnote to table Q-2, the Annual Verification uses the four-quarter moving average inflation rate based on GDP Implicit Price Index for Final Domestic Demand, based on most recently available information at the time the avoided costs are updated. For 2023, this resulted in an inflation rate of 6%, an outlier when comparing to previous AV cost effectiveness analyses (which have ranged from 1.3%-2.9% since program year 2019) and a value that is not representative of long-term projections of inflation (2-3%)[73]. While the nominal discount rate used throughout that same timeframe uses the same rate of inflation, partially insulating the net present value of TRC benefits and costs from large impacts, the effect of the outlier value is still

[71] Inflation was calculated in accordance with the OEB's 2022 DSM Framework (Section 11.1 – Inflation Rate, p. 33) as the four-quarter moving inflation rate based on the Gross Domestic Product Implicit Price Index for Final Domestic Demand, based on the most recently available information. While the resulting 6% inflation rate is anomalous and not representative of Bank of Canada or other forecasts of future inflation (which are closer to 2% per year), the 6% rate gets applied to the entire life of energy efficiency measures.

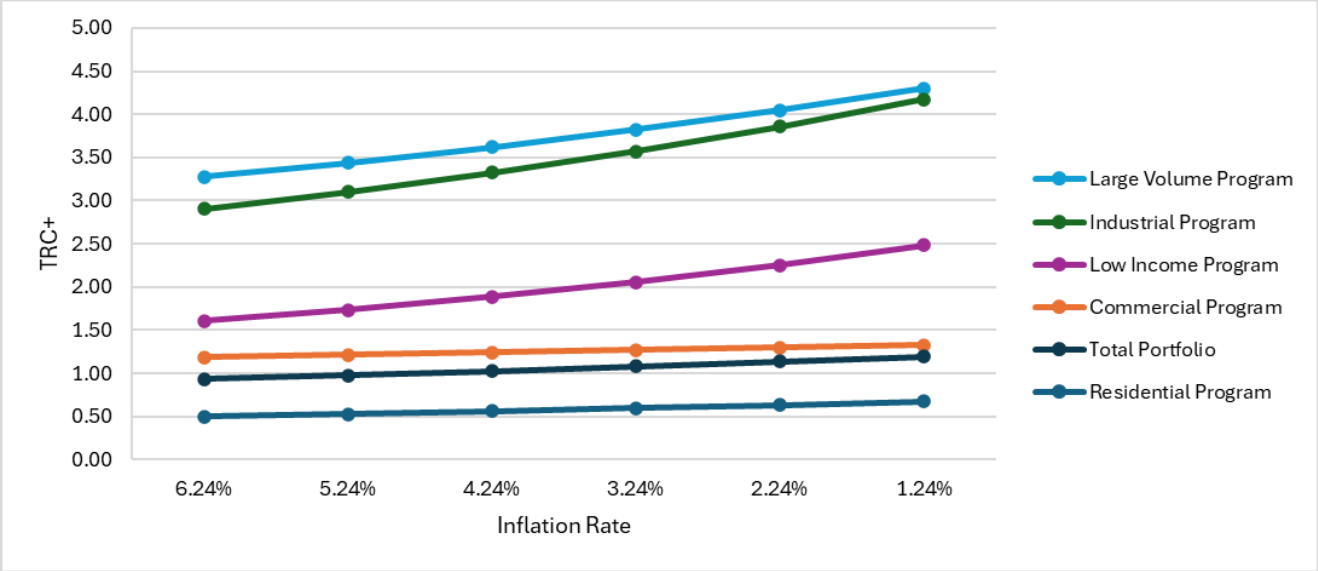
[72] See Appendix Q for greater detail.

[73] Bank of Canada Projections

significant since long term gas savings are the primary benefits from the program and the associated gas avoided costs are forecast to increase by less than 5% per year on average in the analysis.

To illustrate the effect of the high inflation rate, the EC performed a sensitivity analysis by re-running the TRC-Plus test with several different inflation values, changing nothing else. Figure Q-1 shows the TRC-Plus ratios by program and for the total portfolio under varying inflation rate scenarios. As the figure shows, any inflation rate of roughly 4.5% or lower would have resulted in the portfolio achieving a TRC-Plus benefit/cost ratio of 1.0 or greater.

Figure Q-1. Inflation rate sensitivity analysis



The impact of the inflation rate assumption is unlikely to extend beyond the 2023 - 2025 program years for two reasons. First, inflation rates have decreased, so a future analysis using the same methodology (consistent inflation rate for 30 years) will result in values more likely to be accurate and cost effective. Second, Enbridge has proposed a change to the inflation rate selection starting in 2026 that would use a value of 2% when appropriate.

Measures in the Residential Whole Home Offering

Enbridge's Residential Whole Home Offering fell short of the 1.0 threshold in the TRC-Plus test, with a cost effectiveness ratio of 0.37. This offering has outsized importance within the portfolio such that removing the offering from the analysis results in a portfolio TRC-Plus ratio of 1.87. As such, the EC further investigated the root causes of the low cost effectiveness of this offering.

As outlined in Appendix E, in 2023 the Residential Whole Home offering was comprised of Home Energy Conservation (HEC; a continuation of the analogous program under the previous framework that was discontinued in April 2023) and Home Energy Rebate Plus (HER+). HER+ represented nearly 80% of offering participants during 2023.

HER+, which was in place throughout 2023 and the early part of 2024, was a program delivered by Enbridge in partnership with Natural Resources Canada (NRCan). OEB approved the final list of joint measures and incentive levels.

Table Q-4 shows the 2023 residential Whole Home activity, comparting the previously approved HEC offering which was available in the early part of 2023 with the joint EGI-NRCan HER+ offering. The table shows the measure mix of HER+, including the number and percentage of homes with each measure type as well as a total count of measures incentivized. It also shows the measure mix of the HEC offering. As the table shows, while the HEC offering was heavily weighted towards

air sealing and insulation (as well as combustion measures like furnaces that are not shown in the table), these measures were much less prevalent in HER+. In 2023, more than half of HER+ participants received an air source heat pump, a technology not offered in HEC. More than one-third of homes in HER+ received windows and sliding doors, which made up about three-quarters of the total number of HER+ measures. Only 14% of homes in the HEC offering received windows and sliding doors.

Table Q-4. Measure mix of 2023 Residential Whole Home offering

Measure Type	Total Homes HER+	Total Measure Count HER+	% of Total Homes HER+	% of Total Homes HEC
Air Source Heat Pump	13,127	13,127	51%	n/a
Windows / Sliding Door	8,811	91,571	34%	14%
Attic Insulation	7,234	7,234	28%	78%
Air Sealing	5,623	5,623	22%	96%
Foundation Insulation	1,247	1,247	5%	0%
Doors	1,189	1,793	5%	0%
Exterior Wall Insulation	901	901	3%	3%
Basement Header Insulation	494	494	2%	14%
Heat Pump Water Heater	258	258	1%	n/a
Exposed Floor Insulation	125	125	<1%	0%
Basement Slab Insulation	52	52	<1%	0%
Ground Source Heat Pump	16	16	<1%	n/a
Total Measure Types	**39,077**	**122,081**	**N/A**	**N/A**
Total Homes	**25,776**	**N/A**	**N/A**	**N/A**

Since savings for this offering are determined at the whole home level, the EC cannot remove only the heat pumps or windows and sliding door measure types from the analysis and re-calculate cost effectiveness. However, we can limit the analysis to only participants that received heat pumps, for example, and compare them to participants with a different measure mix. Table Q-5 shows that, while projects only containing air sealing or insulation were collectively very cost effective, those with only electrification measures or only windows or sliding glass doors – the two most popular and well-subscribed measures in the program by far - were extremely cost ineffective.

Table Q-5. Cost effectiveness of participants receiving only certain measure types*

Residential Whole Home Group	Benefits ($)	Costs ($)	Value ($)	TRC Ratio	Cases
Only Heat Pump	18,659,445	58,825,205	-40,165,760	0.32	10,560
Only Window/Door	1,509,813	14,109,709	-12,599,896	0.11	3,699
Only Air Sealing/Insulation	12,178,323	5,511,324	6,666,999	2.21	6,562

*These values do not include program-level (like O&A) costs. However, they do illustrate the relative differences between different measure types.

Under the TRC-Plus test, measure incentives are treated as a pass-through, meaning they do not directly affect cost effectiveness results. However, the rich customer incentives offered in 2023 likely had a secondary effect of dramatically increasing the uptake and prevalence of windows/doors and heat pumps in the offering mix, resulting in a greater portion of the program assigned to cost ineffective measures.

The joint Enbridge-NRCan HER+ offering closed to new applicants in early 2024, though existing applicants will continue as part of the program into 2024. Enbridge is now delivering a Home Energy Rebate (HER, no “plus”) offering with reduced incentives. In particular, incentives for Energy Star Certified windows and sliding glass doors have decreased by about 85% for the most efficient models and 70% for others, and incentives for heat pumps have decreased by 55-85% depending on specifications. Therefore, going forward, the Residential Whole Home offering is likely to return to a measure mix more similar to HEC in Table Q-4 and more likely to result in a cost effectiveness ratio greater than one.

Incremental Costs in the Residential Whole Home offering

The Residential Whole Home offering measure mix’s downward effect on the program’s (and the portfolio’s) TRC-Plus ratio was exacerbated by an overstatement of measure costs. Following precedent, the cost effectiveness calculations for the offering used full measure costs and full savings for the entire life of the equipment. Importantly, this included the cost inefficient measures discussed above, namely windows/doors and heat pumps.

For most cases, a more accurate methodology would account for natural replacement of the equipment at some point during the life of the new equipment. For example, imagine a measure with a 20-year effective useful life that is replaced after 10 years. For the first 10-year period, the measure should have an existing equipment baseline, with associated full cost of installation and savings relative to the existing equipment. For the second 10-year period, however, the measure should have a new equipment baseline with incremental costs relative to the installation of a standard efficiency window/door and incremental savings relative to the same. In most cases, this is a more appropriate manner to calculate costs and savings.

Accounting for natural replacement in the manner described above would have a significant downward effect on the costs and a less significant downward effect on the savings, leading to an overall higher cost effectiveness result. Keeping the 2023 measure mix of the Residential Whole Home offering and simply changing the cost basis of these measures may have been enough to push the overall portfolio TRC ratio above 1.0.

Despite acknowledging this deficiency in the cost effectiveness calculations for this offering, the EC does not recommend that Enbridge make any changes to its cost assumptions at this time. Updating the energy savings and cost assumptions would require a non-trivial investment of funds to produce accurate results. This investment would only provide a benefit for one or two program years because of planned changes in the way the program calculates heat pump savings and the anticipated reduced uptake of windows and sliding doors in future program years.

Cost effectiveness inputs

Avoided costs

Table Q-6: Enbridge Gas Distribution Rate Zone Avoided Costs

Year	Residential/Commercial			
	Baseload ($/m³)		Weather Sensitive ($/m³)	
	Rate	NPV	Rate	NPV
1	0.276	0.276	0.317	0.317
2	0.234	0.488	0.259	0.552
3	0.212	0.662	0.233	0.743
4	0.205	0.815	0.227	0.913
5	0.195	0.947	0.219	1.061
6	0.206	1.074	0.231	1.203
7	0.231	1.202	0.257	1.347
8	0.255	1.331	0.283	1.490
9	0.294	1.466	0.324	1.638
10	0.328	1.602	0.360	1.788
11	0.356	1.736	0.390	1.935
12	0.374	1.864	0.410	2.075
13	0.392	1.986	0.430	2.209
14	0.413	2.102	0.453	2.337
15	0.445	2.216	0.488	2.461
16	0.482	2.327	0.527	2.583
17	0.523	2.437	0.571	2.703
18	0.559	2.544	0.610	2.819
19	0.590	2.646	0.644	2.931
20	0.615	2.742	0.672	3.036
21	0.642	2.834	0.703	3.136
22	0.686	2.922	0.750	3.233
23	0.745	3.009	0.814	3.328
24	0.774	3.092	0.846	3.418
25	0.820	3.171	0.897	3.505
26	0.869	3.247	0.950	3.588
27	0.921	3.320	1.007	3.667
28	0.975	3.390	1.067	3.744
29	1.033	3.457	1.130	3.818
30	1.094	3.522	1.197	3.889

Table Q-7: Enbridge Gas Distribution Rate Zone Water and Electricity Avoided Costs

Year	Res/Com/Ind			
	Water ($/1000 litres)		Electricity ($/KWh)	
	Rate	NPV	Rate	NPV
1	1.094	1.094	0.128	0.128
2	1.159	2.145	0.136	0.252
3	1.229	3.157	0.144	0.370
4	1.303	4.129	0.153	0.484
5	1.381	5.064	0.162	0.594
6	1.464	5.963	0.172	0.699
7	1.552	6.827	0.182	0.801
8	1.645	7.659	0.193	0.898
9	1.743	8.458	0.204	0.992
10	1.848	9.226	0.217	1.082
11	1.959	9.965	0.230	1.169
12	2.076	10.676	0.243	1.252
13	2.201	11.359	0.258	1.332
14	2.333	12.016	0.274	1.409
15	2.473	12.647	0.290	1.483
16	2.621	13.255	0.307	1.554
17	2.779	13.839	0.326	1.623
18	2.945	14.400	0.345	1.689
19	3.122	14.940	0.366	1.752
20	3.309	15.459	0.388	1.813
21	3.508	15.959	0.411	1.871
22	3.718	16.439	0.436	1.928
23	3.941	16.900	0.462	1.982
24	4.178	17.344	0.490	2.034
25	4.429	17.771	0.519	2.084
26	4.694	18.181	0.550	2.132
27	4.976	18.575	0.584	2.178
28	5.275	18.955	0.619	2.223
29	5.591	19.319	0.656	2.265
30	5.927	19.670	0.695	2.307

Table Q-8: Enbridge Gas Distribution Rate Zone Carbon Avoided Costs

Year	Res/Com/Ind ($/m³)	
	Rate	NPV
1	0.126	0.126
2	0.155	0.266
3	0.184	0.417
4	0.213	0.576
5	0.242	0.739
6	0.271	0.905
7	0.300	1.072
8	0.329	1.238
9	0.348	1.398
10	0.369	1.551
11	0.391	1.699
12	0.415	1.841
13	0.440	1.977
14	0.466	2.108
15	0.494	2.235
16	0.524	2.356
17	0.555	2.473
18	0.588	2.585
19	0.624	2.693
20	0.661	2.796
21	0.701	2.896
22	0.743	2.992
23	0.787	3.084
24	0.835	3.173
25	0.885	3.258
26	0.938	3.340
27	0.994	3.419
28	1.054	3.494
29	1.117	3.567
30	1.184	3.637

Table Q-9: Union Gas Rate Zone Avoided Costs

Year	Residential/Commercial			
	Baseload ($/m³)		Weather Sensitive ($/m³)	
	Rate	NPV	Rate	NPV
1	0.284	0.284	0.366	0.366
2	0.234	0.496	0.295	0.634
3	0.209	0.669	0.258	0.846
4	0.204	0.821	0.256	1.037
5	0.194	0.952	0.249	1.206
6	0.205	1.078	0.263	1.367
7	0.230	1.206	0.292	1.530
8	0.255	1.335	0.320	1.692
9	0.292	1.469	0.361	1.857
10	0.327	1.605	0.401	2.024
11	0.353	1.738	0.431	2.186
12	0.371	1.865	0.454	2.342
13	0.388	1.985	0.475	2.489
14	0.408	2.100	0.501	2.630
15	0.439	2.212	0.537	2.768
16	0.476	2.323	0.580	2.902
17	0.517	2.432	0.628	3.034
18	0.554	2.537	0.671	3.162
19	0.585	2.638	0.709	3.285
20	0.609	2.734	0.741	3.401
21	0.635	2.824	0.775	3.511
22	0.678	2.912	0.826	3.618
23	0.737	2.998	0.894	3.722
24	0.765	3.079	0.931	3.821
25	0.811	3.158	0.987	3.917
26	0.859	3.233	1.046	4.008
27	0.910	3.305	1.108	4.096
28	0.964	3.374	1.174	4.180
29	1.022	3.441	1.244	4.261
30	1.082	3.505	1.318	4.339

Table Q-10: Union Gas Rate Zone Water and Electricity Avoided Costs

Year	Res/Com/Ind			
	Water ($/1000 litres)		Electricity ($/KWh)	
	Rate	NPV	Rate	NPV
1	0.917	0.917	0.128	0.128
2	0.972	1.800	0.136	0.252
3	1.031	2.648	0.144	0.370
4	1.093	3.463	0.153	0.484
5	1.158	4.248	0.162	0.594
6	1.228	5.002	0.172	0.699
7	1.301	5.727	0.182	0.801
8	1.380	6.424	0.193	0.898
9	1.462	7.094	0.204	0.992
10	1.550	7.739	0.217	1.082
11	1.643	8.359	0.230	1.169
12	1.742	8.955	0.243	1.252
13	1.846	9.528	0.258	1.332
14	1.957	10.079	0.274	1.409
15	2.074	10.609	0.290	1.483
16	2.199	11.118	0.307	1.554
17	2.331	11.608	0.326	1.623
18	2.470	12.079	0.345	1.689
19	2.619	12.532	0.366	1.752
20	2.776	12.967	0.388	1.813
21	2.942	13.386	0.411	1.871
22	3.119	13.788	0.436	1.928
23	3.306	14.176	0.462	1.982
24	3.504	14.548	0.490	2.034
25	3.715	14.906	0.519	2.084
26	3.938	15.250	0.550	2.132
27	4.174	15.581	0.584	2.178
28	4.424	15.899	0.619	2.223
29	4.690	16.205	0.656	2.265
30	4.971	16.499	0.695	2.307

Table Q-11: Union Gas Rate Zone Carbon Avoided Costs

Year	Res/Com/Ind ($/m³)	
	Rate	NPV
1	0.126	0.126
2	0.155	0.266
3	0.184	0.417
4	0.213	0.576
5	0.242	0.739
6	0.271	0.905
7	0.300	1.072
8	0.329	1.238
9	0.348	1.398
10	0.369	1.551
11	0.391	1.699
12	0.415	1.841
13	0.440	1.977
14	0.466	2.108
15	0.494	2.235
16	0.524	2.356
17	0.555	2.473
18	0.588	2.585
19	0.624	2.693
20	0.661	2.796
21	0.701	2.896
22	0.743	2.992
23	0.787	3.084
24	0.835	3.173
25	0.885	3.258
26	0.938	3.340
27	0.994	3.419
28	1.054	3.494
29	1.117	3.567
30	1.184	3.637

Results tables[74]

Table Q-12: Overall TRC-Plus results*†

Scorecard	Annual net savings (m3)	Measure Incremental Costs ($)	TRC- Plus Measure Costs ($) **	TRC Plus Benefits ($)	Program Costs ($)	Overhead ($) ‡	TRC Plus Costs ($)	TRC Plus Value ($)	TRC Plus Ratio
Residential Program	22,809,000	236,531,000	331,795,000	169,490,000	7,525,000	1,209,000	340,529,000	-171,039,000	0.50
Low Income Program	6,250,000	17,573,000	18,219,000	42,610,000	7,188,000	1,168,000	26,575,000	16,035,000	1.60
Commercial Program	25,052,000	41,439,000	96,810,000	122,939,000	3,137,000	3,765,000	103,712,000	19,227,000	1.19
Industrial Program	44,309,000	48,032,000	48,864,000	154,094,000	543,000	3,652,000	53,059,000	101,035,000	2.90
Large Volume Program	22,727,000	3,608,000	3,900,000	13,485,000	25,000	192,000	4,116,000	9,369,000	3.28
Total Portfolio	**121,147,000**	**347,183,697**	**499,587,000**	**502,619,000**	**18,417,000**	**22,076,000**	**540,081,000**	**-37,462,000**	**0.93*** **

*Not all values may compute exactly due to rounding.
†All dollar and savings values are rounded to the nearest thousand.
**TRC-Plus Measure Costs include measure incremental costs and negative benefits.
‡ Portfolio overhead costs for administration, development and evaluation & monitoring are not applied at the program or scorecard level – and as such are not factored into the cost effectiveness results at these levels. Per the 2023 Framework, these costs are applied at the portfolio level and reflected in the cost effectiveness of the overall portfolio. Program costs relevant to individual programs and scorecards are applied at the program and scorecard levels, respectively. Where certain costs are not assigned to a program or scorecard, they are accounted for at the portfolio level. As such, the sum of the rows for Overhead, TRC Plus Costs and TRC Plus Value will not equal the total sum for the portfolio in the above table.
***Some key assumptions in 2023 which do not match the reality of the current market biased the result lower than previous years. This value is not representative of the long-term performance of the portfolio. Please see the discussion in the Summary of Results section above for more detail.

Table Q-13: Residential Program TRC-Plus results*†

Offering	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 ($)	Overhead ($)	TRC Plus Ratio w/ O&A costs
Residential Whole Home	15,379,000	222,215,000	118,942,000	317,478,000	-198,537,000	0.37	4,420,000	937,000	0.37
Residential Single Measure	0	0	0	0	0	-	15,000	0	0.00
Residential Smart Home	7,429,000	14,316,000	50,548,000	14,316,000	36,232,000	3.53	3,091,000	272,000	2.86
Verified Final Results	**22,809,000**	**236,531,000**	**169,490,000**	**331,795,000**	**-162,305,000**	**0.51**	**7,525,000**	**1,209,000**	**0.50**

*Not all values may compute exactly due to rounding.
†All dollar and savings values are rounded to the nearest thousand.

[74] The cost-effectiveness results use federal carbon tax rates that increase by $15 per year up to $170 per tCO2e in 2030. Beyond 2030, a 6% inflation rate is applied.

Table Q-14: Low-Income Program TRC-Plus results*†

Offering	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 ($)	Overhead ($)	TRC Plus Ratio
Affordable Housing Single Family	3,248,000	10,135,000	24,329,000	10,710,000	13,619,000	2.27	6,220,000	640,000	1.38
Affordable Housing Multi-Residential	3,002,000	7,438,000	18,281,000	7,509,000	10,772,000	2.43	967,000	529,000	2.03
Verified Final Results	**6,250,000**	**17,573,000**	**42,610,000**	**18,219,000**	**24,391,000**	**2.34**	**7,188,000**	**1,168,000**	**1.60**

*Not all values may compute exactly due to rounding.
†All dollar and savings values are rounded to the nearest thousand.

Table Q-15: Commercial Program TRC-Plus results*†

Offering	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 ($)	Overhead ($)	TRC Plus Ratio
Commercial Custom	18,301,000	31,922,000	88,427,000	87,000,000	1,427,000	1.02	1,242,000	2,977,000	0.97
Commercial Prescriptive	6,751,000	9,516,000	34,513,000	9,810,000	24,703,000	3.52	1,895,000	788,000	2.76
Verified Final Results	**25,052,000**	**41,439,000**	**122,939,000**	**96,810,000**	**26,129,000**	**1.27**	**3,137,000**	**3,765,000**	**1.19**

*Not all values may compute exactly due to rounding.
†All dollar and savings values are rounded to the nearest thousand.

Table Q-16: Industrial Program TRC-Plus results*†

Offering	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 ($)	Overhead ($)	TRC Plus Ratio
Industrial Custom	44,309,000	48,032,000	154,094,000	48,864,000	105,230,000	3.15	543,000	3,652,000	2.90
Verified Final Results	**44,309,000**	**48,032,000**	**154,094,000**	**48,864,000**	**105,230,000**	**3.15**	**543,000**	**3,652,000**	**2.90**

*Not all values may compute exactly due to rounding.
†All dollar and savings values are rounded to the nearest thousand.

Table Q-17: Large Volume Program TRC-Plus results*†

Offering	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 ($)	Overhead ($)	TRC Plus Ratio
Direct Access	22,727,000	3,608,000	13,485,000	3,900,000	9,585,000	3.46	25,000	192,000	3.28
Verified Final Results	**22,727,000**	**3,608,000**	**13,485,000**	**3,900,000**	**9,585,000**	**3.46**	**25,000**	**192,000**	**3.28**

*Not all values may compute exactly due to rounding.
†All dollar and savings values are rounded to the nearest thousand.

Table Q-18: Overall PAC results*†

Scorecard	PAC Benefits ($)	PAC Costs ($)	PAC Value ($)	PAC Ratio
Residential Program	141,014,447	64,473,109	76,541,338	2.19
Low Income Program	36,633,275	23,844,021	12,789,254	1.54
Commercial Program	104,878,466	20,859,883	84,018,583	5.03
Industrial Program	138,259,928	13,289,021	124,970,907	10.40
Large Volume Program	11,755,861	2,684,891	9,070,970	4.38
Total	**432,541,976**	**137,240,745**	**295,301,231**	**3.15**

*Not all values may compute exactly due to rounding.
†All dollar values are rounded to the nearest thousand.

Table Q-19: Residential Program PAC results*†

Offering	Annual net savings (m3)	Program-level Incentives ($)	Program-level general admin costs ($)	PAC Increased Resource Costs ($)	Overhead ($)	PAC Benefits ($)	PAC Costs ($)	PAC Value ($)	PAC Ratio
Residential Whole Home	15,379,000	50,897,000	4,420,000	369,000	937,000	105,380,000	56,623,000	48,757,000	1.86
Residential Single Measure	0	0	15,000	0	0	0	15,000	-15,000	0.00
Residential Smart Home	7,429,000	4,473,000	3,091,000	0	272,000	35,634,000	7,835,000	27,799,000	4.55
Verified Final Results	**22,809,000**	**55,370,000**	**7,525,000**	**369,000**	**1,209,000**	**141,014,000**	**64,473,000**	**76,541,000**	**2.19**

*Not all values may compute exactly due to rounding.
†All dollar and savings values are rounded to the nearest thousand.

Table Q-20: Low Income Program PAC results*†

Offering	Annual net savings (m3)	Program-level Incentives ($)	Program-level general admin costs ($)	PAC Increased Resource Costs ($)	Overhead ($)	PAC Benefits ($)	PAC Costs ($)	PAC Value ($)	PAC Ratio
Affordable Housing Single Family	3,248,000	11,331,000	6,220,000	0	640,000	20,065,000	18,191,000	1,873,000	1.10
Affordable Housing Multi-Residential	3,002,000	4,157,000	967,000	0	529,000	16,569,000	5,653,000	10,916,000	2.93
Verified Final Results	**6,250,000**	**15,488,000**	**7,188,000**	**0**	**1,168,000**	**36,633,000**	**23,844,000**	**12,789,000**	**1.54**

*Not all values may compute exactly due to rounding.
†All dollar and savings values are rounded to the nearest thousand.

Table Q-21: Commercial Program PAC results*†

Offering	Annual net savings (m3)	Program-level Incentives ($)	Program-level general admin costs ($)	PAC Increased Resource Costs ($)	Overhead ($)	PAC Benefits ($)	PAC Costs ($)	PAC Value ($)	PAC Ratio
Commercial Custom	18,301,000	7,152,000	1,242,000	0	2,977,000	77,949,000	11,371,000	66,578,000	6.86
Commercial Prescriptive	6,751,000	6,805,000	1,895,000	0	788,000	26,930,000	9,489,000	17,441,000	2.84
Verified Final Results	**25,052,000**	**13,958,000**	**3,137,000**	**0**	**3,765,000**	**104,878,000**	**20,860,000**	**84,019,000**	**5.03**

*Not all values may compute exactly due to rounding.
†All dollar and savings values are rounded to the nearest thousand.

Table Q-22: Industrial Program PAC results*†

Offering	Annual net savings (m3)	Program-level Incentives ($)	Program-level general admin costs ($)	PAC Increased Resource Costs ($)	Overhead ($)	PAC Benefits ($)	PAC Costs ($)	PAC Value ($)	PAC Ratio
Industrial Custom	44,309,000	9,094,000	543,000	0	3,652,000	138,260,000	13,289,000	124,971,000	10.40
Verified Final Results	**44,309,000**	**9,094,000**	**543,000**	**0**	**3,652,000**	**138,260,000**	**13,289,000**	**124,971,000**	**10.40**

*Not all values may compute exactly due to rounding.
†All dollar and savings values are rounded to the nearest thousand.

Table Q-23: Large Volume Program PAC results*†

Offering	Annual net savings (m3)	Program-level Incentives ($)	Program-level general admin costs ($)	PAC Increased Resource Costs ($)	Overhead ($)	PAC Benefits ($)	PAC Costs ($)	PAC Value ($)	PAC Ratio
Direct Access	22,727,000	2,468,000	25,000	0	192,000	11,756,000	2,685,000	9,071,000	4.38
Verified Final Results	**22,727,000**	**2,468,000**	**25,000**	**0**	**192,000**	**11,756,000**	**2,685,000**	**9,071,000**	**4.38**

*Not all values may compute exactly due to rounding.
†All dollar and savings values are rounded to the nearest thousand.

APPENDIX R. Process Evaluation Summary

As confirmed within the most recent Decision and Order, process evaluations remain the responsibility of Enbridge Gas. The Annual Verification includes a summary and general description of all process evaluations completed by Enbridge Gas during the evaluation year. For 2024, these included the Home Winterproofing Program Evaluation and the Affordable Housing Multi-Residential Program Evaluation.

Home Winterproofing Program Evaluation

This report presents the results of the process evaluation of the Enbridge Gas Inc. (Enbridge) Home Winterproofing Program (hereinafter the program or HWP). The program allows income-eligible households to take advantage of a variety of no-cost upgrades to improve the energy efficiency of their homes. Since 2022, HWP has been delivered in collaboration with the Independent Electricity System Operator (IESO) Energy Affordability Program (EAP) that provides free electricity saving upgrades in income-eligible homes.

Enbridge believes that this program could be more successful. Several factors are at play:

› The effects of the COVID-19 pandemic and inflation on program delivery, staffing, and participation.

› Low awareness about HWP and difficulty reaching or interesting some low-income customers.

› Program mistrust among low-income customers.

› Reluctance of low-income customers to self-identify.

› Pre-weatherization health and safety issues that need to be addressed.

› A period of learning and adaptation after the launch of the jointly delivered program.

For this process evaluation, Enbridge wished to better understand the following issues:

› How can participation levels be increased?

› How effective are marketing, communications, and outreach activities?

› Are engagement channels with community stakeholders being leveraged appropriately?

› What is working well and where are there challenges through the customer journey?

› Are the IESO collaboration and joint program delivery working effectively?

› Why do some participants start but do not complete the program participation process?

The developed research approach centred on a series of qualitative interviews that enabled the Evaluator to probe the above issues in depth. Interviews were held with Enbridge program staff, delivery agents (DAs), IESO staff, a community organization, and customers who started but did not complete the participation process (incomplete participants). A review of program-related documentation provided by Enbridge was also conducted.

Affordable Housing Multi-Residential Program Evaluation

This report presents the results of the process evaluation of the Enbridge Gas Distribution (Enbridge) Affordable Housing Multi-Residential program (the program or AHMR). AHMR is a commercial income-eligible program designed to reduce energy costs and improve the indoor comfort of affordable multi-family housing. The program allows providers, owners, or managers of income-eligible multi-family properties to take advantage of an energy assessment and a variety of upgrade incentives to improve energy efficiency in their buildings.

Enbridge believes that this program could be more successful and wishes to know how to expand program reach. Several factors are at play:

› Affordable multi-residential housing providers, building owners, and property managers operate with tight budgets and make only necessary or minimal repairs to their buildings.

› There is low awareness about energy efficiency and the program, particularly among smaller housing providers.

› Enbridge faces challenges engaging smaller housing providers and building owners/managers, especially in market rate areas.

› Energy Solutions Advisors (ESAs) spend a significant amount of time providing support and guidance to participants. Hence, participation levels suffer.

With the above context in mind, Enbridge asked some fundamental questions upon which the process evaluation is based.

› How can participation be increased?

› How effective are marketing, communications, and outreach activities?

› Are engagement channels with community stakeholders being leveraged appropriately?

› What is working well and where are there challenges through the customer journey?

› How well does the sales team support customers and business partners/contractors?

› How effective are business partners/contractors and how can they be leveraged?

APPENDIX S. Custom Savings Verification Evaluation

The final report for the Custom Savings Verification Evaluation can be found in the following pages.

FINAL REPORT

Custom Savings Verification Evaluation for Ontario's Natural Gas Demand-Side Management Program

Ontario Energy Board

Date: November 25, 2024

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EXECUTIVE SUMMARY

To verify the impacts of the Enbridge Gas Distribution, Inc. (Enbridge) demand side management (DSM) programs, the Ontario Energy Board (OEB) undertakes various annual evaluation studies. The Gross Savings Verification Evaluation of the 2023 Natural Gas Demand Side Management Custom Programs is summarized in this document.

In 2023, Enbridge delivered ratepayer-funded DSM programs to customers, including custom programs delivered to large volume, commercial, and industrial customers that encouraged them to reduce their energy consumption by providing customer-specific energy efficiency and conservation solutions. The custom programs offered provide financial incentives, technical expertise, and guidance with respect to energy-related decision-making and business justification to help customers prioritize energy efficiency projects against their own internal competing factors. Multi-residential buildings – other than low-income buildings, which are dealt with separately – are eligible to participate in Enbridge's custom commercial programs.

The OEB evaluates the custom commercial and industrial program results annually as the programs have significant OEB-approved savings targets. Based on the results of the utilities' programs, the utilities may be eligible for performance incentives. The portion of shareholder incentives that come from the custom commercial and industrial programs is based on the amount of verified net natural gas savings achieved by each utility relative to the OEB-approved targets.

- **Verified savings** are utility draft program savings that are audited and confirmed by an independent third party. The process and results of the verification are described in a separate report. The result of the analysis is a ratio that represents the percentage of utility-draft energy savings that are verified by the auditor.
- **Net savings** are those that are caused, or influenced, by the utility. The process and results of the net savings assessment are described in the 2023 Natural Gas Demand Side Management Free-Ridership Based Attribution Evaluation report. The result of the analysis is a ratio that represents the percentage of verified savings that were caused by the utility.

The two ratios are applied to the utility draft savings to produce final verified net natural gas savings according to the equation in the following figure.

This summary reports the verification ratio, which along with claimed savings and the net savings ratio serves as an input used to calculate verified net savings. The customer program results are combined with the results from other utility programs in a "scorecard." The utilities' scorecard results determine overall performance and if the utility is eligible for a shareholder incentive. The following tables shows the gross savings verification ratio for each program and segment.

Table ES-1. Commercial program

Segment	Gross Realization Rate	+/- at 90% Confidence	Sampled Measures	Population Measures	Population M3 Savings	Percent population M3 Savings
Commercial	91.13%	9%	14	405	17,165,686	57%
Low Income and Multi-Residential Multi-Family	97.61%	8%	18	681	12,961,169	43%
Commercial Program	93.85%	7%	32	1,086	30,126,855	100%

Table ES-2. Industrial program

Segment	Gross Realization Rate	+/- at 90% Confidence	Sampled Measures	Population Measures	Population M3 Savings	Percent population M3 Savings
Agricultural	99.12%	1%	29	190	30,754,095	48%
Industrial	96.52%	5%	18	163	32,772,861	52%
Industrial Program	97.69%	3%	47	353	63,526,956	100%

Table ES-3. Large Volume

Segment	Gross Realization Rate	+/- at 90% Confidence	Sampled Measures	Population Measures	Population M3 Savings	Percent population M3 Savings
Large Volume	98.07%	11%	12	31	80,549,726	100%

Findings and recommendations

#	Energy savings and program performance: Finding	Energy savings and program performance: Recommendation	Applies to: Enbridge	Applies to: Evaluation	Primary beneficial outcome: Reduce costs	Primary beneficial outcome: Increase savings	Primary beneficial outcome: Customer satisfaction	Primary beneficial outcome: Decrease risk
1	Enbridge continues to exhibit a strong commitment to accurate energy savings estimates.	Enbridge should continue its cultural commitment to accuracy.	✓			✓	✓	✓
2	The CPSV effort this year found realization rates between 90% and 100%	Continue performing custom savings verification on a regular basis.		✓				✓
		Consider approaches to sampling that can reduce sample sizes and costs.		✓	✓		✓	

#	Energy savings and program performance		Applies to		Primary beneficial outcome			
	Finding	Recommendation	Enbridge	Evaluation	Reduce costs	Increase savings	Customer satisfaction	Decrease risk
3	Some measures in each utility program are routine maintenance, periodic repairs or like for like replacements that are considered standard care in other jurisdictions.	Establish a clear policy regarding eligibility of maintenance, repair and like for like replacement measures for the programs.	✓		✓			✓
4	The close relationships between Enbridge Energy Savings Consultants (ESCs) and customers provide advantages and challenges for evaluation.	Clarify the role of evaluation engineers, customers, and ESCs in the evaluation. Set and communicate clear expectations for each of the three roles so all parties are aligned.	✓	✓			✓	✓
5	Project documentation continues to improve.	Continue to improve data quality.	✓			✓		✓
6	Some Large Volume measures appear as two separate measure rows in the database due to having two sources of incentive funding.	Add a field to the tracking database to link two rows that are a single measure implementation.	✓		✓			

1 INTRODUCTION

On behalf of the Ontario Energy Board (OEB), DNV carried out the Custom Program Savings Verification (CPSV) of Enbridge Gas Inc.'s (Enbridge) natural gas demand-side management (DSM) programs delivered in 2023. The study produced verified savings ratios and verified gross savings totals for the custom projects in the Enbridge programs examined, shown in Table 1-1.

Table 1-1. CPSV by program

Program	2023 Gross Verification
Large Volume	✓
Commercial*	✓
Industrial	✓

*Custom Market-Rate Multi-Residential (Multifamily) and Low Income Multi-Residential projects are expected to be included as a part of this program.

1.1 Evaluation objectives and approach

The study objectives were to:

- Develop accurate verified gross savings for each of Enbridge's custom commercial, industrial, multi-residential (including low-income), and large volume programs carried out in 2023, with disaggregated rates for each of the major program components within these groupings (for example, differentiated by segment/technology type and determined in consultation with the EC, OEB staff, and EAC at the start of the study).
- Establish and maintain transparency throughout the project.
- Follow industry best practices.
- Achieve 90/10 precision[1] at the requested stratification segment levels.

The methodology selected for the CPSV study consisted of engineer reviews of gross savings. Reviews of complex projects included on-site verification and data collection, while less complex projects were verified with Telephone Supported Engineering Reviews (TSERs).

1.2 Study background

To encourage Enbridge to implement public benefits programs designed to reduce overall energy use, called conservation demand-side management (DSM) programs, the OEB reimburses them for the cost of program implementation and provides an incentive, called the shareholder incentive, that reflects the utilities' performance against pre-determined targets. The OEB also compensates the utilities for the revenue lost as a result of the lower natural gas sales.

In the 2023 calendar year, programs delivered by Enbridge targeted all natural gas ratepayers, including residential, multifamily, low-income, commercial, and industrial customers. This study is part of step 4 of an overall conservation program cycle, as shown in Figure 1-1.

[1] 90/10 precision refers to 10% relative precision with 90% confidence.

Figure 1-1. Conservation program cycle

To verify the impacts of the Enbridge DSM programs, the OEB sponsors studies to verify the energy savings achieved. Specifically, this study verifies the engineering calculations, inputs, and assumptions that produce the utilities' claimed gas savings. The results of this study are combined with the results of the 2023 Net-to-Gross study to produce verified net cumulative gas savings for Custom measures in Enbridge's 2023 Commercial, Industrial and Custom Large Volume programs.

2 COMMERCIAL CUSTOM PROGRAM

Enbridge's custom DSM programs for commercial customers encourage customers to reduce their natural gas consumption by recommending and incentivizing energy saving projects and actions.

These custom programs differ from the prescriptive programs by providing additional technical support for projects. They also provide financial incentives based on overall natural gas savings realized by the customer rather than a per-unit incentive.[2]

2.1 Gross savings realization rate

The gross realization rate (GRR) represents the ratio of the savings verified by the evaluation to the savings claimed (or reported) by the utility, as shown in the following equation. A 90% GRR means the verified gross savings for the project or program were 90% of the claimed savings. Differences between claimed and verified savings for each project can arise for a number of reasons, usually related to differences in forecast assumptions, differences in underlying facts, or differences in calculation approaches or parameters.

$$gross\ realization\ rate = \frac{evaluation\ verified\ savings}{utility\ reported\ savings}$$

Table 2-1 shows the first-year gross savings realization rate by customer segment for the Commercial Custom Program. It shows the gross realization rate, statistical precision at the 90% confidence interval, the program-claimed population cumulative cubic meters of natural gas (CCM) savings, and percent of program savings for each customer segment. The percent of program savings represents the relative contribution that each customer segment makes to the overall result.

Enbridge's Commercial custom program overall achieved a 94% gross realization rate. The customer segment gross realization rates varied from 91% to 98%. The largest segment was Commercial with 57% of the population energy savings. Relative precision for the program overall was 7% at 90% confidence.

Table 2-1. First year gross savings realization rate for the Commercial Custom program

Segment	Gross Realization Rate	+/- at 90% Confidence	Sampled Measures	Population Measures	Population M3 Savings	Percent population M3 Savings
Commercial	91.13%	9%	14	405	17,165,686	57%
Low Income and Multi-Residential Multi-Family	97.61%	8%	18	681	12,961,169	43%
Commercial Program	93.85%	7%	32	1,086	30,126,855	100%

2.2 Discrepancy summary

This section presents detailed results of the various project-level discrepancies between program claimed and evaluation verified savings. The verification found discrepancies in 53% of the projects reviewed.

Figure 2-1 shows that 16 of the 32 measures had no adjustment from program claimed to evaluation verified savings, while 16 measures were adjusted based on verification findings. For custom savings verification, we consider verified savings that differ more than 20% from utility tracking savings to be a "large" discrepancy. Moderate adjustments within 20% of utility tracking savings are expected given the level of uncertainty in forecasting energy savings. Nine of the 16 adjusted measures

[2] A more detailed description of the program can be found in Enbridge's 2023 Demand Side Management Annual Report

had verified savings within 20% of utility tracked savings. Of the 7 measures with adjustments greater than 20%, one (1) had an adjustment increasing savings (measure level realization rate greater than 120%) and six (4) had adjustments decreasing savings (adjusted measure level realization rate less than 80%).

Figure 2-1. Adjusted realization rate (ARR) summary – Commercial Custom program

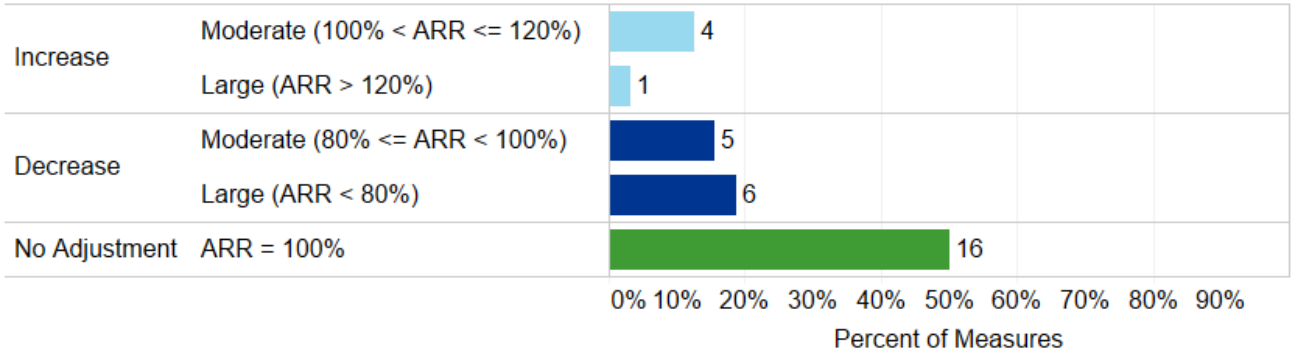


Figure 2-2 plots the claimed first year savings and the realization rate for each measure in the sample. The plot is sorted with the smallest measure on the bottom and largest on the top. The left plot shows the relative size of each measure. The right plot shows the gross realization rate for each measure. In both plots, measures with light blue bars have a realization rate greater than 100% (verified savings greater than utility claimed savings). Measures with dark blue bars represent a gross realization rate less than 100% (verified savings lower than utility claimed savings). Measures with green bars represent a gross realization rate of 100%.

Figure 2-2. Sample measure realization rates sorted by size – Commercial Custom program

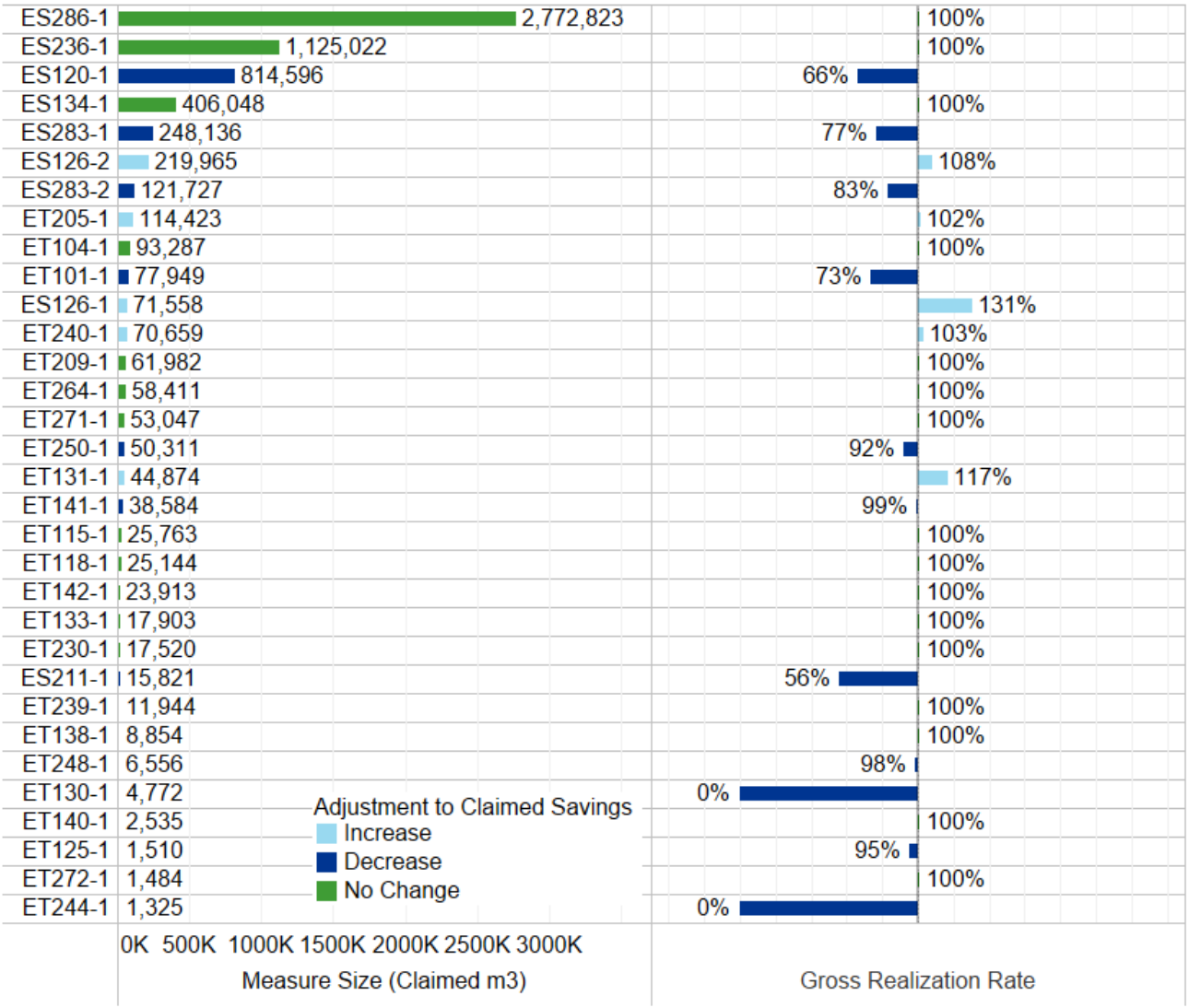
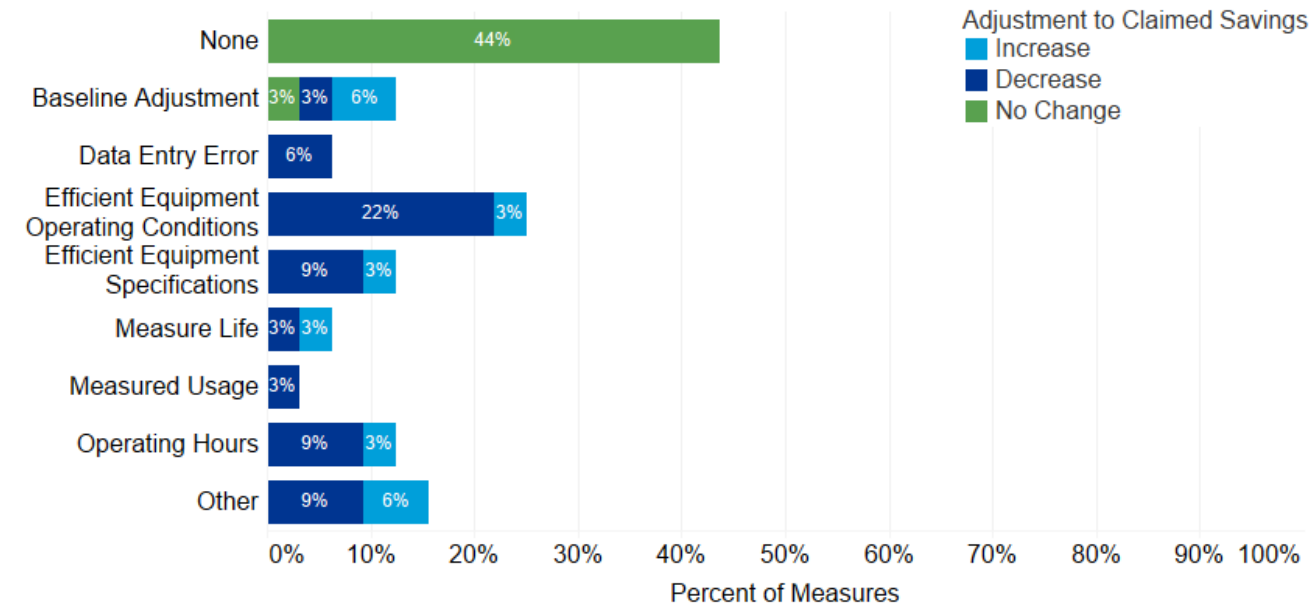


Figure 2-3 shows the types of discrepancies found by the verification. Each measure may have more than one discrepancy. The verification found no discrepancies for 44% of sampled measures. Operating conditions were the only type of discrepancy found for more than 20% of measures. The utility can reduce this type of discrepancy by documenting projects more thoroughly with sources for the assumptions used and more complete documentation of conditions found at the time of installation (see recommendations in section 5); however, this type of discrepancy is partially outside of utility control. One measure had a baseline adjustment that resulted in no change to savings.

Figure 2-3. Savings discrepancies – Commercial Custom program



3 INDUSTRIAL CUSTOM PROGRAM

Enbridge's custom DSM programs for industrial customers encourage customers to reduce their natural gas consumption by recommending and incentivizing energy saving projects and actions.

These custom programs differ from the prescriptive programs by providing additional technical support for projects. They also provide financial incentives based on overall natural gas savings realized by the customer rather than a per-unit incentive.[3]

3.1 Gross savings realization rate

The gross realization rate (GRR) represents the ratio of the savings verified by the evaluation to the savings claimed (or reported) by the utility, as shown in the following equation. A 90% GRR means the verified gross savings for the project or program were 90% of the claimed savings. Differences between claimed and verified savings for each project can arise for a number of reasons, usually related to differences in forecast assumptions, differences in underlying facts, or differences in calculation approaches or parameters.

$$gross\ realization\ rate = \frac{evaluation\ verified\ savings}{utility\ reported\ savings}$$

Table 3-1 shows the first-year gross savings realization rate by customer segment for the Industrial Custom Program. The table shows the gross realization rate, statistical precision at the 90% confidence interval, the program-claimed population cumulative cubic meters of natural gas (CCM) savings, and percent of program savings for each customer segment. The percent of program savings represents the relative contribution that each customer segment makes to the overall result.

Enbridge's custom program overall achieved a 98% gross realization rate. The customer segment gross realization rates varied from 97% to 99%. The largest segment was Industrial with 52% of the population energy savings. Relative precision for the program overall was 3% at 90% confidence.

Table 3-1. First year gross savings realization rate for the Industrial Custom program

Segment	Gross Realization Rate	+/- at 90% Confidence	Sampled Measures	Population Measures	Population M3 Savings	Percent population M3 Savings
Agricultural	99.12%	1%	29	190	30,754,095	48%
Industrial	96.52%	5%	18	163	32,772,861	52%
Industrial Program	97.69%	3%	47	353	63,526,956	100%

3.2 Discrepancy summary

This section presents detailed results of the various project-level discrepancies between program claimed and evaluation verified savings. The verification found discrepancies in 28% of the projects reviewed.

Figure 3-1 shows that 34 of the 47 measures had no adjustment from program claimed to evaluation verified savings, while 13 measures were adjusted based on verification findings. For custom savings verification, we consider verified savings that differ more than 20% from utility tracking savings to be a "large" discrepancy. Moderate adjustments within 20% of utility

[3] A more detailed description of the program can be found in Enbridge's 2023 Demand Side Management Annual Report

tracking savings are expected given the level of uncertainty in forecasting energy savings. Eight of the 13 adjusted measures had verified savings within 20% of utility tracked savings. Of the four (4) measures with adjustments greater than 20%, 1 had adjustments increasing savings (adjustment greater than 120%) and three (3) had adjustments decreasing savings (adjustment less than 80%).

Figure 3-1. Adjusted realization rate (ARR) summary – Industrial Custom program

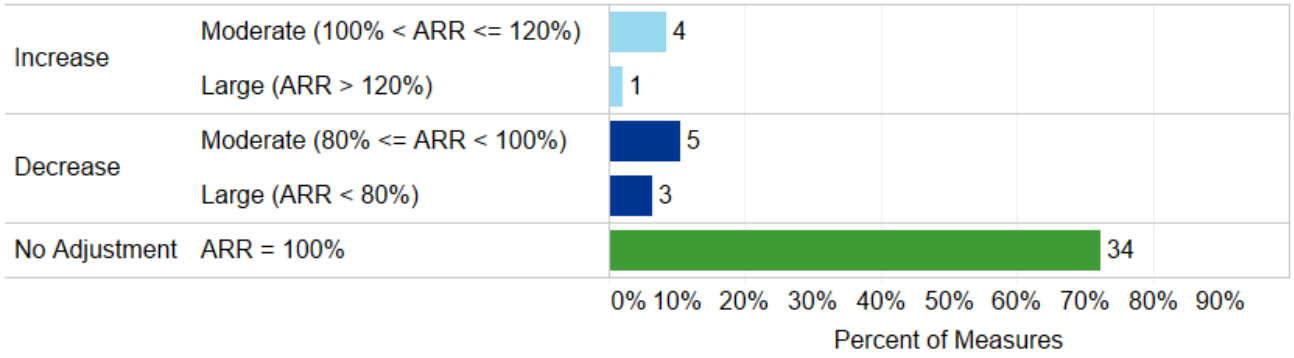


Figure 3-2 plots the claimed first year savings and the realization rate for each measure in the sample. The plot is sorted with the smallest measure on the bottom and largest on the top. The left plot shows the relative size of each measure. The right plot shows the gross realization rate for each measure. In both plots, measures with light blue bars have a realization rate greater than 100% (verified savings greater than utility claimed savings). Measures with dark blue bars represent a gross realization rate less than 100% (verified savings lower than utility claimed savings). Measures with green bars represent a gross realization rate of 100%.

Figure 3-2. Sample measure realization rates sorted by size – Industrial Custom program

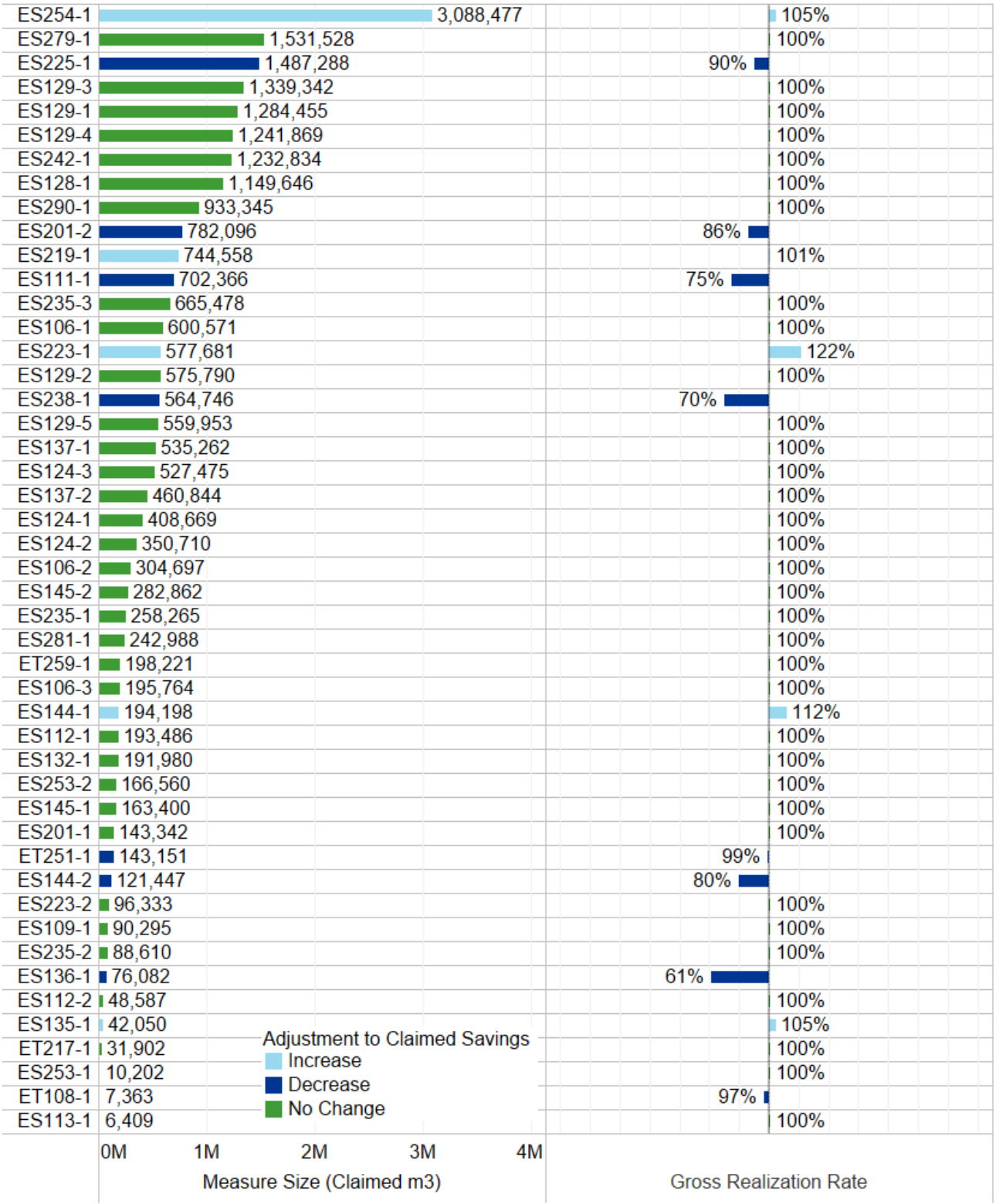
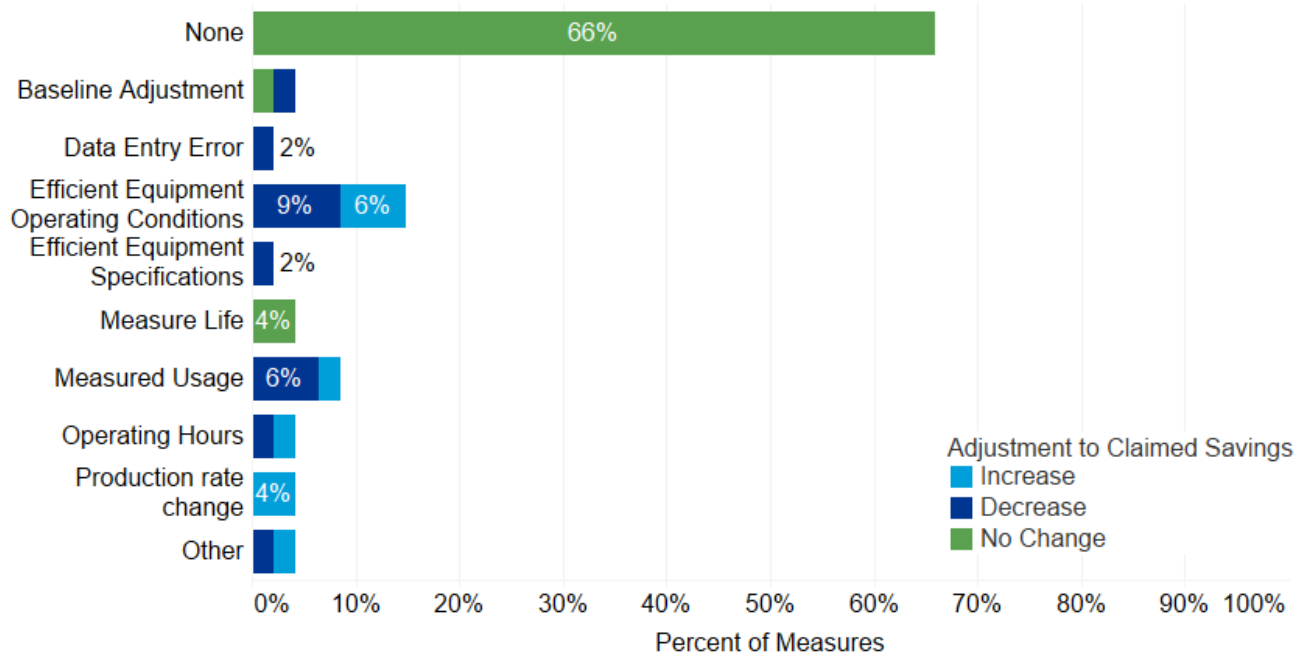


Figure 3-3 shows the types of discrepancies found by the verification. Each measure may have more than one discrepancy. The verification found no discrepancies for 66% of sampled measures. Operating conditions were the only type of discrepancy found for more than 10% of measures. The utility can reduce this type of discrepancy by documenting projects more thoroughly with sources for the assumptions used and more complete descriptions of conditions found at the time of installation (see recommendations in section 5); however, this type of discrepancy is partially outside of utility control. One measure had a baseline adjustment that did not impact savings, while two measures had measure life adjustments, but no discrepancy that affected first year savings.

Figure 3-3. Savings discrepancies – Industrial Custom program



4 LARGE VOLUME

Enbridge encourages the adoption of energy efficient equipment, technologies, and actions via its Large Volume program. In 2023, the Large Volume program was applicable to customers in Rate T2 or Rate 100.

The program uses a direct access budget mechanism for the customer incentive budget process. This mechanism collects funds from each customer through rates. Customers must use these funds to identify and implement energy efficiency projects, or the funds become available for use by other customers in the same rate class. This “use it or lose it” approach ensures each customer has first access to the amount of incentive budget funded by their rates. The Large Volume program is the only “direct access” program offered in Ontario.

Custom projects implemented as part of this program and claimed in 2023 were included in the CPSV study.

4.1 Gross savings realization rate

The GRR represents the ratio of the savings verified by the evaluation to the savings claimed (or reported) by the utility, as shown in the following equation. A 90% GRR means the verified gross savings for the project or program were 90% of the claimed savings. Differences between claimed and verified savings for each project can arise for a number of reasons, usually related to differences in forecast assumptions, differences in underlying facts, or differences in calculation approaches or parameters.

$$gross\ realization\ rate = \frac{evaluation\ verified\ savings}{utility\ reported\ savings}$$

Table 4-1 shows the cumulative gross savings realization rate for the Large Volume program. The table shows the gross realization rate, statistical precision at the 90% confidence interval, the program-claimed population CCM savings, and percent of program savings.

The Large Volume program overall had a 98% annual gross realization rate. The absolute precision (+/-) for the program was 11% at 90% confidence.

Table 4-1. First year gross savings realization rate for Large Volume program

Segment	Gross Realization Rate	+/- at 90% Confidence	Sampled Measures	Population Measures	Population M3 Savings	Percent population M3 Savings
Large Volume	98.07%	11%	12	31	80,549,726	100%

4.2 Discrepancy summary

This section presents detailed results of the various project-level discrepancies between program claimed and evaluation verified savings. The final realization rate for the program was 98% and the verification found discrepancies for 67% of the projects reviewed.

Figure 4-1 shows that four (4) out of 12 measures had no adjustment from program claimed to evaluation verified savings, while eight (8) measures were adjusted based on verification findings. For custom savings verification, we consider verified savings that differ more than 20% from utility tracking savings to be a “large” discrepancy. Moderate adjustments within 20% of utility tracking savings are expected given the level of uncertainty in forecasting energy savings. Three (3) of the eight (8) adjustments had verified savings within 20% of utility tracked savings. Of the five (5) measures with adjustments greater

than 20%, three (3) had adjustments increasing savings (adjustments greater than 120%) and two (2) had adjustments decreasing savings (adjustment less than 80%).

Figure 4-1. Adjusted realization rate (ARR) summary – Large Volume program

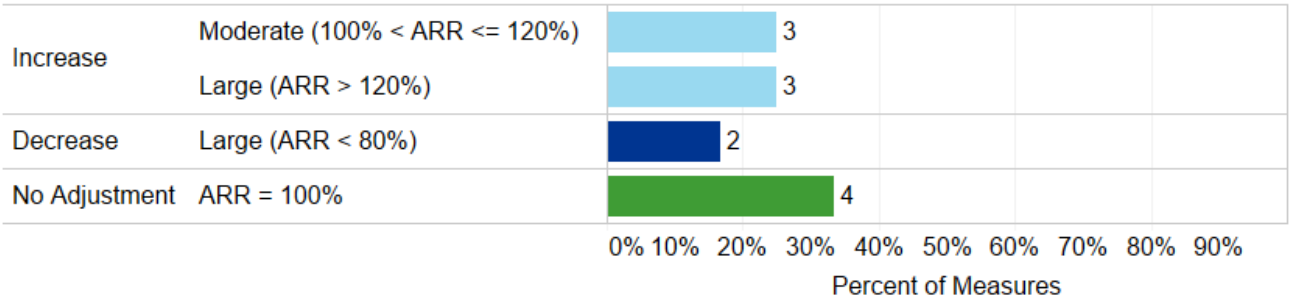


Figure 4-2 plots the claimed cumulative savings and the realization rate for each measure in the sample. The plot is sorted with the smallest measure on the bottom and largest on the top. The left plot shows the relative size of each measure. The right plot shows the gross realization rate for each measure. In both plots, measures with light blue bars have a realization rate greater than 100% (verified savings greater than utility claimed savings). Measures with dark blue bars represent a gross realization rate less than 100% (verified savings lower than utility claimed savings). Measures with green bars represent a gross realization rate of 100%.

Figure 4-2. Sample measure realization rates sorted by size – Large Volume program

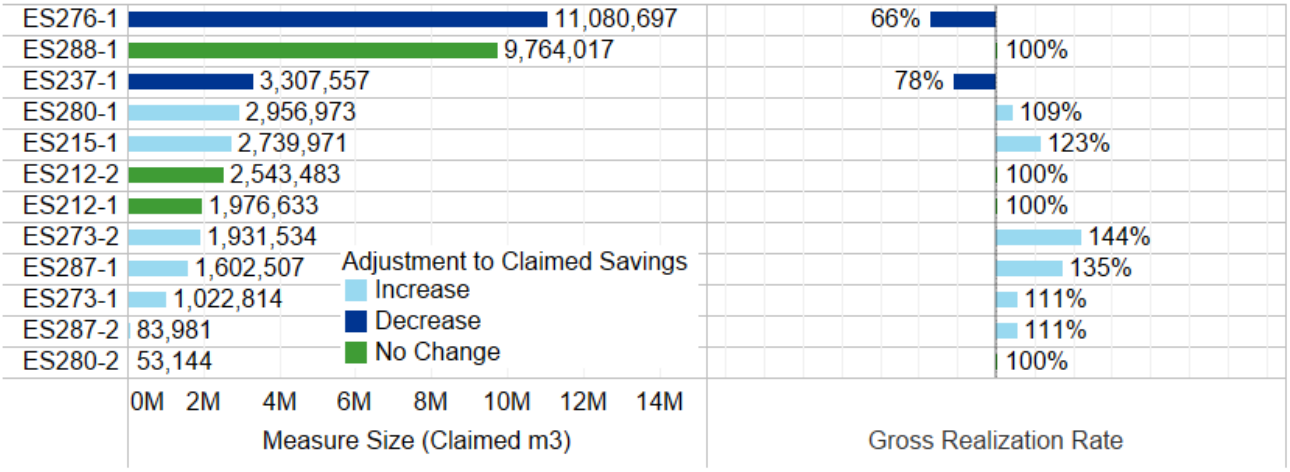
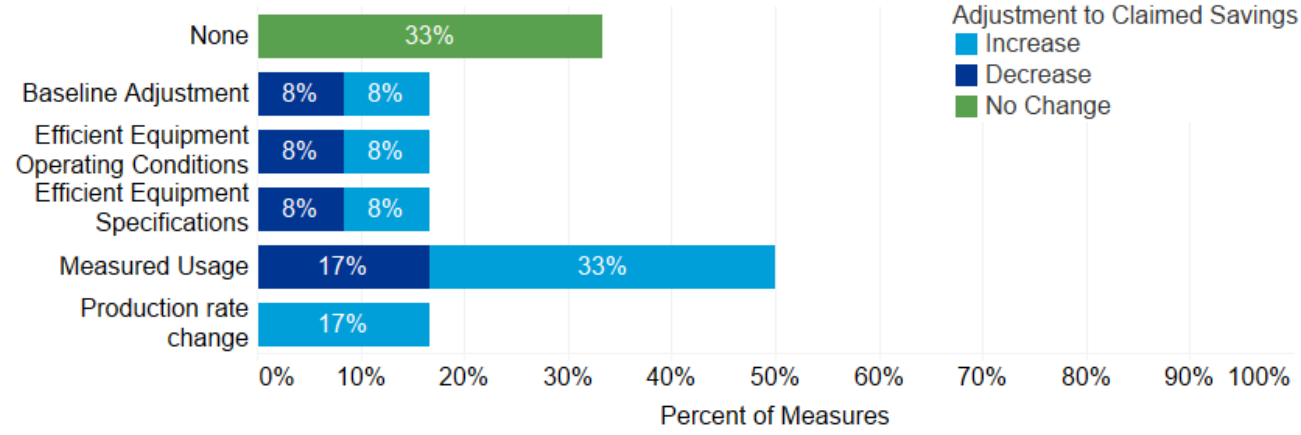


Figure 4-3 shows the types of discrepancies found by the verification. Each measure may have more than one discrepancy. The verification found no discrepancies for 33% of sampled measures. The most common discrepancy between claimed savings and verified savings (50% of measures) was updates to measured energy usage data provided by customers to the verification team. Savings based on measured energy usage are expected to result in some discrepancy during verification because the verification has access to a longer time period of post-installation data than the implementation team. In several cases the implementation team was working with very limited post-installation period data to model savings, which increases the risk of a large adjustment in verification.

Each of four other discrepancy types (baseline adjustment, EE equipment operating conditions, EE specifications and production rate changes) were found for 17% of measures. The utility can reduce this type of discrepancy by documenting projects more thoroughly with sources for the assumptions used and more complete descriptions of conditions found at the

time of installation (see recommendations in section 5); however, these types of discrepancies are partially outside of utility control.

Figure 4-3. Savings discrepancies – Large Volume program



5 FINDINGS AND RECOMMENDATIONS

Table 5-1 presents the key findings and recommendations from the study. It shows the party to whom the recommendation applies and the primary beneficial outcome of the recommendation. We classified outcomes into four categories: reduce costs, increase savings, increase (or maintain) customer satisfaction and decrease risk (multiple types of risk are in this category including risk of adjusted savings, risk to budgets or project schedules, and others). Details of the findings, recommendations and outcomes follow the table.

Table 5-1. Energy savings and program performance recommendations

			Applies to		Primary beneficial outcome			
#	Finding	Recommendation	Enbridge	Evaluation	Reduce costs	Increase savings	Customer satisfaction	Decrease risk
1	Enbridge continues to exhibit a strong commitment to accurate energy savings estimates.	Enbridge should continue its cultural commitment to accuracy.	✓			✓	✓	✓
2	The CPSV effort this year found realization rates between 90% and 100%	Continue performing custom savings verification on a regular basis.		✓				✓
		Consider approaches to sampling that can reduce sample sizes and costs.		✓	✓		✓	
3	Some measures in each utility program are routine maintenance, periodic repairs or like for like replacements that are considered standard care in other jurisdictions.	Establish a clear policy regarding eligibility of maintenance, repair and like for like replacement measures for the programs.	✓		✓			✓
4	The close relationships between Enbridge Energy Savings Consultants (ESCs) and customers provide advantages and challenges for evaluation.	Clarify the role of evaluation engineers, customers, and ESCs in the evaluation. Set and communicate clear expectations for each of the three roles so all parties are aligned.	✓	✓			✓	✓
5	Project documentation continues to improve.	Continue to improve data quality.	✓			✓		✓
6	Some Large Volume measures appear as two separate measure rows in the database due to having two sources of incentive funding.	Add a field to the tracking database to link two rows that are a single measure implementation.	✓		✓			

Finding 1: Enbridge continues to exhibit a strong commitment to accurate energy savings estimates. The utility has made significant investments in developing calculation tools that model savings accurately, such as the commercial and industrial Etools calculator, which is very thorough in attempting to model savings for key measures.

Enbridge's engineers have a strong understanding of their customers' building and process systems and show a commitment to finding accurate savings estimates. In this evaluation and in previous rounds of CPSV, the Enbridge engineering team has appropriately questioned evaluation findings that increased savings as well as those that decreased savings.

- **Recommendation 1:** Enbridge should continue its cultural commitment to accuracy.
- **Outcome 1:** Accurate energy savings.

Finding 2: The CPSV effort this year found realization rates between 90% and 100% and identified adjustments for 40 percent of projects. Across the programs, adjustments increased savings for 16 measures and decreased savings for 21 measures. 16 measures had a large adjustment (verified savings more than 20% different from tracked), which was a decrease from the 2017 verification.

- **Recommendation 2a:** Continue performing custom savings verification on a regular basis. Even a study that results in an adjustment of near 100% is still valuable because the programs know that their savings estimates will be reviewed. Knowing a review will be conducted improves the quality of ex ante estimates. The review itself also results in information that improves future program savings estimates.
- **Recommendation 2b:** Consider approaches to sampling that can reduce sample sizes and costs. Consistent realization rates of close to 100% are an indication that frequent smaller sample CPSV may provide the benefits cited in recommendation 2a while allowing for lower cost.
- **Outcome 2:** Accurate energy savings.

Finding 3: Some measures in each utility program are routine maintenance, periodic repairs or like for like replacements that are considered standard care in other jurisdictions.

- **Recommendation 3:** Establish a clear policy regarding eligibility of maintenance, repair and like for like replacement measures for the programs.
- **Outcome 3:** Reduced free-ridership risk.

Finding 4: The close relationships between Enbridge Energy Savings Consultants (ESCs) and customers provide advantages and challenges for evaluation.

A major advantage is that evaluation response rates were higher than they would have been otherwise due to ESC involvement in recruitment and regular attendance at site visits. Another advantage is that at some sites the ESC was able to help ensure both customers and evaluation engineers are talking about the same equipment or parameters, reducing miscommunication risk.

In evaluating some sites, the evaluation faced challenges ensuring that the data collected was coming from the customer rather than the ESC. Customers at times would defer to the ESC for some questions, which risks introducing confirmation bias and less independence for the evaluation.

- **Recommendation 4:** Clarify the role of evaluation engineers, customers, and ESCs in the evaluation. Set and communicate clear expectations for each of the three roles so all parties are aligned.
- **Outcome 4:** Independent and accurate evaluation with a positive customer experience.

Finding 5: Project documentation continues to improve. In this evaluation, some specific areas for improvement were identified:

- Project data or details missing
  - Basecase heating system details (quantities, efficiencies and conditions)
  - Trend data used for ex ante savings estimates
  - Measure loading order in Virtual Grower
- Measure descriptions not matching what was installed
- Use of black box tools
- Hardcoded information in calculation spreadsheets
- Undocumented assumptions and inputs
  - Values (such as CFM, temperature setpoints etc) provided with no documentation
- Insufficient access to customer data (by customers).
- **Recommendation 5:** Continue to improve data quality. Possible steps include:
  - Include explicit sources for all inputs and assumptions in the project documentation, with supporting evidence wherever possible
  - Store background studies and information sources with the project files and make them available to evaluators.
  - Provide evaluators full access to customer data.
  - Provide pre- and post-installation photos, where available.
  - Consider increasing documentation requirements for projects above certain incentive or gas savings amount
  - Institute a checklist as part of project closeout to ensure all relevant project documentation is assembled as ready for verification
- **Outcome 5:** Lower evaluation risk. Properly explaining and sourcing the savings calculation method and assumptions allows the evaluating engineer to more easily identify what needs to be verified. It also makes it easier to determine whether the methods and assumptions are reasonable and use ex ante assumptions rather than seek documented values elsewhere.

Finding 6: Some Large Volume measures appear as two separate measure rows in the database due to having two sources of incentive funding. These were not always easy to identify in the data.

- **Recommendation 6:** Add a field to the tracking database to link two rows that are a single measure implementation.
- **Outcome 6:** Consistent identification of multiple row measures will reduce re-work for sampling and expansion in the evaluation.

APPENDIX A. GLOSSARY OF TERMS AND KEY CONCEPTS

Term	Description
Adjustment factor	The adjustment factors are ratios of savings that allow evaluation findings from a sample of projects to be applied to and "adjust" the population of program savings. Realization rates, and ratios are other common terms.
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	Energy used / equipment in place if the program measure had not been done.
Building envelope	Exterior surfaces (e.g., walls, windows, roof, and floor) of a building that separate the conditioned space from the outdoors.
C&I	Commercial and industrial
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)	Activities related to the collection, analysis, and reporting of data for purposes of measuring gross custom program impacts.
Customer	Unique customers can be identified based on the account number and the contact information provided by Enbridge. A customer may have multiple site addresses, decision makers, and account numbers. Customers can only be identified for records for which we received contact information. i.e., records associated with account numbers that have measures in the sample or backup sample).
Customer Incentive	An incentive is a transfer payment from the utility to participants of a DSM program. Incentives can be paid to customers, vendors or other parties as part of a DSM program.
Demand side management (DSM)	Modification of perceived customer demand for a product through various methods such as financial incentives, education, and other programs
Domain	Grouping of like projects. A domain may be defined as projects within a specific sector or a category of measure types, end uses or other.
Dual baseline	Savings calculation approach which addresses or combines the savings associated with early replacement and the savings after the early replacement period. This concept is relevant to the measurement of lifetime gas savings (CCM) but not first-year annual savings.
Early replacement (ER)	Measure that replaces a piece of equipment that is not past EUL and in good operating condition.
Early replacement period (ER Period)	Years that the existing equipment would have continued to be in use. This is the same as RUL. This concept is relevant to the measurement of lifetime gas savings (CMM) but not first-year annual savings.
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 solutions advisors	Energy Solutions Consultants (ESCs) work with customers on a one-to-one basis to address the unique processes and opportunities within each customer facility, identify energy savings opportunities and promote Enbridge's DSM offerings.
Estimated useful life (EUL)	Typically, the median number of years that the measure will remain in service.

Term	Description
Ex ante	Program claimed or reported inputs, assumptions, savings, etc.
Ex post	Program inputs, assumptions, savings, etc. which are verified after the claimed savings are finalized. Does not include assessment of program influence.
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	Gross savings are changes in energy consumption and/or demand directly caused by program-related actions by participants, regardless of reasons for participation (savings relative to baseline, defined above).
In situ	Existing measure, conditions, and settings.
In-depth interviews	Structured technical interviews administered by evaluation engineers and market researchers either in person or more frequently, over the phone, IDIs offer more flexibility than CATIs and are best leveraged for complex projects and topics.
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)	Common measure implemented within the industry.
Input assumptions	A common practice used within an industry but not formally defined by code or regulation.
Lifetime cumulative savings	Total natural gas savings (CCM) over the life of a DSM measure. It can be claimed, gross, or net. Sometimes referred to as just "cumulative" or "lifetime."
Maintenance (Maint.)	Repair, maintain, or restore to prior efficiency.
Measure	Equipment, technology, practice, or behavior that, once installed or working, results in a reduction in energy use. Measures are identified in the tracking data as unique line items for which savings within a custom project are quantified. 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)	Verification of savings using methods not including attribution/free ridership assessment.
Metric	This is a term used by the OEB 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 annual 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	Multifamily (multi-residential)
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)	Years after the ER period up to the EUL.

Term	Description
Non-energy impacts	Sometimes called non-energy benefits, these are the wider socio-economic or environmental outcomes that arise from energy efficiency improvements, aside from energy savings. NEIs can include but are not limited to impacts such as improved safety, improved health, and job creation. For example, offering participants may benefit from increased property value, and improved health and comfort. The TRC-Plus test includes a 15% adder to the benefits calculation to account for NEIs.
Normal replacement (NR)	Measure that replaces a piece of equipment that is past EUL and in good operating condition.
Offering	One or more DSM activities or measures which a utility may use to affect a specifically identified target market in their choices around the amount and timing of energy consumption.
Persistence	The extent to which a DSM measure remains installed and performing as originally predicted in relation to its EUL.
Portfolio	A group of DSM programs which have been selected and combined in order to achieve the objectives of a utility's DSM Plan.
Program	The programs outlined in Enbridge's Multi-Year Plan are comprised of one or more offerings and address the needs of a subset of Enbridge's customer base.
Program evaluation	Activities related to the collection, analysis, and reporting of data for purposes of measuring program impacts 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	Projects are identified in the tracking data based on the project code. A project may have multiple measures as indicated by sub-codes in the current data tracking system.
Rate class	The OEB establishes distribution rate classes for Enbridge. Distribution rate classes group customers with similar energy profiles.
Realization rate	A combination of adjustment factors, which represents ratios between two savings values. For example, the final realization rate is the ratio between evaluated savings and program claimed savings.
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)	Measure that replaces a failed or failing piece of equipment.
Retrofit add-on (REA)	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-2021-0002.
Scorecard Achievement	The verified value for program-specific metric targets (annual savings, 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 125%.
Site	Sites are identified based on unique site addresses provided by 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 a site id.

Term	Description
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)	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	Telephone-supported engineering review.
Unit of analysis	The level at which the data are analyzed, which in 2023 will likely be a "measure" or sub-project level for Enbridge.
Vendors	Program trade allies, business partners, contractors, and suppliers who work with program participants to implement energy saving measures.

APPENDIX B. FINAL SAMPLE ACHIEVEMENT

Commercial Custom: Summary of participant data collection

Table B-1 summarizes the CPSV data collection efforts for the Commercial Custom Program. The table shows the portion of the program that:

- Completed on-site visits
- Completed telephone supported engineering reviews (TSER)
- Did not respond to an evaluation attempt at contact, or refused verification
- Was not contacted by the evaluation team.

The data collected is represented as the number of sites, the number of measures, and first-year ex ante natural gas savings (ex ante m3). The proportion of the program in each category is also represented in Table B-2. In the table, size categories within segments (e.g. Industrial) are ordered with 1 being the smallest stratum within each segment. The study had a customer response rate of 75%, which is higher than recent comparable studies in central North America.

Table B-1. Summary of CPSV data collection for Commercial Custom program

Data collection category	Targeted # measures	# sites	# measures	Ex ante m^3
Completed On-Site		7	9	5,795,697
Completed TSER		23	23	812,751
Attempted Contact, Not Completed		10	35	4,808,969
Not Attempted		763	1,019	18,709,438
Total	35	803	1,086	30,126,855

Table B-2. CPSV sample achievement for Commercial program

Segment	Stratum	Max m3	Target	Completed Measures	Frame Measures	Completed m3	Population m3
Commercial	1	14,944	4	3	253	22,282	1,763,968
	2	40,413	4	2	93	41,584	2,182,322
	3	107,135	4	4	43	286,769	2,617,012
	4	814,596	3	3	13	1,335,067	2,768,314
	5	3,936,225	3	2	3	3,897,845	7,834,070
Low Income and Multi-Residential Multi-Family	1	13,539	5	5	398	16,698	2,409,060
	2	27,085	4	4	152	84,479	2,978,868
	3	57,673	4	3	89	141,943	3,396,812
	4	219,965	4	5	41	533,643	3,928,293
	5	248,136	1	1	1	248,136	248,136
			Grand Total	32	1,086	6,608,447	30,126,855

Industrial Custom: Summary of participant data collection

Table B-3 summarizes the CPSV data collection efforts for the Industrial Custom Program. The table shows the portion of the program that:

- Completed on-site visits
- Completed telephone supported engineering reviews (TSER)
- Did not respond to an evaluation attempt at contact, or refused verification
- Was not contacted by the evaluation team.

The data collected is represented as the number of sites, the number of measures, and first-year ex ante natural gas savings (ex ante m3). The proportion of the program in each category is also represented in Table B-4. In the table, size categories within segments (e.g., Industrial) are ordered with 1 being the smallest stratum within each segment. The study had a customer response rate of 86%, which is higher than comparable studies in central North America.

Table B-3. Summary of CPSV data collection for Industrial program

Data collection category	Targeted # measures	# sites	# measures	Ex ante m^3
Completed On-Site		26	43	24,262,540
Completed TSER		4	4	380,637
Attempted Contact, Not Completed		5	81	13,712,491
Not Attempted		131	225	25,171,288
Total	44	166	353	63,526,956

Table B-4. CPSV sample achievement for Industrial program

Segment	Stratum	Max m3	Target	Completed Measures	Frame Measures	Completed m3	Population m3
Agricultural	1	78,988	4	4	114	97,100	3,232,999
	2	191,980	4	7	32	965,634	4,231,024
	3	298,378	4	5	20	1,124,575	4,805,489
	4	600,571	4	6	12	3,037,117	5,380,262
	5	1,171,415	4	3	7	2,380,919	6,288,144
	6	1,418,983	3	3	4	3,865,666	5,284,649
	7	1,531,528	1	1	1	1,531,528	1,531,528
Industrial	1	112,851	4	4	98	221,828	4,085,872
	2	267,939	4	3	27	584,360	5,203,176
	3	408,669	4	2	18	759,379	6,084,045
	4	702,366	4	4	11	2,372,268	6,109,767
	5	1,232,834	3	3	7	3,127,038	6,714,235
	6	3,088,477	2	2	2	4,575,765	4,575,765
			Grand Total	47	353	24,643,177	63,526,956

Large Volume: Summary of participant data collection

Table B-5 summarizes the participant data collection efforts for CPSV of the Large Volume program. The table shows the portion of the program that:

- Completed on-site visits
- Did not respond to an evaluation attempt at contact, or refused verification
- Was not contacted by the evaluation team.10

The data collected is represented as the number of sites, the number of measures, and cumulative ex ante natural gas savings (ex ante CCM). The proportion of the program in each category is also represented in Table C-6. In the table, size categories are ordered with 1 being the smallest stratum. The study had a customer response rate of 80%, which is higher than recent comparable studies in central North America.

Table B-5. Summary of CPSV data collection for Large Volume program

Data Collection Category	Targeted # Measures	# Sites	# Measures	Ex Ante m3
Completed On-Site		8	12	39,063,311
Attempted Contact, Not Completed		2	9	33,687,899
Not Attempted		8	9	7,798,516
Total	14	18	30	80,549,726

Table B-6. CPSV sample achievement for Large Volume program

Segment	Stratum	Max m3	Target	Completed Measures	Frame Measures	Completed m3	Population m3
Large Volume	1	1,913,687	3	4	16	2,762,446	8,426,602
	2	2,539,584	3	2	5	3,908,167	11,059,954
	3	2,956,973	3	3	4	8,240,427	10,795,261
	4	15,193,375	5	3	5	24,152,271	50,267,909
			Grand Total	12	30	39,063,311	80,549,726

APPENDIX C. ADDITIONAL RESULTS

Table C-1. Cumulative cubic meter realization rate – Commercial Program

Segment	Gross Realization Rate	+/- at 90% Confidence	Sampled Measures	Population Measures	Population CCM Savings	Percent population CCM Savings
Commercial	83.87%	15%	14	405	337,913,454	56%
Low Income and Multi-Residential Multi-Family	97.10%	6%	18	681	267,391,282	44%
Commercial Program	90.25%	9%	32	1,086	605,304,736	100%

Table C-2. Cumulative cubic meter realization rate – Industrial Program

Segment	Gross Realization Rate	+/- at 90% Confidence	Sampled Measures	Population Measures	Population CCM Savings	Percent population CCM Savings
Agricultural	99.64%	1%	29	190	476,096,535	46%
Industrial	99.07%	8%	18	163	556,156,911	54%
Industrial Program	99.30%	5%	47	353	1,032,253,447	100%

Table C-3. Cumulative cubic meter realization rate – Large Volume Program

Segment	Gross Realization Rate	+/- at 90% Confidence	Sampled Measures	Population Measures	Population CCM Savings	Percent population CCM Savings
Large Volume	89.64%	18%	12	31	741,145,146	100%

Table C-4. First year gross savings realization rate – Commercial Program – non-FPC precision

Segment	Gross Realization Rate	+/- at 90% Confidence	Sampled Measures	Population Measures	Population M3 Savings	Percent population M3 Savings
Commercial	91.13%	11%	14	405	17,165,686	57%
Low Income and Multi-Residential Multi-Family	97.61%	8%	18	681	12,961,169	43%
Commercial Program	93.85%	7%	32	1,086	30,126,855	100%

Table C-5. First year gross savings realization rate – Industrial Program – non-FPC precision

Segment	Gross Realization Rate	+/- at 90% Confidence	Sampled Measures	Population Measures	Population M3 Savings	Percent population M3 Savings
Agricultural	99.12%	2%	29	190	30,754,095	48%
Industrial	96.52%	6%	18	163	32,772,861	52%
Industrial Program	97.69%	3%	47	353	63,526,956	100%

Table C-6. First year gross savings realization rate – Large Volume Program – non-FPC precision

Segment	Gross Realization Rate	+/- at 90% Confidence	Sampled Measures	Population Measures	Population M3 Savings	Percent population M3 Savings
Large Volume	98.07%	17%	12	31	80,549,726	100%

APPENDIX D. KEY DOCUMENTS

The Scope of Work embedded below includes the technical background and methodology used in this study. Also provided are the sample design memo and the site report template used for reporting site specific results.

Scope of Work

OEB CPSV 2023 SOW

Sample Design Memo

2023 CPSV Wave 2 Sample Design

Site report template

2023 CPSV Site Report Template

APPENDIX E. SITE-LEVEL SAVINGS RESULTS

Table E-1. Commercial site-level savings results

Measure Number	Tracking m3	Verified First Year m3	First year m3 Realization Rate	Verified Average Annual m3	Tracking CCM	Verified CCM	CCM Realization Rate
1	2,772,823	2,772,823	100%	2,772,823	55,456,460	55,456,460	100%
2	1,125,022	1,125,022	100%	1,125,022	16,875,330	16,875,330	100%
3	814,596	534,240	66%	534,240	20,364,900	10,684,800	52%
4	406,048	406,048	100%	406,048	2,030,240	2,030,240	100%
5	248,136	191,870	77%	191,870	6,203,408	4,180,575	67%
6	219,965	236,846	108%	236,846	3,299,475	3,552,690	108%
7	121,727	100,611	83%	100,611	1,825,905	1,509,165	83%
8	114,423	116,842	102%	116,842	686,538	701,052	102%
9	93,287	93,287	100%	93,287	559,722	559,722	100%
10	77,949	57,153	73%	57,153	1,169,242	857,295	73%
11	71,558	93,504	131%	93,504	1,073,377	1,402,560	131%
12	70,659	72,724	103%	72,724	1,766,475	1,454,480	82%
13	61,982	61,982	100%	61,982	1,549,545	1,549,550	100%
14	58,411	58,411	100%	58,411	876,164	876,165	100%
15	53,047	53,047	100%	53,047	1,326,181	1,326,175	100%
16	50,311	46,536	92%	46,536	1,257,779	1,163,256	92%
17	44,874	52,353	117%	52,353	673,110	785,295	117%
18	38,584	38,066	99%	38,066	964,608	951,650	99%
19	25,763	25,763	100%	25,763	644,087	644,075	100%
20	25,144	25,144	100%	25,144	628,604	628,600	100%
21	23,913	23,913	100%	23,913	597,814	597,825	100%
22	17,903	17,903	100%	17,903	447,566	447,575	100%
23	17,520	17,520	100%	17,520	437,995	438,000	100%
24	15,821	8,866	56%	8,866	158,208	88,660	56%
25	11,944	11,999	100%	11,999	179,154	179,985	100%
26	8,854	8,854	100%	8,854	53,124	53,124	100%
27	6,556	6,401	98%	6,401	163,904	160,025	98%
28	4,772	0	0%	0	71,580	0	0%
29	2,535	2,535	100%	2,535	35,490	35,490	100%
30	1,510	1,427	95%	1,427	22,651	21,405	94%
31	1,484	1,484	100%	1,484	37,105	37,100	100%
32	1,325	0	0%	0	33,131	0	0%

Table E-2. Industrial site-level savings results

Measure Number	Tracking m3	Verified First Year m3	First year m3 Realization Rate	Verified Average Annual m3	Tracking CCM	Verified CCM	CCM Realization Rate
1	3,088,477	3,250,975	105%	3,250,975	61,769,540	65,019,500	105%
2	1,531,528	1,531,528	100%	1,531,528	15,315,278	15,315,280	100%
3	1,487,288	1,343,760	90%	1,343,760	29,745,760	26,875,200	90%
4	1,339,342	1,339,340	100%	1,339,340	20,090,130	20,090,100	100%
5	1,284,455	1,284,454	100%	1,284,454	25,689,100	25,689,080	100%
6	1,241,869	1,241,851	100%	1,241,851	24,837,380	24,837,020	100%
7	1,232,834	1,232,834	100%	1,232,834	24,656,680	24,656,680	100%
8	1,149,646	1,149,646	100%	1,149,646	22,992,920	22,992,920	100%
9	933,345	933,344	100%	933,345	4,666,725	4,666,725	100%
10	782,096	675,529	86%	675,529	3,910,480	3,377,645	86%
11	744,558	754,424	101%	754,424	14,891,160	15,088,480	101%
12	702,366	524,248	75%	713,026	14,047,320	14,260,520	102%
13	665,478	665,478	100%	665,478	6,654,780	6,654,780	100%
14	600,571	600,571	100%	600,571	12,011,420	12,011,420	100%
15	577,681	702,731	122%	702,731	11,553,620	14,054,620	122%
16	575,790	575,790	100%	575,790	11,515,800	11,515,800	100%
17	564,746	394,882	70%	580,900	11,294,920	11,618,000	103%
18	559,953	559,954	100%	559,954	8,399,295	8,399,310	100%
19	535,262	535,262	100%	535,262	8,028,930	8,028,930	100%
20	527,475	527,475	100%	527,475	10,549,500	10,549,500	100%
21	460,844	460,844	100%	460,844	9,216,880	9,216,880	100%
22	408,669	408,669	100%	408,669	8,173,380	8,173,380	100%
23	350,710	350,710	100%	350,710	3,507,100	3,507,100	100%
24	304,697	304,697	100%	304,697	3,046,970	3,046,970	100%
25	282,862	282,863	100%	282,863	5,657,240	5,657,260	100%
26	258,265	258,265	100%	258,265	5,165,300	5,165,300	100%
27	242,988	242,988	100%	242,988	2,429,880	4,373,784	180%
28	198,221	198,221	100%	198,221	3,964,420	2,775,094	70%
29	195,764	195,658	100%	195,658	1,957,640	1,956,580	100%
30	194,198	217,946	112%	217,946	3,883,960	4,358,920	112%
31	193,486	193,486	100%	193,486	2,902,290	2,902,290	100%
32	191,980	191,979	100%	191,979	2,879,700	2,879,685	100%
33	166,560	166,560	100%	166,560	1,665,600	1,665,600	100%
34	163,400	163,400	100%	163,400	2,451,000	2,451,000	100%
35	143,342	143,342	100%	143,342	2,866,840	2,866,840	100%
36	143,151	142,174	99%	142,174	858,906	853,044	99%
37	121,447	97,700	80%	97,700	2,428,940	1,954,000	80%
38	96,333	96,333	100%	96,333	577,998	577,998	100%

Measure Number	Tracking m3	Verified First Year m3	First year m3 Realization Rate	Verified Average Annual m3	Tracking CCM	Verified CCM	CCM Realization Rate
39	90,295	90,297	100%	90,297	1,354,425	1,354,455	100%
40	88,610	88,610	100%	88,610	886,100	886,100	100%
41	76,082	46,238	61%	29,396	1,521,640	587,920	39%
42	48,587	48,587	100%	48,587	485,870	485,870	100%
43	42,050	44,072	105%	44,072	841,000	881,440	105%
44	31,902	31,902	100%	31,902	319,020	319,020	100%
45	10,202	10,202	100%	10,202	204,040	204,040	100%
46	7,363	7,153	97%	7,153	103,082	100,142	97%
47	6,409	6,408	100%	6,408	128,180	128,160	100%

Table E-3. Large volume site-level savings results

Measure Number	Tracking m3	Verified First Year m3	First year m3 Realization Rate	Verified Average Annual m3	Tracking CCM	Verified CCM	CCM Realization Rate
1	11,080,697	7,346,807	66%	7,346,807	221,613,941	146,936,140	66%
2	9,764,017	9,764,017	100%	9,764,017	48,820,085	48,820,085	100%
3	3,307,557	2,571,884	78%	2,571,884	66,151,140	51,437,680	78%
4	2,956,973	3,236,350	109%	3,236,350	2,956,973	3,236,350	109%
5	2,739,971	3,382,338	123%	1,690,863	8,219,913	5,072,589	62%
6	2,543,483	2,543,483	100%	2,543,483	2,543,483	2,543,483	100%
7	1,976,633	1,976,633	100%	1,976,633	11,859,798	11,859,798	100%
8	1,931,534	2,772,774	144%	2,772,774	1,931,534	2,772,774	144%
9	1,602,507	2,158,358	135%	2,158,358	40,062,675	53,958,950	135%
10	1,022,814	1,139,069	111%	1,139,069	15,342,210	17,086,035	111%
11	83,981	93,149	111%	93,149	1,679,620	1,862,980	111%
12	53,144	53,144	100%	53,144	318,864	318,864	100%

About DNV

DNV is an independent assurance and risk management provider, operating in more than 100 countries, with the purpose of safeguarding life, property, and the environment. Whether assessing a new ship design, qualifying technology for a floating wind farm, analyzing sensor data from a gas pipeline, or certifying a food company's supply chain, DNV enables its customers and their stakeholders to manage technological and regulatory complexity with confidence. As a trusted voice for many of the world's most successful organizations, we use our broad experience and deep expertise to advance safety and sustainable performance, set industry standards, and inspire and invent solutions.

APPENDIX T. Net-to-Gross Evaluation for Ontario's Natural Gas Custom C&I DSM Programs

The final report for the Net-to-Gross Evaluation can be found in the following pages.

FINAL REPORT

Net-to-Gross Evaluation for Ontario's Natural Gas Custom C&I DSM Programs

Ontario Energy Board

Date: November 8, 2024

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EXECUTIVE SUMMARY

To verify the impacts of the Enbridge Gas Distribution, Inc. (Enbridge) demand side management (DSM) programs, the Ontario Energy Board (OEB) undertakes various annual evaluation studies. The Net-to-Gross Evaluation of the 2023 Natural Gas Demand Side Management is summarized in this document.

In 2023, Enbridge delivered ratepayer-funded DSM programs to customers, including custom programs delivered to large volume, commercial, and industrial customers that encouraged them to reduce their energy consumption by providing customer-specific energy efficiency and conservation solutions. The custom programs offered provide financial incentives, technical expertise, and guidance with respect to energy-related decision-making and business justification to help customers prioritize energy efficiency projects against their own internal competing factors. Multifamily buildings – other than low-income buildings, which are dealt with separately – are eligible to participate in Enbridge's custom commercial programs.

The OEB evaluates the custom commercial and industrial program results annually as the programs have significant OEB-approved savings targets. Based on the results of the utilities' programs, the utilities may be eligible for performance incentives. The portion of shareholder incentives that come from the custom commercial and industrial programs is based on the amount of verified net natural gas savings achieved by each utility relative to the OEB-approved targets.

- **Verified savings** are utility draft program savings that are audited and confirmed by an independent third party. The process and results of the verification are described in a separate report. The result of the analysis is a ratio that represents the percentage of utility-draft energy savings that are verified by the auditor.
- **Net savings** are those that are caused, or influenced, by the utility, including attributable (non-free rider) program savings and spillover. The process and results of the net savings assessment are described in two separate reports: this report, the 2023 Natural Gas Demand Side Management Net-to-Gross Evaluation report (published 2024), and the CPSV Participant Spillover Results report (published 2018). The result of the analysis is a ratio that represents the percentage of verified savings that were caused by the utility.

The two ratios are applied to the utility draft savings to produce final verified net natural gas savings according to the equation in the following figure.

This report provides the free-ridership-based attribution ratio which once combined with spillover becomes the net savings ratio. For the agriculture segment this report also includes results from the 2024 spillover study focused on that segment. The net savings ratio together with claimed savings and the verification ratio serves as an input used to calculate verified net savings. The customer program results are combined with the results from other utility programs in a "scorecard." The utilities' scorecard results determine overall performance and if the utility is eligible for a shareholder incentive.

The following table provides an example of how the results from this report could be used to calculate the net savings ratio for each segment. Apart from the agricultural segment, the free-ridership-based attribution ratios are combined with spillover

ratios from the 2013-2014 spillover study[1], the most recent spillover results for the non-agricultural segments. For segments that consist of multiple 2013-2014 spillover domains, a 2023 savings weighted average of the 2013-2014 spillover ratios is used in the example table. The table is shown for illustration of how the free-ridership-based attribution ratios can be combined with the spillover ratios to calculate the net savings ratios. For each year, the year specific application of results is decided within the scope of the annual verification reporting process.

Net savings ratio example

Program	Segment	Free-ridership-based attribution	Spillover ratio	Net savings ratio	Population m^3 savings	Percent population m^3 savings
Commercial	Commercial	65.81%	1.03%	66.84%	6,100,147	4%
	Institutional	73.55%	0.50%	74.05%	11,065,539	6%
	Market Rate Multi-Residential	65.74%	6.64%	72.38%	10,074,677	6%
Industrial	Agricultural	62.52%	14.96%	77.48%	30,754,095	18%
	Industrial	64.19%	1.22%	65.41%	32,772,861	19%
Large Volume	Large Volume	27.95%	0.82%	28.77%	80,549,726	47%

The following tables show the free-ridership-based attribution and the spillover for the agriculture segment.

Custom program	Free-ridership-based attribution
Commercial	68.54%
Industrial	63.47%
Large Volume	27.95%

Commercial program

Segment	Free-ridership-based attribution	Sample customers	Sample measures	± at 90% confidence (FPC on)	Population m^3 savings	Percent population m^3 savings
Commercial	65.81%	32	38	12%	6,100,147	22%
Institutional	73.55%	19	24	14%	11,065,539	41%
Market Rate Multi-Residential	65.74%	32	35	9%	10,074,677	37%
Commercial Program Overall	68.54%	83	97	7%	27,240,363	100%

Industrial program

Segment	Free-ridership-based attribution	Sample customers	Sample measures	± at 90% confidence (FPC on)	Population m^3 savings	Percent population m^3 savings
Agricultural	62.52%	31	49	8%	30,754,095	48%
Industrial	64.19%	46	58	7%	32,772,861	52%
Industrial program overall	63.47%	77	107	6%	63,526,956	100%

[1] CPSV Participant Spillover Results, DNV for the Ontario Energy Board, May 23, 2018

Agriculture Segment Spillover

M^3 Results	Spillover ratio	Sample customers	Sample sites	± at 90% confidence (FPC on)	Population m^3 spillover savings
Spillover relative to program savings - all sources	14.96%	105	143	11.91%	4,599,439
Spillover relative to consumption - all sources	0.54%	105	143	0.43%	4,599,439

Large volume

Segment	Free-ridership-based attribution	Sample customers	Sample measures	± at 90% confidence (FPC on)	Population m^3 savings	Percent population ^{m3} savings
Large Volume Program Overall	27.95%	14	20	4%	80,549,726	100%

Findings and recommendations

The following table presents a summary of the key findings and recommendations from the study. It shows the party to whom the recommendation applies and its primary beneficial outcome. We classified outcomes into four categories: reduce costs, increase savings, increase (or maintain) customer satisfaction, and decrease risk (multiple types of risk are in this category including risk of adjusted savings, risk to budgets or project schedules, and others). All recommendations address energy savings and program performance.

Energy savings and program performance		Applies to		Primary beneficial outcome			
Finding	Recommendation	Enbridge	Evaluation	Reduce costs	Increase savings	Customer satisfaction	Decrease risk
FR-based attribution in the programs is variable	Evaluate free-ridership for the programs annually and couple the free-ridership evaluation with process evaluation		✓		✓		
FR-based attribution for the programs came primarily through acceleration	Consider strategies to have greater impact on increasing efficiency and amount (where applicable) of measures	✓			✓		
Many customers with high FR report involving Enbridge late in the process	Consider strategies to reduce customers taking advantage of the rebate for projects that are already fully decided upon.	✓			✓		✓
Return on Investment is mentioned consistently by customers and vendors as a key metric	Continue emphasis on ROI effect of incentives with customers. Consider helping to quantify kWh, water and other non-energy benefits of projects to sell projects that do not pass ROI on gas savings alone	✓			✓		

Energy savings and program performance		Applies to		Primary beneficial outcome			
Finding	Recommendation	Enbridge	Evaluation	Reduce costs	Increase savings	Customer satisfaction	Decrease risk
Safety code requirements differ among commercial buildings can affect energy saving measures	Consider reviewing safety code requirements for facilities likely to have higher than typical code.	✓					✓
Reducing Carbon tax bills is a driver for some customers	Consider ways to leverage Carbon tax and Carbon effects as part of the package to motivate customers to participate	✓			✓		
The Large Volume program has high free ridership	Consider the high free-ridership within the context of the cost effectiveness of the program. High free rider programs can still deliver meaningful cost-effective net savings.		✓		✓	✓	
	Conduct a process evaluation to improve Large Volume influence on customer projects	✓			✓	✓	✓
	Consider limiting the measure types or payback periods that are eligible for Large Volume incentives	✓			✓	✓	✓
Vendor attribution increased program attribution significantly for the Enbridge Commercial and Multifamily Segments	Consider expanding approaches to market for other programs that leverage third-party vendors.	✓		✓	✓		
Vendor attribution recruitment resulted in less completed interviews than desired.	Consider interviewing participating vendors independent of the participating customer sample and recruitment.		✓		✓		✓
In the attribution scoring methodology, timing assumptions, specifically the number of years assumed for "never would have implemented" have a significant effect on FR-based attribution.	Consider studying the typical planning horizons for each of the customer segments. The assumed planning horizon for companies is used in the scoring to determine at what point the program receives full influence credit for accelerating a measure's implementation.		✓				✓
The treatment of efficiency in the scoring has a relatively small effect FR-based attribution.	Consider simplifying the efficiency question sequence in future research to reduce survey length while still capturing attribution.		✓			✓	
A significant amount of spillover was found in the Agricultural segment.	Consider replicating the agriculture go-to-market approach in segments where it may provide similar results. In other customer groups this might be a combination of customer segmentation and specific measure type focus to achieve similar market effect in different niches.	✓			✓		

Energy savings and program performance		Applies to		Primary beneficial outcome			
Finding	Recommendation	Enbridge	Evaluation	Reduce costs	Increase savings	Customer satisfaction	Decrease risk
Data collection for the Agricultural segment spillover study was successful, with some areas for improvement.	Consider replicating the spillover study approach in segments where it may be applicable. Applicable segments include those with a strong program theory for market effects in a specific segment or segment-measure combination and those with known high market share for the program in an area.		✓		✓		
	The offered incentive and multi-modal survey approach led to higher than typical response rate for a general population study and should be considered for future research that includes non-participants.		✓	✓			✓
	Attempting to collect sufficient detail for site specific energy savings calculations provided marginal value and should be reconsidered.		✓	✓			
	Adding a question about why customers did not go through the program could provide additional value in future studies of this type.		✓				✓
The spillover study found 14.96% annual m3 spillover and 11.21% lifetime CCM spillover.	The spillover found in the study should be applied to the agricultural custom offering results using the percent of program savings ratios.	✓	✓		✓		
	The separate annual and lifetime ratios should be applied to calculate the annual and cumulative savings respectively.	✓	✓		✓		
	The spillover found in this study should replace the value found in the 2015 participant survey as this study covers both participant and non-participant spillover.	✓	✓		✓		

1 INTRODUCTION

On behalf of the Ontario Energy Board (OEB), DNV carried out the Net-to-Gross Study alongside the Custom Program Savings Verification (CPSV) of Enbridge Gas Inc.'s (Enbridge) natural gas demand-side management (DSM) programs delivered in 2023. The study produced free-ridership (FR) and spillover (SO) ratios for the set of Enbridge custom programs examined, shown in Table 1-1.

Table 1-1. FR by program, 2023

Program	2023 FR	2023 SO
Large Volume	✓	
Commercial*	✓	
Industrial**	✓	✓
Affordable Housing Multi-Residential		

*Custom Market-Rate Multi-Residential (Multifamily) projects are expected to be included as a part of this program.
**Non-participant spillover in the agricultural segment was studied.

1.1 Evaluation objectives and approach

The overall objectives of this study were to:

- Develop appropriate free-ridership rates for Enbridge custom projects (excluding low-income) carried out in 2023, with disaggregated rates within these groups.
- Establish and maintain transparency throughout the project
- Follow industry best practices

The methodology selected for the FR evaluation relied on end-user self-report surveys and interviews. The end-user self-reports were supplemented by project-specific interviews with vendors to capture the indirect effects of the programs on end-user decision-making. Surveys and interviews were collected from the most recent (2023) program years in order to create FR factors (later to be combined with spillover (SO) factors to create NTG factors ahead of 2023 verification activities) that will be most meaningful for future years.

1.2 Study background

To encourage Enbridge Gas Distribution, Inc. (Enbridge) to implement public benefits programs designed to reduce overall energy use, called conservation demand-side management (DSM) programs, the Ontario Energy Board (OEB) reimburses them for the cost of program implementation and provides an incentive, called the shareholder incentive, that reflects the utilities' performance against pre-determined targets. The OEB also compensates the utilities for the revenue lost as a result of the lower natural gas sales.

In the 2023 calendar year, programs delivered by Enbridge targeted all natural gas ratepayers, including residential, multifamily, low income, commercial, and industrial customers. This study is part of an overall conservation program cycle as shown in the following figure. This study is part of step 4.

Figure 1-1. Conservation program cycle

To verify the impacts of the Enbridge DSM programs, the OEB sponsors studies to verify the energy savings achieved. Specifically, this study researched attribution rates, which are estimates of the influence the utility had on the energy efficiency projects that were installed and measured as a percentage of the savings "attributable" to the utility. As part of the annual verification report, the results of this study are combined with the results of three other studies[2,3] to produce verified net cumulative gas savings for the utilities' 2023 Custom programs. This study was completed by DNV concurrent with the 2023 Custom Savings Verification Study, though independent samples were selected and separate analyses performed for each.

The remainder of this report references the following industry terms. Additional definitions are found in the glossary in APPENDIX A.

- **Free rider:** a customer who would install the same energy efficiency measure without intervention from the utility.
- **Free-ridership:** the portion of a program's verified energy savings that would naturally occur without intervention from the utility.
- **Spillover:** energy savings that occur as a result of the utility's intervention, but are not part of the utility's verified savings. For example, if the utility identifies (and the customer implements) an energy efficiency measure that does not require payment to a vendor for equipment or servicing, the customer would not receive an incentive and the utility would not claim those energy savings. The energy savings are considered spillover.
- **Attribution:** the portion of a program's verified energy savings that the utility influenced, including the effects of free-ridership and spillover. When multiplied by the utility's claimed savings, the attribution ratio produces the volume of energy saved as a result of program implementation.
- **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).

[2] *CPSV Participant Spillover Results.* Prepared for The Ontario Energy Board by DNV, May 23, 2018.
[3] *2023 Natural Gas Demand Side Management Custom Savings Verification.* Prepared for The Ontario Energy Board by DNV, November 25, 2024.

2 COMMERCIAL CUSTOM PROGRAM

Enbridge's custom DSM program for commercial customers encourages customers to reduce their natural gas consumption by recommending and incentivizing energy saving projects and actions.

This custom program differs from the prescriptive programs by providing additional technical support for projects and financial incentives based on overall natural gas savings realized by the customer rather than a per-unit incentive.[4]

A subset of the projects in this program is part of the multi-residential segment. The free-ridership (FR)-based attribution study included custom projects from the Market-Rate Multifamily (MR MF) section of the program. Under the 2023 DSM framework,[5] low-income projects use a deemed (pre-determined) value for Low Income Multifamily (LI MF) free-ridership, so the LI MF segment was not included in the free-ridership-based attribution evaluation.

All non-LI MF projects implemented as part of these programs and claimed in 2023 as custom projects are included in the scope of the FR study.

2.1 Free-ridership-based attribution rate

The FR-based attribution ratio represents the ratio of the savings influenced by the utility (considering only free-ridership, not spillover) to the savings verified by the evaluation, as shown in the following equation. The methods used to determine evaluation verified savings are presented in a separate report.[6] A 90% FR-based attribution ratio means the utility-influenced savings (considering only free-ridership) were 90% of the program savings.

$$free-ridership-based\ attribution = \frac{Utility\ influenced\ savings\ considering\ only\ free-ridership, not\ spillover}{Program\ savings}$$

Table 2-1 shows the FR-based attribution ratio by domain for the Enbridge Commercial Custom program. The table shows the FR-based attribution ratio, statistical precision at the 90% confidence interval, the program-claimed population first year meters cubed (m^3) savings, and percent of program savings for each customer segment. The percent of program savings represents the relative contribution that each customer segment makes to the overall result.

The ratio result is based on an overall sample size of 83 customers and 97 measures. Additional details on stratification, sample size, and population size are provided in APPENDIX D. Additional statistical details for the results are provided in APPENDIX G.

The Commercial free-ridership-based attribution rate includes the effect of indirect utility influence on non-institutional projects through vendors. Vendor attribution was studied for non-institutional commercial projects due to the design of the program for these segments, which included significant vendor outreach and efforts to influence vendor business practices to increase sales of gas saving measures. APPENDIX H provides more detail on the vendor attribution. Influence on projects through vendors increased the Commercial measure type free-ridership-based attribution rates by 15 percentage points (from 51% to 66%), and increased Market Rate Multifamily attribution by free-ridership attribution by 31% (from 35% to 66%). Results from vendors did not show an influence on the Institutional segment.

[4] Enbridge's Annual Report provides a more detailed description of the program and can be found here: https://www.oeb.ca/sites/default/files/OEB-Annual-Report-2022-2023-EN.pdf

[5] EB-2021-0002

[6] *2023 Natural Gas Demand Side Management Custom Savings Verification.* Prepared for The Ontario Energy Board by DNV, November 25, 2024.

Table 2-1. Free-ridership-based attribution ratio for Commercial custom program*

Segment	Free-ridership-based attribution	Sample customers	Sample measures	± at 90% confidence (FPC on)	Population m^3 savings	Percent population m^3 savings
Commercial	65.81%	32	38	12%	6,100,147	22%
Institutional	73.55%	19	24	14%	11,065,539	41%
Market Rate Multifamily	65.74%	32	35	9%	10,074,677	37%
Commercial Program Overall	68.54%	83	97	7%	27,240,363	100%

* The table shows statistical precision (± at 90% confidence factor) that does include the effects of a finite population correction factor. See Appendix B for more information.

2.2 Components of free-ridership-based attribution

The FR-based attribution rate for each measure is calculated based on participant survey responses to questions regarding the utility's influence on the timing, quantity, and efficiency of the measure installed. This section reports the program's effect on each component and provides an indication of which aspects of the projects show the greatest utility influence.

- **Timing** questions help us understand the impact programs had on when project installations took place by asking participants if they would have implemented measures earlier, later, or at the same time without program assistance
- **Efficiency** questions are geared towards understanding if the equipment had been installed without program incentives and influence, if it would have been more or less efficient as what ended up getting installed.
- **Quantity** questions delve into the program's influence on how many measures were installed as part of the project (if applicable based on measure type) compared to how many would have been installed without the program's influence

Throughout this section, a "Null" value in the table reflects less than five customer responses. For confidentiality reasons, results for less than five responses are not displayed. Customers with more than one installed measure and different survey responses by measure will appear multiple times in the table, resulting in a customer total greater than the number of customers interviewed.

Note that while the ratios in Table 2-1 include vendor influence for the commercial and multifamily segments, tables in this section only provide insight into participant responses and do not incorporate vendor influence.

Table 2-2 represents the possible combinations of timing, efficiency, and quantity attribution. A "yes" in the timing, efficiency, or quantity column indicates partial or full FR-based attribution for that source. A "no" indicates no FR-based attribution for that source. For example, the row that has "yes" for timing, efficiency, and quantity reports the portion of the sample that indicated that the program had at least partial influence on the timing, efficiency, and quantity for that measure. For some measures, efficiency or quantity may not be applicable questions; for the purposes of this table, the not applicable measures are included as "no" on the non-applicable dimension.

The table shows the number of customers, measures, and savings that fall into each timing, efficiency, and quantity combination. The percentage of sample sample-weighted cumulative savings shows the portion of population savings represented by that category.

The table shows that a majority (60%) of program savings were at least partially influenced by the utility (excluding those customers influence through a vendor). Timing is the most common reflection of program influence, with respondents reporting that approximately 50% of the program savings were accelerated by the program. Efficiency affects approximately 25% of the program savings, and the program influenced quantity for approximately 17% of program savings.

Table 2-2. Overview of the sources of attribution for Commercial custom program, excluding vendor-based attribution*

Timing	Efficiency	Quantity	Sample Custs	Sample Meas	Percent of Weighted M3
Yes	Yes	Yes	5	5	4%
		No	12	15	15%
	No	Yes	8	8	5%
		No	19	19	26%
No	Yes	Yes	Null	Null	4%
		No	Null	Null	2%
	No	Yes	Null	Null	4%
		No	35	40	39%

Partial or Full Attribution No Attribution

* Because of confidentiality reasons and "Null" table entries, the sum of sample customers and sample measures in this table may not match the sum of sample customers and sample measures in other tables.

2.2.1 Timing component

Respondents answered a sequence of questions that addresses the timing of the equipment installation. (See APPENDIX K for the full survey instrument.) First, respondents answered the likelihood of installing the same type of equipment at the same time without the program (DAT1a). Respondents who answered "Later" specified the number of months later in the next question (DAT1b).[7] During the acceleration period, the energy savings for early replacement installations includes additional savings credit which reflects the utility-influenced replacement of older, less efficient equipment.

More than 43 customers, accounting for 49% of program savings, said they would have installed their measure(s) at the same time. Projects representing approximately 38% of savings received full attribution by answering that they either never would have installed the measure (10% of savings), would have delayed the project by 48 months or more (6% of savings), or would have delayed the project by between 24 months and 48 months (22%). The remaining 12% of savings received partial timing attribution (Table 2-3).

[7] See the Scope of Work attached in APPENDIX H for the detailed scoring algorithm.

Table 2-3. Determining the acceleration period, Commercial custom program, excluding vendor-based attribution *†

DAT1a. Without the utility when would you have performed the measure?
DAT1b. Approximately how much later?

DAT1a	DAT1b	Timing Attribution	Sample Custs	Sample Meas	Percent of Weighted M3
Same Time	N/A	0%	43	49	49%
Earlier	N/A	0%	Null	Null	1%
Later	Months <24	ER baseline credit for months accelerated	8	8	4%
	24≤ Months <48	100% ER baseline credit	12	14	22%
	Months ≥48	100% ER baseline credit	Null	Null	6%
	Don't Know/Refused	ER baseline credit for avg. of DAT1b	7	7	6%
Never	N/A	100%	9	11	10%
Don't Know/ Refused	N/A	ER baseline credit for avg. of DAT1a	Null	Null	2%

No Timing Attribution Full or Partial Timing Attribution

* Because of confidentiality reasons and "Null" table entries, the sum of sample customers and sample measures in this table may not match the sum of sample customers and sample measures in other tables.
†ER is an acronym for early replacement. N/A represents not applicable.

2.2.2 Efficiency component

Respondents answered a sequence of questions that address the utility's influence on the efficiency level of the installed equipment. (See APPENDIX K for the full survey instrument.) First, respondents were asked whether they would have installed the same level of efficiency without the utility (DAT2a). Respondents who answered that they would have installed a less efficient option answered two follow-up questions: first, "What would you have installed?" (DAT2c), followed by the scored follow-up question (DAT2b) to put their answer into a predetermined category. DAT2c was used to confirm the responses to DAT2b.

The utility had limited influence on efficiency (Table 2-4). Most of the survey respondents (62% of savings) said the utility had no influence on the efficiency level of the equipment installed. Respondents who indicated the utility improved the efficiency level of their measures accounted for approximately 22% of program savings. The remaining respondents, accounting for 16% of program savings, either did not know or did not respond to efficiency attribution.

Table 2-4. Determining efficiency attribution, Commercial custom program, excluding vendor-based attribution *†

DAT2a. Without the utility, would you have installed the same efficiency, lesser or greater?
DAT2b. What efficiency would you have installed?

DAT2a	DAT2b	Efficiency Attribution	Sample Custs	Sample Meas	Percent of Weighted M3
Same	N/A	0%	56	61	62%
Lower	Baseline Efficiency	100%	8	9	8%
	Between Baseline and Installed Efficiency	50%	9	10	14%
	Don't Know/Refused	Average of Dat2b	Null	Null	2%
	Null	Null	Null	Null	1%
Don't Know/Refused	N/A	Average of dat2a	Null	Null	1%
Not Applicable	N/A	Not Asked	10	10	12%

No Efficiency Attribution Full or Partial Efficiency Attribution

* Because of confidentiality reasons and "Null" table entries, the sum of sample customers and sample measures in this table may not match the sum of sample customers and sample measures in other tables.
† N/A represents not applicable.

2.2.3 Quantity component

Respondents answered a sequence of questions that addressed the utility's effects on the quantity or size of the equipment installed. (See APPENDIX K for the full survey instrument.) First, respondents were asked whether they would have installed the same amount of equipment (or capacity for measures for which quantity is less relevant, such as boilers) without the utility (DAT3a). Respondents who answered that they would have installed less (or in some cases more/larger) equipment answered a follow-up question (DAT3b) to specify how the utility changed the amount/size that they installed.

The program had limited influence on the quantity of measures installed. Fifty customers, accounting for 48% of program savings, said they would have purchased the same quantity of equipment without the program (Table 2-5). Customers representing 15% of program savings received partial attribution. Another 35% of savings were from measures for which quantity is not applicable. Examples of not applicable measures include building automation systems, a roof or a system optimization.

Table 2-5. Determining quantity/size attribution, Commercial custom program, excluding vendor-based attribution *†

DAT3a. Without the utility would you have installed the same amount, more or less?
DAT3b. What amount would you have installed?

DAT3a	DAT3b	Quantity Attribution	Sample Custs	Sample Meas	Percent of Weighted M3
Same	N/A	0%	50	56	48%
Less/Fewer/Smaller	Don't Know/Refused	Average of dat3b	Null	Null	3%
	Partial change	0%<Value<100%	5	5	7%
None	N/A	100%	7	7	6%
Don't Know/Refused	N/A	Average of Dat3a	Null	Null	1%
Not Applicable	N/A	Not Asked	21	23	35%

No Quantity Attribution Full or Partial Quantity Attribution

* Because of confidentiality reasons and "Null" table entries, the sum of sample customers and sample measures in this table may not match the sum of sample customers and sample measures in other tables.
† N/A represents not applicable.

2.3 Vendor attribution

Evaluation interviews with the Enbridge program teams indicated that the program design for the Commercial and Multi-Residential segments focuses on working with and influencing vendors who in turn influence customers in their DSM project decisions. Since the other programs and segments are focused on selling DSM directly to customers, not through influencing vendors, it was decided in consultation with the EAC to focus vendor survey resources on designing an approach specific to these Enbridge segments.

The FR participant interviews included a series of framing questions that served to help respondents think through the decision-making process for their projects. Through the responses to these questions, the interview was able to identify projects where a vendor played a role in the decision making. This data was collected for each program and was used to trigger vendor interviews.

Across all programs and segments, vendors play a role in the decision making for most projects. This indicates that there could be opportunity for programs to increase net savings through proactively working with vendors as is the case with these segments' program strategy.

Table 2-6 shows that nearly all participants in the Institutional segment indicated that a vendor was involved in their decision making on the project.

Table 2-6. Vendor interviews for Custom Commercial – Institutional program

Vendor Involvement	Participant Attribution	Sample Customers	Sample Measures
Not Involved in Decision	100% Participant Attribution	3	3
Involved in Decision	100% Participant Attribution	8	10
	Less than 100% Participant Attribution	9	11

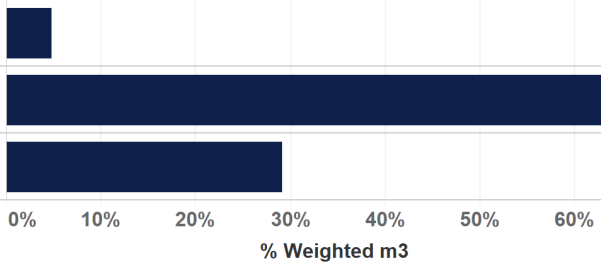


Table 2-7 and Table 2-8 show that nearly all measures in the Commercial and Multi-Residential segments had vendor involvement in project decision making.

Table 2-7. Vendor interviews for Custom Commercial – Commercial program

Vendor Involvement	Participant Attribution	Vendor Interview	Vendor Complete	Sample Customers	Sample Measures
Not Involved in Decision	Less than 100% Participant Attribution	Did not attempt vendor interview	N/A	1	1
Involved in Decision	100% Participant Attribution	Did not attempt vendor interview	N/A	8	10
	Less than 100% Participant Attribution	Attempted vendor interview	N/A	12	14
			Completed Vendor Interview	11	13

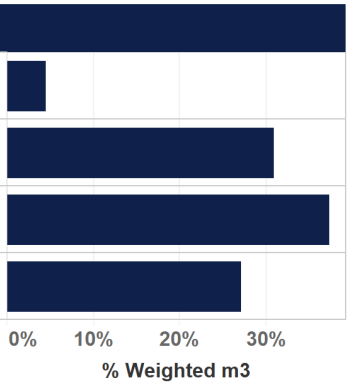


Table 2-8. Vendor interviews for Custom Commercial – Market Rate Multi-Residential program

Vendor Involvement	Participant Attribution	Vendor Interview	Vendor Complete	Sample Customers	Sample Measures
Not Involved in Decision	Less than 100% Participant Attribution	Did not attempt vendor interview	N/A	4	4
Involved in Decision	100% Participant Attribution	Did not attempt vendor interview	N/A	5	6
	Less than 100% Participant Attribution	Attempted vendor interview	N/A	12	12
			Completed Vendor Interview	11	13

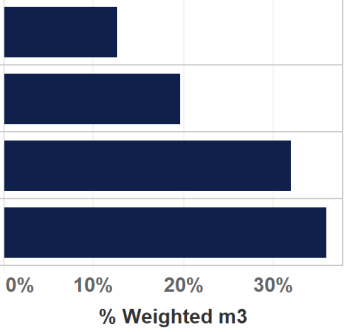


Table 2-9 shows that vendor attribution increased attribution by 18% for the Commercial segment and by 31% for the Multi-Residential segment. The results for these segments indicate that Enbridge is affecting vendor recommendations and that customers, particularly in the multifamily segment, rely on vendor involvement in making equipment and maintenance decisions.

Table 2-9. Free-ridership-based attribution with and without vendors for Commercial and Multi-Residential segments

Segment	Approach	Free-ridership based-attribution	Lower bound at 90% confidence	Upper bound at 90% confidence
Commercial	Vendor Included	66%	49%	72%
	Without Vendor	51%	39%	62%
Market Rate Multi-Residential	Vendor Included	66%	57%	74%
	Without Vendor	35%	19%	50%

Table 2-10 and Table 2-11 shows the dimensions of attribution where Enbridge's effect on vendors had the most impact. Efficiency was the most common dimension affected, which is the expected result: vendors cannot affect timing for replace on burnout measures and quantity/size is often pre-determined by site needs as well. Many measures received no increase (18 commercial and 15 multi residential) as the vendor effect was lower than the direct Enbridge attribution on the dimensions where Enbridge affected their vendor.

Table 2-10. Overview of the sources of vendor attribution – Commercial program

Sample Customers	Sample Measures	Vendor Increase to Timing	Vendor Increase to Efficiency	Vendor Increase to Quantity	Vendor increase to Simple Program Attribution (SPA)
1	1	Yes	No	No	Yes
		No	No	No	Yes
3	4	No	No	Yes	No
4	4	No	Yes	No	No
9	10	No	Yes	Yes	No
14	18	No	No	No	No

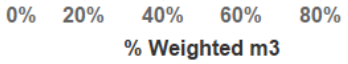
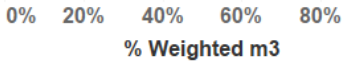


Table 2-11. Overview of the sources of vendor attribution – Market Rate Multi-Residential program

Sample Customers	Sample Measures	Vendor Increase to Timing	Vendor Increase to Efficiency	Vendor Increase to Quantity	Vendor increase to Simple Program Attribution (SPA)
1	1	Yes	Yes	No	No
			No	No	Yes
2	3	No	No	No	Yes
14	15	No	No	No	No
15	15	No	Yes	No	No



3 INDUSTRIAL CUSTOM PROGRAM

Enbridge's custom DSM program for industrial customers encourages customers to reduce their natural gas consumption by recommending and incentivizing energy saving projects and actions.

This custom program differs from the prescriptive programs by providing additional technical support for projects and financial incentives based on overall natural gas savings realized by the customer rather than a per-unit incentive.[8]

3.1 Free-ridership-based attribution rate

The FR-based attribution ratio represents the ratio of the savings influenced by the utility (considering only free-ridership, not spillover) to the savings verified by the evaluation, as shown in the following equation. The methods used to determine evaluation-verified savings are presented in a separate report.[9] A 90% FR-based attribution ratio means the utility-influenced savings (considering only free-ridership) were 90% of the evaluation verified savings.

$$free-ridership-based\ attribution = \frac{Utility-influenced\ savings\ considering\ only\ free-ridership, not\ spillover}{Evaluation-verified\ savings}$$

Table 3-1 shows the FR-based attribution ratio by domain for the Enbridge Custom Industrial programs. The table shows the FR-based attribution ratio, statistical precision at the 90% confidence interval, the program-claimed population first year m^3 savings, and percent of program savings for each customer segment. The percent of program savings represents the relative contribution that each customer segment makes to the overall result.

The ratio result is based on an overall sample size of 77 customers and 107 measures. Additional details on stratification, sample size, and population size are provided in APPENDIX D. Additional statistical details for the results are provided in APPENDIX G. The Enbridge free-ridership-based attribution rate is 63% for the Industrial Agricultural segment and 64% for the Industrial segment.

Vendor attribution was studied for Agricultural projects due to the design of the program for this segment, which included significant vendor outreach and efforts to influence vendor business practices to increase sales of gas saving measures. Vendor attribution was not studied for the industrial segment as the program design did not include similar vendor efforts. APPENDIX H provides more detail on the vendor attribution. For the Agricultural segment, we did not find any Enbridge effect on vendors. Despite attempting a census of the 17 triggered vendors, our completed sample only included three vendors and five measures, which is too small of a sample to draw any long-term conclusions as to the broader Enbridge effect on vendors for this segment.

Table 3-1. Free-ridership-based attribution ratio for Industrial custom program*

Segment	Free-ridership-based attribution	Sample customers	Sample measures	± at 90% confidence (FPC on)	Population m^3 savings	Percent population m^3 savings
Agricultural	62.52%	31	49	8%	30,754,095	48%
Industrial	64.19%	46	58	7%	32,772,861	52%
Industrial program overall	63.47%	77	107	6%	63,526,956	100%

* The table shows statistical precision (± at 90% confidence factor) that does include the effects of a finite population correction factor. See Appendix B for more information

[8] Enbridge's Annual Report provides a more detailed description of the program and can be found here: https://www.oeb.ca/sites/default/files/OEB-Annual-Report-2022-2023-EN.pdf

[9] *2023 Natural Gas Demand Side Management Custom Savings Verification.* Prepared for The Ontario Energy Board by DNV, November 25, 2024.

3.2 Components of free-ridership-based attribution

The FR-based attribution rate for each measure is calculated based on participant survey responses to questions regarding the utility's influence on the timing, quantity, and efficiency of the measure installed. This section reports the program's effect on each component and provides an indication of which aspects of the projects show the greatest utility influence.

Throughout this section, a "Null" value in the table reflects less than five customer responses. For confidentiality reasons, results for less than five responses are not displayed. Customers with more than one installed measure and different survey responses by measure will appear multiple times in the table, resulting in a customer total greater than the number of customers interviewed.

Note that while the ratios in Table 3-1 include vendor influence in the Agricultural segment, tables in this section only provide insight into participant responses and do not incorporate vendor influence.

Table 3-2 represents the possible combinations of timing, efficiency, and quantity attribution. A "yes" in the timing, efficiency, or quantity column indicates partial or full FR-based attribution for that source. A "no" indicates no FR-based attribution for that source. For example, the row that has "yes" for timing, efficiency, and quantity reports the portion of the sample that indicated that the program had at least partial influence on the timing, efficiency, and quantity for that measure. For some measures, efficiency or quantity may not be applicable questions; for the purposes of this table, the not applicable measures are included as "no" on the non-applicable dimension.

The table shows the number of customers, measures, and savings that fall into each timing, efficiency, and quantity combination. The percentage of sample weighted cumulative savings shows the portion of population savings represented by that category.

The table shows that approximately the majority (76%) of program savings were at least partially influenced by the utility. Timing is the most common reflection of program influence, with respondents reporting that approximately 60% of the program savings were accelerated by the program. Efficiency affects approximately 45% of the program savings, and the program influenced quantity for approximately 20% of program savings.

Table 3-2. Overview of the sources of attribution for Industrial custom program*†

Timing	Efficiency	Quantity	Sample Custs	Sample Meas	Percent of Weighted M3
Yes	Yes	Yes	8	10	10%
		No	20	24	20%
	No	Yes	5	5	8%
		No	24	25	22%
No	Yes	Yes	Null	Null	1%
		No	16	17	14%
	No	Yes	Null	Null	1%
		No	19	23	24%

Partial or Full Attribution No Attribution

* Because of confidentiality reasons and "Null" table entries, the sum of sample customers and sample measures in this table may not match the sum of sample customers and sample measures in other tables.
† The study team attempted to explore vendor influence for Ag, but the completed sample was too small to draw any conclusions from.

3.2.1 Timing component

Respondents answered a sequence of questions that addresses the timing of the equipment installation. (See APPENDIX K for the full survey instrument.) First, respondents answered the likelihood of installing the same type of equipment at the same time without the program (DAT1a). Respondents who answered "Later" specified the number of months later in the next question (DAT1b).[10] During the acceleration period, the energy savings for early replacement installations includes additional savings credit, which reflects the utility-influenced replacement of older, less efficient equipment.

The timing component was strongly influenced by the utility. More than 34 customers, accounting for 40% of program savings, said they would have installed their measure(s) at the same time. Projects representing approximately 38% of savings received full attribution by answering that they either never would have installed the measure (17% of savings), would have delayed the project by 48 months or more (4% of savings), or would have delayed the project by between 24 months and 48 months (17%). The remaining 22% of savings received partial timing attribution (Table 3-3).

[10] See the Scope of Work attached in APPENDIX H for the detailed scoring algorithm.

Table 3-3. Determining the acceleration period, Industrial custom programs*†‡

DAT1a. Without the utility when would you have performed the measure?
DAT1b. Approximately how much later?

DAT1a	DAT1b	Timing Attribution	Sample Custs	Sample Meas	Percent of Weighted M3
Same Time	N/A	0%	34	43	40%
Later	Months <24	ER baseline credit for months accelerated	14	15	16%
	24≤ Months <48	100% ER baseline credit	16	18	17%
	Months ≥48	100% ER baseline credit	5	5	4%
	Don't Know/Refused	ER baseline credit for avg. of DAT1b	5	7	6%
Never	N/A	100%	16	19	17%

No Timing Attribution Full or Partial Timing Attribution

* Because of confidentiality reasons and "Null" table entries, the sum of sample customers and sample measures in this table may not match the sum of sample customers and sample measures in other tables.
†ER is an acronym for early replacement. N/A represents not applicable.
‡ The study team attempted to explore vendor influence for Ag, but the completed sample was too small to draw any conclusions from.

3.2.2 Efficiency component

Respondents answered a sequence of questions that address the utility's influence on the efficiency level of the installed equipment. (See APPENDIX K for the full survey instrument.) First, respondents were asked whether they would have installed the same level of efficiency without the utility (DAT2a). Respondents who answered that they would have installed a less efficient option answered two follow-up questions: first "what would you have installed," (DAT2c) followed by the scored follow-up question (DAT2b) to put their answer into a predetermined category. DAT2c was used to confirm the responses to DAT2b.

The utility's influence on efficiency is shown in Table 3-4. Respondents representing 38% of savings said the utility had no influence on the efficiency level of the equipment installed. Respondents who indicated the utility improved the efficiency level of their measures accounted for approximately 41% of program savings.

Table 3-4. Determining efficiency attribution, Industrial custom program*†‡

DAT2a. Without the utility, would you have installed the same efficiency, lesser or greater?
DAT2b. What efficiency would you have installed?

DAT2a	DAT2b	Efficiency Attribution	Sample Custs	Sample Meas	Percent of Weighted M3
Same	N/A	0%	29	35	38%
Lower	Baseline Efficiency	100%	18	22	21%
	Between Baseline and Installed Efficiency	50%	19	21	14%
	Don't Know/Refused	Average of Dat2b	6	6	6%
Don't Know/Refused	N/A	Average of dat2a	Null	Null	3%
Not Applicable	N/A	Not Asked	19	20	18%

No Efficiency Attribution Full or Partial Efficiency Attribution

* Because of confidentiality reasons and "Null" table entries, the sum of sample customers and sample measures in this table may not match the sum of sample customers and sample measures in other tables.
† N/A represents not applicable.
‡ The study team attempted to explore vendor influence for Ag, but the completed sample was too small to draw any conclusions from.

3.2.3 Quantity component

Respondents answered a sequence of questions that addressed the utility's effects on the quantity or size of the equipment installed. (See APPENDIX K for the full survey instrument.) First, respondents were asked whether they would have installed the same amount of equipment (or capacity for measures for which quantity is less relevant, such as boilers) without the utility (DAT3a). Respondents who answered that they would have installed less (or in some cases more/larger) equipment answered a follow-up question (DAT3b) to specify how the utility changed the amount/size that they installed.

The program had limited influence on the quantity of measures installed. Forty-one customers, accounting for 37% of program savings, said they would have purchased the same quantity of equipment without the program (Table 3-5). Customers representing 20% of program savings received partial attribution. Another 43% of savings were from measures for which quantity is not applicable. Examples of not applicable measures include building automation systems, a roof or a system optimization.

Table 3-5. Determining quantity/size attribution, Industrial custom program*†‡

DAT3a. Without the utility would you have installed the same amount, more or less?
DAT3b. What amount would you have installed?

DAT3a	DAT3b	Quantity Attribution	Sample Custs	Sample Meas	Percent of Weighted M3
Same	N/A	0%	41	45	37%
Less/Fewer/Smaller	Don't Know/Refused	Average of dat3b	Null	Null	4%
	Partial change	0%<Value<100%	5	6	6%
None	N/A	100%	7	9	10%
Not Applicable	N/A	Not Asked	36	44	43%

No Quantity Attribution Full or Partial Quantity Attribution

* Because of confidentiality reasons and "Null" table entries, the sum of sample customers and sample measures in this table may not match the sum of sample customers and sample measures in other tables.
† N/A represents not applicable.
‡ The study team attempted to explore vendor influence for Ag, but the completed sample was too small to draw any conclusions from.

3.3 Vendor attribution

Evaluation interviews with the Enbridge program teams indicated that the program design for the Agricultural segment focuses on working with and influencing vendors who in turn influence customers in their DSM project decisions. Since the Industrial segment is focused on selling DSM directly to customers, not through influencing vendors, it was decided in consultation with the EAC to focus vendor survey resources on designing an approach specific to the Agricultural segment.

The FR participant interviews included a series of framing questions that served to help respondents think through the decision-making process for their projects. Through the responses to these questions, the interview was able to identify projects where a vendor played a role in the decision making. This data was collected for each program and was used to trigger vendor interviews in the Agricultural segment.

Across all programs and segments, vendors play a role in the decision making for most projects. This indicates that there could be opportunity for programs to increase net savings through proactively working with vendors as is the case with these segments' program strategy.

Table 3-6 and Table 3-7 show the vendor interview triggers for Industrial program segments.

Table 3-6. Vendor interview trigger for Custom Industrial – Agricultural programs

Vendor Involvement	Participant Attribution	Vendor Interview	Vendor Complete	Sample Customers	Sample Measures
Not Involved in Decision	100% Participant Attribution	Did not attempt vendor interview	N/A	2	3
	Less than 100% Participant Attribution	Did not attempt vendor interview	N/A	4	5
Involved in Decision	100% Participant Attribution	Did not attempt vendor interview	N/A	13	20
	Less than 100% Participant Attribution	Attempted vendor interview	N/A	14	16
			Completed Vendor Interview	3	5

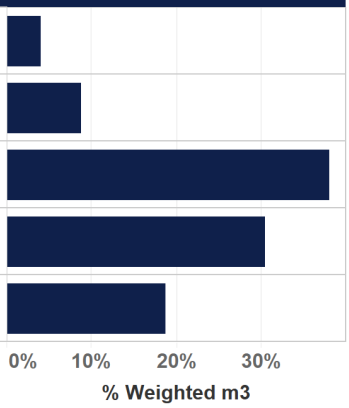
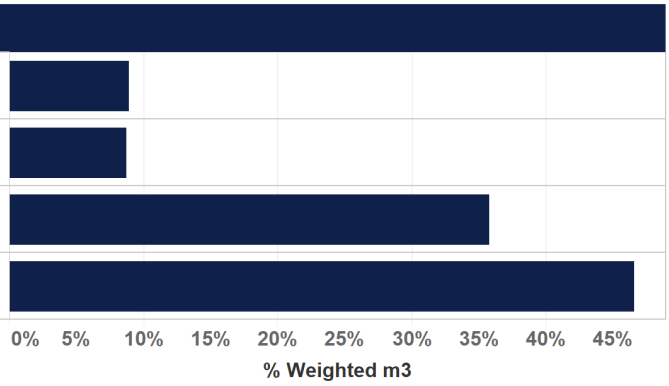


Table 3-7. Vendor interview trigger for Custom Industrial – Industrial program

Vendor Involvement	Participant Attribution	Sample Customers	Sample Measures
Not Involved in Decision	100% Participant Attribution	6	6
	Less than 100% Participant Attribution	8	8
Involved in Decision	100% Participant Attribution	15	19
	Less than 100% Participant Attribution	22	25



For the Agricultural segment, we did not find any Enbridge effect on vendors. Despite attempting a census of the 17 triggered vendors, our completed sample only included three vendors and five measures, which is too small of a sample to draw any long-term conclusions as to the broader Enbridge effect on vendors for this segment. The results of these surveys were not incorporated into the FR rate for the Agricultural segment.

3.4 Agricultural Spillover Study

The Agricultural segment spillover study captured both participant and non-participant spillover in a single ratio through a general population survey. The spillover ratio represents the ratio of market savings influenced by Enbridge outside the program to the savings in the program. A 10% spillover ratio indicates that the program influenced an additional 10% of program savings beyond what was captured in the program.

$$Spillover = \frac{Utility\ influenced\ savings\ outside\ the\ progam}{Program\ savings}$$

Table 3-8 shows the spillover ratio for the Enbridge agricultural segment, including the spillover ratio relative to program savings, spillover ratio relative to consumption, and estimated statistical precision at the 90% confidence interval as well as the total 2023 spillover found in m^3.

The study attempted a census of all 2023 customers targeted by the Enbridge agricultural custom offering team. The ratio result is based on an overall sample size of 105 customers and 143 accounts from a population of 322 customers and 425 accounts. Additional details on stratification, sample size, and population size are provided in APPENDIX J.

The study found an 15% of annual m^3 program savings as spillover (4,599,439 m^3) for the Enbridge Agricultural program. Approximately 10% was from direct sources of Enbridge influence, and approximately 5% was from indirect sources. The spillover found was approximately 0.5% of annual consumption for the program's target population. The savings found are reasonable for a program that is intensively targeting a small population through many different paths of influence and is already capturing roughly 50% market share of the savings occurring. Non-participant spillover studies tend to have wide error bounds due to the high amount of variability with many sites of all sizes having no spillover and many sites having some spillover of various amounts. The precision of the study showed that spillover is statistically greater than zero and as expected has a wide error bound that is just smaller than the ratio itself.

Table 3-8. Agricultural Segment Spillover ratio results – m^3

M^3 Results	Spillover ratio	Sample customers	Sample sites	± at 90% confidence (FPC on)	Population m^3 spillover savings
Spillover relative to program savings - all sources	14.96%	105	143	11.91%	4,599,439
Spillover relative to consumption - all sources	0.54%	105	143	0.43%	4,599,439
Spillover relative to program savings - direct sources	9.88%	105	143	11.31%	3,037,197
Spillover relative to program savings - indirect sources	5.08%	105	143	3.51%	1,562,243

The study also estimated spillover for lifetime m3 savings, or cumulative cubic meters (CCM). The study found an 11% of CCM program savings as spillover (53,357,251) for the Enbridge Agricultural program. Approximately 9% of lifetime was from direct sources of Enbridge influence, and approximately 2% was from indirect sources. The lifetime spillover found was approximately 6.3% of annual m3 consumption for the program's target population. The spillover savings are a lower percent of program savings for lifetime savings than for annual savings since the spillover measure savings on average came from measures with shorter measure lives than program measures.

Table 3-9. Spillover ratio results – CCM

CCM results	Spillover ratio	Sample customers	Sample sites	± at 90% confidence (FPC on)	Population CCM spillover savings	Percent population CCM spillover savings
Spillover relative to program savings - all sources	11.21%	105	143	9.83%	53,357,251	100.0%
Spillover relative to consumption - all sources	6.30%	105	143	5.52%	53,357,251	100.0%
Spillover relative to program savings - direct sources	8.75%	105	143	9.68%	41,651,079	78.1%
Spillover relative to program savings - indirect sources	2.46%	105	143	1.48%	11,706,172	21.9%

3.5 Detailed results

Table 3-10 shows the results of the first steps in identifying spillover projects; namely, which respondents made changes to their facilities, which of those changes saved gas, and which of the gas savings are outside of the Enbridge program. The study found that sites representing 55% of consumption made changes to their facility and 44% made changes that saved gas. Sites representing 40% of consumption made changes that saved gas outside of the program.

Table 3-10. Reported changes to facilities

Change	Sample customers	Sample sites	Weighted m^3 consumption	Percent m^3 consumption
All sites	105	143	854,820,545	100.0%
Any changes	72	81	466,723,788	54.6%
Saved gas	60	68	371,897,723	43.5%
Saved gas with non-program measures	52	60	339,578,057	39.7%

Table 3-11 and Table 3-12 show the same information as Table 3-10, but separate the results for 2023 custom program participants and 2023 non-participants.[11] Participants representing 69% of participant consumption reported making changes. For non-participants, respondents representing 50% of consumption reported making changes.[12]

Table 3-11. Reported changes to facilities – 2023 program participants

Change	Sample customers	Sample sites	Weighted m^3 consumption	Percent of participant m^3 consumption
All 2023 program participants	21	26	201,891,868	100.0%
Any changes	16	19	139,617,137	69.2%
Saved gas	15	18	137,819,779	68.3%
Saved gas with non-program measures	7	10	105,500,113	52.3%

[11] Note that five customers had both participating and non participating sites, so Table 2-4 and Table 2-5 total to more customers than reported in Table 2-3.

[12] While 100% of participants had a change reported in the program tracking data, not all of the projects in a program year were completed in the calendar year of the program.

Table 3-12. Reported changes to facilities – 2023 Program Non-participants

Change	Sample customers	Sample sites	Weighted m^3 consumption	Percent of non-participant m^3 consumption
All 2023 program non-participants	89	117	652,928,677	100.0%
Any changes	57	62	327,106,651	50.1%
Saved gas	46	50	234,077,944	35.9%
Saved gas with non-program measures	46	50	234,077,944	35.9%

The spillover study provided an estimate of the size of the market for gas savings from measures implemented in the Agricultural segment, which is approximately 62,000,000 annual m^3. Figure 3-1 shows that the Enbridge influenced savings make up 38% of the market (blue wedges), while program incentives are funding 50% of the market (dark green and dark blue wedges.

Figure 3-1. Gas savings market overall

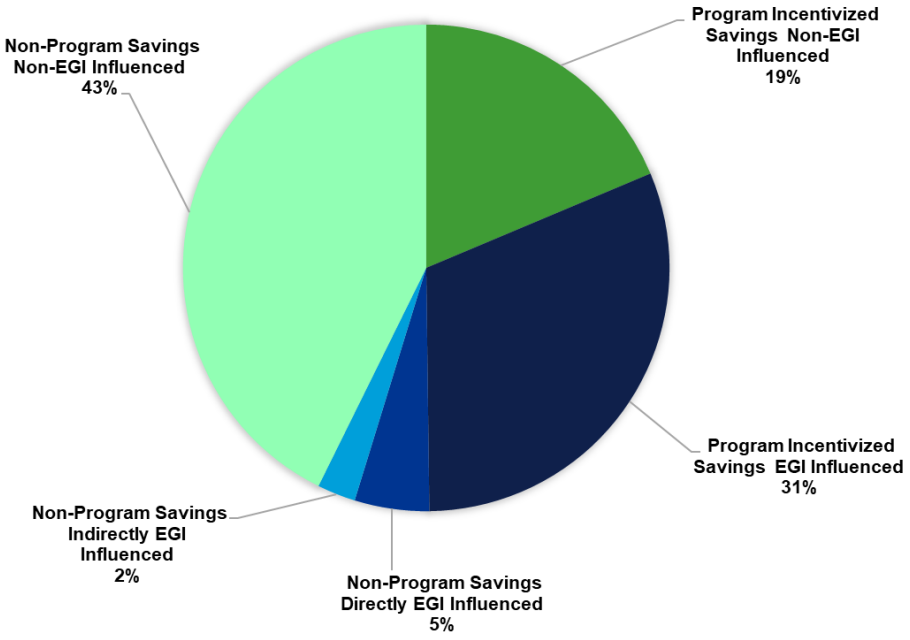


Table 3-13 shows the distribution of non-Enbridge program savings across measure type. Sites and customers could report multiple measures. The greatest savings were found for production increases. Production increases resulted from actions taken by sites such as changing configurations, changes to climate systems and/or lighting, and changes in varietals. The next biggest source of savings was energy curtains, with climate systems installation the third largest source.

Table 3-13. Non-Program savings by measure type

Measure type	Sample customers	Sample sites	Reported measures	Weighted m^3 savings	Percent weighted m^3 savings
Production increase	28	32	32	18,577,990	59.9%
Greenhouse energy curtains for roof	9	9	9	2,993,858	9.7%
Climate control upgrades	7	7	7	2,535,480	8.2%
Climate or system controls	7	7	7	1,663,771	5.4%

Measure type	Sample customers	Sample sites	Reported measures	Weighted m^3 savings	Percent weighted m^3 savings
Boiler controls	4	4	4	1,046,667	3.4%
Boiler/furnace	7	7	7	935,255	3.0%
Wall insulation	6	6	6	538,323	1.7%
Equipment for ag process, e.g. biomass combustor, optimization	1	1	1	389,987	1.3%
Boiler/furnace tune-ups	16	17	17	375,734	1.2%
Boiler economizer	3	3	3	315,935	1.0%
Roof insulation	3	3	3	256,201	0.8%
CO_2 condenser	2	2	2	240,122	0.8%
Loading dock door sealing	4	4	4	230,576	0.7%
Doors	4	4	4	230,576	0.7%
Boiler system insulation - pipes	4	4	4	125,710	0.4%
Greenhouse vent seals	2	2	2	120,034	0.4%
Boiler system insulation – fittings	3	3	3	99,168	0.3%
Burner upgrades or new installs	3	3	3	73,201	0.2%
Destratification fans	1	1	1	65,982	0.2%
Windows	4	4	4	56,377	0.2%
Heating system upgrade from steam to hot water	1	1	1	45,940	0.1%
Boiler system insulation - tank	2	2	2	43,591	0.1%
Other heat recovery	2	2	2	38,254	0.1%
Greenhouse glazing for walls	1	1	1	9,388	0.0%

Table 3-14 shows the specific influences on the non-Enbridge program gas savings. Respondents could select more than one source of influence. Expansion and prior experience with the measure are the most significant influences, with respondents representing 45% and 33% of savings citing them.

Table 3-14. Influences on non-Enbridge program gas savings

Enbridge influence on non-program gas savings	Specific source	Sample customers	Sample sites	Reported measures	Weighted m^3 savings	Percent weighted m^3 savings
None	Company growth, expansion, or other business operation reasons	27	27	63	13,983,993	45.1%
	Prior experience with equipment	17	19	27	10,088,366	32.5%
	Routine upgrade schedule/plans	25	27	31	8,161,960	26.3%
	Company policies	12	12	15	5,913,044	19.1%
	Other	6	10	11	4,687,012	15.1%
	Equipment failed or at end of useful life	8	8	15	3,826,619	12.3%
	Non-EGI program incentive	1	2	2	222,157	0.7%
Direct source	Prior Enbridge conservation program experience	9	10	16	4,698,904	15.2%
	Conversations, consultation, or advice from Enbridge reps	10	11	24	4,590,418	14.8%
	Enbridge advertising, workshops, seminars, training, and/or education	5	5	11	3,937,291	12.7%

Enbridge influence on non-program gas savings	Specific source	Sample customers	Sample sites	Reported measures	Weighted m^3 savings	Percent weighted m^3 savings
Indirect source	Consulting done by vendors, contractors, design firms, consultants, or other third parties	13	13	26	7,353,094	23.7%
	Word of mouth/other person's experience	15	17	25	4,896,058	15.8%
	Audits (to reduce gas use)	8	8	13	4,744,606	15.3%
	Trade show presentation/booth	3	3	9	3,245,208	10.5%
	Submetering, feasibility, or other studies	3	3	4	3,220,409	10.4%
	Publications or case studies	3	3	4	2,729,787	8.8%

Table 3-15 shows the final Enbridge influence on non-Enbridge program gas savings. The final influence for a measure was scored as direct influence if the respondent indicated at least one direct Enbridge source of influence. It was scored as indirect influence if the respondent did not cite any direct influences and indicated at least one indirect source of influence. Respondents representing 64% of weighted savings indicated no Enbridge influence on the measures implemented, while 17% of savings had direct influence and 19% had indirect influence.

Table 3-15. Final scored Enbridge Influence on non-Enbridge program gas savings

Enbridge influence on non-program gas savings	Sample customers	Sample sites	Reported measures	Weighted m^3 savings	Percent weighted m^3 savings
None	31	37	77	19,886,797	64.1%
Direct source	12	13	26	5,104,899	16.5%
Indirect source	21	22	26	6,016,427	19.4%

4 LARGE VOLUME

Enbridge encourages the adoption of energy efficient equipment, technologies, and actions via its Large Volume program. The Large Volume program in 2023 was applicable to customers in Rate T2/Rate 100 in the Union rate zones.

The program uses a direct access budget mechanism for the customer incentive budget process. This mechanism collected funds from each customer through rates. Customers must use these funds to identify and implement energy efficiency projects, or the funds become can be used by other customers in the same rate class. This "use it or lose it" approach ensures each customer has first access to the amount of incentive budget funded by their rates. The Large Volume program is the only "direct access" program offered in Ontario.[13]

Custom projects implemented as part of this program and claimed in 2023 were included in this study.

4.1 Free-ridership-based attribution rate

The FR-based attribution ratio represents the ratio of the savings influenced by the utility (considering only free-ridership, not spillover) to the savings verified by the evaluation, as shown in the following equation. The methods used to determine evaluation verified savings are presented in a separate report.[14] A 90% FR-based attribution ratio means the utility influenced savings (considering only free-ridership) were 90% of the evaluation verified savings.

$$free-ridership-based\ attribution = \frac{Utility\ influenced\ savings\ considering\ only\ free-ridership, not\ spillover}{Evaluation\ verified\ savings}$$

Table 4-1 shows the FR-based attribution ratio for the Large Volume program. The table shows the FR-based attribution ratio, statistical precision at the 90% confidence interval, the program-claimed population first year m^3 savings, and percent of program savings.

The ratio result is based on an overall sample size of 14 customers and 20 measures. Additional details on stratification, sample size, and population size are provided in APPENDIX D. Additional statistical details for the results are provided in APPENDIX G.

The Large Volume program had the lowest FR-based attribution among the three programs. This program faces unique challenges to increasing attribution, including the direct access budget mechanism, low gas rates for participating customers, and measures that typically address maintenance concerns. The result is often projects with very low or very high simple payback periods, which often have low FR-based attribution.

Table 4-1. Free-ridership-based attribution ratio for Large Volume *

Segment	Sample customers	Sample measures	Free-ridership-based attribution	± at 90% confidence (FPC on)	Population m3 savings	Percent population m3 savings
Large Volume Program Overall	14	20	27.95%	4%	80,549,726	100%

* The table shows statistical precision (± at 90% confidence factor) that does not include the effects of a finite population correction factor. See APPENDIX B for more information.

[13] Enbridge's Annual Report provides a more detailed description of the program and can be found here: https://www.oeb.ca/sites/default/files/OEB-Annual-Report-2022-2023-EN.pdf

[14] *2023 Natural Gas Demand Side Management Custom Savings Verification.* Prepared for The Ontario Energy Board by DNV, November 25, 2024.

4.2 Components of free-ridership-based attribution

The FR-based attribution rate for each measure is calculated based on participant survey responses to questions regarding the utility's influence on the timing, quantity, and efficiency of the measure installed. This section reports the program's effect on each component and provides an indication of which aspects of the projects show the greatest utility influence.

Throughout this section, a "Null" value in the table reflects less than five customer responses. For confidentiality reasons, results for less than five responses are not displayed. Customers with more than one installed measure and different survey responses by measure will appear multiple times in the table, resulting in a customer total greater than the number of customers interviewed.

Table 4-2 represents the possible combinations of timing, efficiency, and quantity attribution. A "yes" in the timing, efficiency, or quantity column indicates partial or full FR-based attribution for that source. A "no" indicates no FR-based attribution for that source. For example, the row that has "yes" for timing, efficiency, and quantity reports the portion of the sample that indicated that the program had at least partial influence on the timing, efficiency, and quantity for that measure. For some measures, efficiency or quantity may not be applicable questions; for the purposes of this table, the not applicable measures are included as "no" on the non-applicable dimension.

The table shows the number of customers, measures, and savings that fall into each timing, efficiency, and quantity combination. The percentage of sample sample-weighted cumulative savings shows the portion of population savings represented by that category.

The table shows that over half of program participation (~57% of savings) was at least partially influenced by the utility. Timing is the most common reflection of program influence, with respondents reporting that approximately 39% of the program savings were accelerated by the program. The utility influenced the efficiency levels of approximately 20% of the savings and the quantity/size of approximately 18%.

Table 4-2. Overview of the sources of attribution for Large Volume*

Timing	Efficiency	Quantity	Sample Custs	Sample Meas	Percent of Weighted M3
Yes	Yes	No	Null	Null	17%
	No	No	5	5	22%
No	Yes	Yes	Null	Null	3%
	No	Yes	Null	Null	15%
		No	8	10	43%

Partial or Full Attribution No Attribution

* Because of confidentiality reasons and "Null" table entries, the sum of sample customers and sample measures in this table may not match the sum of sample customers and sample measures in other tables.

4.2.1 Timing component

Respondents answered a sequence of questions that address the timing of the equipment installation. (See APPENDIX K for the full survey instrument.) First, respondents answered the likelihood of installing the same type of equipment at the same time without the utility (DAT1a). Respondents who answered "Later" specified the number of months later in the next

question (DAT1b).[15] During the acceleration period, the energy savings for early replacement installations includes additional savings credit which reflects the utility-influenced replacement of older, less efficient equipment.

Eight out of 14 surveyed customers, accounting for 61% of program savings, said they would have installed their measure(s) at the same time. Customers representing approximately a third of savings indicated some amount of utility acceleration on at least one measure, mostly between 1 and 24 months (Table 4-3).

Table 4-3. Determining the acceleration period, Large Volume*†

DAT1a. Without the utility when would you have performed the measure?
DAT1b. Approximately how much later?

DAT1a	DAT1b	Timing Attribution	Sample Custs	Sample Meas	Percent of Weighted M3
Same Time	N/A	0%	8	13	61%
Later	Months <24	ER baseline credit for months accelerated	Null	Null	33%
	Don't Know/Refused	ER baseline credit for avg. of DAT1b	Null	Null	0%
Never	N/A	100%	Null	Null	5%

No Timing Attribution Full or Partial Timing Attribution

* Because of confidentiality reasons and "Null" table entries, the sum of sample customers and sample measures in this table may not match the sum of sample customers and sample measures in other tables.
†ER is an acronym for early replacement. N/A represents not applicable.

4.2.2 Efficiency component

Respondents answered a sequence of questions that address the utility's influence on the efficiency level of the installed equipment. (See APPENDIX K for the full survey instrument.) First, respondents were asked whether they would have installed the same level of efficiency without the utility (DAT2a). Respondents who answered that they would have installed a less efficient option answered two follow-up questions: first "what would you have installed," (DAT2c) followed by the scored follow-up question (DAT2b) to put their answer into a predetermined category. DAT2c was used to confirm the responses to DAT2b.

The utility had less influence on efficiency than timing, partially affecting 19% of the program savings (Table 4-4). Over three-quarters of program savings received zero efficiency attribution.

[15] See the Scope of Work attached in APPENDIX H for the detailed scoring algorithm.

Table 4-4. Determining efficiency attribution, Large Volume*†

DAT2a. Without the utility, would you have installed the same efficiency, lesser or greater?
DAT2b. What efficiency would you have installed?

DAT2a	DAT2b	Efficiency Attribution	Sample Custs	Sample Meas	Percent of Weighted M3
Same	N/A	0%	10	13	54%
Lower	Baseline Efficiency	100%	Null	Null	5%
	Don't Know/Refused	Average of Dat2b	Null	Null	3%
Don't Know/Refused	N/A	Average of dat2a	Null	Null	11%
Not Applicable	N/A	Not Asked	Null	Null	26%

No Efficiency Attribution Full or Partial Efficiency Attribution

* Because of confidentiality reasons and "Null" table entries, the sum of sample customers and sample measures in this table may not match the sum of sample customers and sample measures in other tables.
† N/A represents not applicable.

4.2.3 Quantity component

Respondents answered a sequence of questions that addressed the utility's effects on the quantity or size of the equipment installed. (See APPENDIX K for the full survey instrument.) First, respondents were asked whether they would have installed the same amount of equipment (or capacity for measures for which quantity is less relevant, such as boilers) without the utility (DAT3a). Respondents who answered that they would have installed less (or in some cases more/larger) equipment answered a follow-up question (DAT3b) to specify how the utility changed the amount/size that they installed.

The utility had little influence on the quantity of measures installed. Seven customers, accounting for 28% of the program savings, said they would have purchased the same amount of equipment without the utility (Table 4-5). Eighteen percent of savings were influenced by the utility, while 54% were from measures for which quantity is not applicable. Examples of not applicable measures include building automation systems, a roof or a system optimization.

Table 4-5. Determining quantity/size attribution, Large Volume*†

DAT3a. Without the utility would you have installed the same amount, more or less?
DAT3b. What amount would you have installed?

DAT3a	DAT3b	Quantity Attribution	Sample Custs	Sample Meas	Percent of Weighted M3
Same	N/A	0%	7	8	28%
Less/Fewer/Smaller	Partial change	0%<Value<100%	Null	Null	18%
Not Applicable	N/A	Not Asked	7	9	54%

No Quantity Attribution Full or Partial Quantity Attribution

* Because of confidentiality reasons and "Null" table entries, the sum of sample customers and sample measures in this table may not match the sum of sample customers and sample measures in other tables.
† N/A represents not applicable.

4.3 Vendor attribution

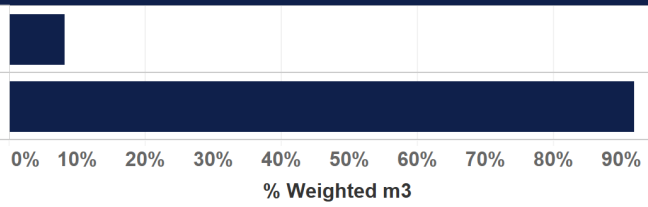
Evaluation interviews with the Enbridge program teams indicated that the program design for the Large Volume segment does not focus on working with and influencing vendors who in turn influence customers in their DSM project decisions. Vendor surveys were not completed for this Large Volume customers.

Across all programs and segments, vendors play a role in the decision making for most projects. This indicates that there could be opportunity for programs to increase net savings through proactively working with vendors as is the case with these segments' program strategy.

Table 4-6 shows that most projects in the Large Volume program indicated that a vendor was involved in their decision making on the project.

Table 4-6. Vendor interview trigger for Large Volume

Vendor Involvement	Participant Attribution	Sample Customers	Sample Measures
Involved in Decision	100% Participant Attribution	2	2
	Less than 100% Participant Attribution	12	18



5 FINDINGS AND RECOMMENDATIONS

Table 5-1 presents the key findings and recommendations from the study. The table shows the party to whom the recommendation applies and the primary beneficial outcome of the recommendation. We classified outcomes into four categories: reduce costs, increase savings, increase (or maintain) customer satisfaction, and decrease risk (multiple types of risk are in this category including risk of adjusted savings, risk to budgets or project schedules, and others). Details of the findings, recommendations, and outcomes follow the table. All recommendations address energy savings and program performance.

Table 5-1. Recommendations summary table

#	Energy savings and program performance		Applies to		Primary beneficial outcome			
	Finding	Recommendation	Enbridge	Evaluation	Reduce costs	Increase savings	Customer satisfaction	Decrease risk
1	FR-based attribution in the programs is variable	Evaluate free-ridership for the programs annually and couple the free-ridership evaluation with process evaluation		✓		✓		
2	FR-based attribution for the programs came primarily through acceleration	Consider strategies to have greater impact on increasing efficiency and amount (where applicable) of measures	✓			✓		
3	Many customers with high FR report involving Enbridge late in the process	Consider strategies to reduce customers taking advantage of the rebate for projects that are already fully decided upon.	✓			✓		✓
4	Return on Investment is mentioned consistently by customers and vendors as a key metric	Continue emphasis on ROI effect of incentives with customers. Consider helping to quantify kWh, water and other non-energy benefits of projects to sell projects that do not pass ROI on gas savings alone	✓			✓		
5	Safety code requirements differ among commercial buildings can affect energy saving measures	Consider reviewing safety code requirements for facilities likely to have higher than typical code.	✓					✓
6	Reducing Carbon tax bills is a driver for some customers	Consider ways to leverage Carbon tax and Carbon effects as part of the package to motivate customers to participate	✓			✓		
7	The Large Volume program has high free ridership	Consider the high free-ridership within the context of the cost effectiveness of the program. High free rider programs can still deliver meaningful cost-effective net savings.		✓		✓	✓	
		Conduct a process evaluation to improve Large Volume influence on customer projects	✓			✓	✓	✓
		Consider limiting the measure types or payback periods that are eligible for Large Volume incentives	✓			✓	✓	✓

#	Energy savings and program performance		Applies to		Primary beneficial outcome			
	Finding	Recommendation	Enbridge	Evaluation	Reduce costs	Increase savings	Customer satisfaction	Decrease risk
8	Vendor attribution increased program attribution significantly for the Enbridge Commercial and Multifamily Segments	Consider expanding approaches to market for other programs that leverage third-party vendors.	✓		✓	✓		
9	Vendor attribution recruitment resulted in less completed interviews than desired.	Consider interviewing participating vendors independent of the participating customer sample and recruitment.		✓		✓		✓
10	In the attribution scoring methodology, timing assumptions, specifically the number of years assumed for "never would have implemented" have a significant effect on FR-based attribution.	Consider studying the typical planning horizons for each of the customer segments. The assumed planning horizon for companies is used in the scoring to determine at what point the program receives full influence credit for accelerating a measure's implementation.		✓				✓
11	The treatment of efficiency in the scoring has a relatively small effect FR-based attribution.	Consider simplifying the efficiency question sequence in future research to reduce survey length while still capturing attribution.		✓			✓	
12	A significant amount of spillover was found in the Agricultural segment.	Consider replicating the agriculture go-to-market approach in segments where it may provide similar results. In other customer groups this might be a combination of customer segmentation and specific measure type focus to achieve similar market effect in different niches.	✓			✓		
		Consider replicating the spillover study approach in segments where it may be applicable. Applicable segments include those with a strong program theory for market effects in a specific segment or segment-measure combination and those with known high market share for the program in an area.		✓		✓		
13	Data collection for the Agricultural segment spillover study was successful, with some areas for improvement.	The offered incentive and multi-modal survey approach led to higher than typical response rate for a general population study and should be considered for future research that includes non-participants.		✓	✓			✓
		Attempting to collect sufficient detail for site specific energy savings calculations provided marginal value and should be reconsidered.		✓	✓			

#	Energy savings and program performance		Applies to		Primary beneficial outcome			
	Finding	Recommendation	Enbridge	Evaluation	Reduce costs	Increase savings	Customer satisfaction	Decrease risk
		Adding a question about why customers did not go through the program could provide additional value in future studies of this type.		✓				✓
14	The spillover study found 14.96% annual m3 spillover and 11.21% lifetime CCM spillover.	The spillover found in the study should be applied to the agricultural custom offering results using the percent of program savings ratios.	✓	✓		✓		
		The separate annual and lifetime ratios should be applied to calculate the annual and cumulative savings respectively.	✓	✓		✓		
		The spillover found in this study should replace the value found in the 2015 participant survey as this study covers both participant and non-participant spillover.	✓	✓		✓		

Finding 1: FR-based attribution in the programs is variable.

- **Recommendation 1:** Consistent evaluation of free-ridership coupled with process evaluation will help identify specific ways for each program to manage and reduce free-ridership. Consistent measurement of free-ridership early in the next DSM framework can help Enbridge and stakeholders to understand what is working to drive net savings and provide lessons for continuous improvement.
- **Outcome 1:** Effective free-ridership management will allow the programs to continue to increase their net savings in future years.

Finding 2: FR-based attribution for the programs came primarily through acceleration rather than changes in efficiency or quantity. Acceleration periods tend to be considerably shorter than the estimated useful life (EUL) of a measure and thus the partial FR-based attribution that results is low relative to cumulative gross savings. Acceleration is less valuable to societal and provincial goals than changes in efficiency and quantity due to its short-term effect. Program goals in the current framework are first-year gas savings rather than cumulative savings, so this recommendation will not have a significant effect on program results.

- **Recommendation 2:** To ensure the programs continue to deliver significant cumulative net savings, the utilities should continue to:
  - Identify unique solutions that save energy at customer plants
  - Expand promotion of energy efficiency measures with low market penetration
  - Motivate customers to increase the scope of their projects. Some options include multi-measure bonuses or escalating incentive structures that pay more for doing more.
  - Promote long life measures and consider discontinuing the promotion of short-lived measures
  - Proactively upsell equipment purchases from standard to efficient products

  - Target hard -to-reach customers who have not participated in the past
  - Adopt lessons learned from the Enbridge Commercial and Multifamily approach to market, working proactively with vendors
  - Focus on promoting novel energy energy-saving solutions to industrial and agriculture customer problems. Several customers indicated that the project would not have happened without the utility because a utility representative identified a solution that they had not considered

  In addition, the utilities should stop providing incentives for standard efficiency products in non-replace on burnout situations.

- **Outcome 2:** Additional effect on efficiency and quantity of measures will increase net savings and hedge against regulatory risk if future frameworks revert to cumulative savings metrics.

Finding 3: Many customers with high FR report involving Enbridge late in the process.

- **Recommendation 3:** Consider strategies to reduce customers taking advantage of the rebate for projects that are already fully decided upon. The program has established proactive marketing and engagement strategies in place to be involved early in the process with many of the largest customers, which helps mitigate this risk. Increasing efforts and resources in order to expand these efforts to the broader mid-size customers could be an option.
- **Outcome 3:** Increasing proactive engagement approaches will reduce the percentage of free riders in the program and increase gross savings.

Finding 4: Return on Investment is mentioned consistently by customers and vendors as a key metric.

- **Recommendation 4:** Continue emphasis on ROI effect of incentives with customers. Consider increasing efforts to quantify kWh, water, and other non-energy benefits of projects to sell projects that do not pass ROI on gas savings alone.
- **Outcome 4:** Adding additional quantifiable impacts to sales pitches can help increase net savings, both through increased volume of gross savings and through more visible and memorable Enbridge support for making business case for DSM projects.

Finding 5: Safety code requirements differ among commercial buildings can affect energy saving measures.

- **Recommendation 5:** Consider reviewing safety code requirements for facilities likely to have higher than typical code. At least one participant referenced their measure as being required by code for their facility. Codes can vary across jurisdictions at different levels of government and may apply for some facilities and situations, but not others. Consider maintaining an internal tracker for situations where codes are higher and affect typical custom measures. Pipe insulation and steam trap jackets are two examples.
- **Outcome 5:** Keeping an internal tracker of codes that affect projects can help the program avoid free-rider projects and identify measures that are ready to be sunset or limited in the programs.

Finding 6: Reducing Carbon tax bills is a driver for some customers.

- **Recommendation 6:** Consider ways to leverage Carbon tax and Carbon effects as part of the package to motivate customers to participate. Carbon tax was cited by at least one customer as a significant driver for reducing gas use at the participating facility. While this presents a free-ridership risk, Enbridge can also use Carbon tax effects as a lever in ROI conversations and for making the business case.
- **Outcome 6:** Quantifying likely Carbon tax effects of DSM measures for customers can help grow the program and reduce free-ridership.

Finding 7: The Large Volume program has high free-ridership.

- **Recommendation 7a:** Consider the high free-ridership within the context of the cost effectiveness of the program. High free rider programs can still deliver meaningful, cost-effective net savings.
- **Outcome 7a:** The Large Volume program delivers significant net savings
- **Recommendation 7b:** Conduct a process evaluation to improve Large Volume influence on customer projects
- **Outcome 7b:** A process evaluation may uncover ways for Enbridge to drive net savings at Large Volume sites with less free-ridership.
- **Recommendation 7c:** Consider limiting the measure types or payback periods that are eligible for Large Volume incentives. Continuous maintenance projects and projects where payback is single digit months are projects that will generally get priority without program funds. Eliminating high potential free-ridership projects will enable additional funds to be targeted toward projects that require funding to get done. From a customer service standpoint, it is difficult for utilities to deny incentives to customers unless they have pre-established rules to point to. Clear rules can allow Enbridge to reject potentially poor projects without a large effect on customer satisfaction.
- **Outcome 7c:** Reducing free-rider projects will increase net savings.

Finding 8: Vendor attribution increased program attribution significantly for the Enbridge Commercial and Multifamily Segments. Participants of all programs indicated vendor involvement at key decision-making junctures, suggesting that if Enbridge is able to influence vendor recommendations, there may be an opportunity to increase indirect influence on participants in all segments.

- **Recommendation 8:** The utilities should consider what lessons can be learned from the Enbridge multifamily approach to market that is applicable to other segments. All segments may have opportunities to leverage third-party vendors. A process evaluation that includes vendor interviews might uncover specific opportunities and approaches that would help in transferring the Enbridge multifamily lessons to other segments.
- **Outcome 8:** Effective leveraging of vendors could both increase FR-based attribution and program uptake.

Finding 9: Vendor attribution recruitment resulted in less completed interviews than desired.

- **Recommendation 9:** Consider interviewing participating vendors independent of the participating customer sample and recruitment. The current evaluation practice is to interview vendors that are identified as influential on customers through the participant interview, which ties the vendor and customer responses together, but also creates a challenge in project delivery since the vendor interviews cannot be started until late in participant data collection. An alternative approach would be to have an independent sample of projects to ask vendors about that could be completed in parallel with participant data collection.
- **Outcome 9:** Larger completed samples of vendors allowing for more robust estimates of Enbridge effect on vendor actions.

Finding 10: In the attribution scoring methodology, timing assumptions, specifically the number of years assumed for “never would have implemented” have a significant effect on FR-based attribution.

- **Recommendation 10:** Consider studying the typical planning horizons for Ontario businesses in each segment. Currently, the two-year and four-year assumptions offered are based more on anecdotal evidence than on data. The assumed planning horizon for companies is used in the scoring to determine at what point the program receives full influence credit for accelerating a measure’s implementation.
- **Outcome 10:** More accuracy and confidence in free-ridership-based attribution results.

Finding 11: The sensitivity testing shows that the treatment of efficiency in the scoring has a relatively small effect on free-ridership-based attribution.

- **Recommendation 11:** Consider simplifying the efficiency question sequence in future research to reduce survey length, while still capturing attribution.
- **Outcome 11:** Reduced customer burden during interviews.

Finding 12: A significant amount of spillover was found in the Agricultural segment.

- **Recommendation 12a:** Consider replicating the agriculture go-to-market approach in segments where it may provide similar results. In other customer groups this might be a combination of customer segmentation and specific measure type focus to achieve similar market effect in different niches.
- **Recommendation 12b:** Consider replicating the spillover study approach in segments where it may be applicable. Applicable segments include those with a strong program theory for market effects in a specific segment or segment-measure combination and those with known high market share for the program in an area.
- **Outcome 12:** Increased savings through market effects.

Finding 13: Data collection for the Agricultural segment spillover study was successful, with some areas for improvement.

- **Recommendation 13a:** The offered incentive and multi-modal survey approach led to higher than typical response rate for a general population study and should be considered for future research that includes non-participants.
- **Recommendation 13b:** Attempting to collect sufficient detail for site specific energy savings calculations provided marginal value and should be reconsidered.
- **Recommendation 13c:** Adding a question about why customers did not go through the program could provide additional value in future studies of this type.
- **Outcome 13:** Improved value from future studies.

Finding 14: The spillover study found 14.96% annual m3 spillover and 11.21% lifetime CCM spillover. While the relative precision of the study showed high variability, this is a common feature of spillover studies generally and should not preclude applying the ratio to estimate net savings for the program.

- **Recommendation 14a:** The spillover found in the study should be applied to the agricultural custom offering results using the percent of program savings ratios.
- **Recommendation 14b:** The separate annual and lifetime ratios should be applied to calculate the annual and cumulative savings respectively.
- **Recommendation 14c:** The spillover found in this study should replace the value found in the 2015 participant survey as this study covers both participant and non-participant spillover.
- **Outcome 14:** Updated energy savings estimates for the program.

APPENDIX A. GLOSSARY OF TERMS AND KEY CONCEPTS

Term	Description
Action	A DSM measure that generates savings through optimization, maintenance, or repair of existing systems. Actions (vs. equipment) were categorized for the populations of measures based on tracking database information provided by Enbridge for sample design.
Adjustment factor	The adjustment factors are ratios of savings that allow evaluation findings from a sample of projects to be applied to and "adjust" the population of program savings. Realization rates and ratios are other common terms.
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	Energy used / equipment in place if the program measure had not been done.
Building envelope	Exterior surfaces (e.g., walls, windows, roof, and floor) of a building that separate the conditioned space from the outdoors.
C&I	Commercial and Industrial
Capacity Expansion	Measure that allows customer to increase production/productivity
CCM	Cumulative cubic meters (cumulative m^3). 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)	Activities related to the collection, analysis, and reporting of data for purposes of measuring gross custom program impacts.
Customer	Unique customers can be identified based on the account number and the contact information provided by Enbridge. A customer may have multiple site addresses, decision makers, and account numbers. Customers can only be identified for records for which we received contact information. (i.e., records associated with account numbers that have measures in the sample or backup sample).
Demand side management (DSM)	Modification of perceived customer demand for a product through various methods such as financial incentives, education, and other programs.
Domain	Grouping of like projects. A domain may be defined as projects within a specific sector or a category of measure types, end uses, or other.

Term	Description
Dual baseline	Savings calculation approach which addresses or combines the savings associated with early replacement and the savings after the early replacement period. This concept is relevant to the measurement of lifetime gas savings (CCM) but not first-year annual savings.
Early replacement (ER)	Measure that replaces a piece of equipment that is not past its estimated useful life (EUL) and in good operating condition. A measure category where a utility energy efficiency program has caused a customer to replace operable equipment with a higher efficiency alternative (also referred to as advancement).
Early replacement period (ER Period)	Time that the existing equipment would have continued to be in use. This is the same as remaining useful life (RUL). This concept is relevant to the measurement of lifetime gas savings (CCM) but not first-year annual savings.
Energy solutions advisor (ESA)	Energy Solutions Advisors work with customers on a one-to-one basis to address the unique processes and opportunities within each customer facility, identify energy savings opportunities, and promote Enbridge's DSM offerings.
Estimated 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). Typically, the median number of years that the measure will remain in service.
Ex ante	Program claimed or reported inputs, assumptions, savings, etc.
Ex post	Program inputs, assumptions, savings, etc. which are verified after the claimed savings are finalized. Does not include assessment of program influence.
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	Gross savings are changes in energy consumption and/or demand directly caused by program-related actions by participants, regardless of reasons for participation (savings relative to baseline, defined above).
In situ	Existing measure, conditions, and settings.
In-depth interviews (IDIs)	Structured technical interviews administered by evaluation engineers and market researchers either in person or more frequently, over the phone, IDIs offer more flexibility than CATIs and are best leveraged for complex projects and topics.
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.
Industry standard practice (ISP)	A common practice used within an industry but not formally defined by code or regulation.
Input assumptions	Assumptions such as operating characteristics and associated units of resource savings for DSM technologies and measures.
Lifetime cumulative savings	Total natural gas savings (CCM) over the life of a DSM measure. It can be claimed, gross, or net. Sometimes referred to as just "cumulative" or "lifetime."

Term	Description
Maintenance (Maint.)	Repair, maintain, or restore to prior efficiency.
Measure	Equipment, technology, practice, or behaviour that, once installed or working, results in a reduction in energy use. Measures are identified in the tracking data as unique line items for which savings within a custom project are quantified. 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)	Verification of savings using methods not including attribution/Free-Ridership assessment.
Metric	This is a term used by the OEB 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 annual 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	Multifamily (multi-residential)
Natural Replacement	A measure category where the equipment is replaced on failure or where a utility energy efficiency program has not influenced the customer decision to replace but once the decision has been made, the utility program influences a higher efficiency alternative. (see replace on burnout)
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, or a category of efficiency measures in new construction or major renovations, whose baseline would be the relevant code or standard market practice.
Non-early replacement period (non-ER period)	Time after the ER period up to the EUL.
Non-energy impacts	Sometimes called non-energy benefits, these are the wider socio-economic or environmental outcomes that arise from energy efficiency improvements, aside from energy savings. NEIs can include but are not limited to impacts such as improved safety, improved health, and job creation. For example, offering participants may benefit from increased property value, and improved health and comfort. The TRC-Plus test includes a 15% adder to the benefits calculation to account for NEIs.
Normal replacement (NR)	Measure that replaces a piece of equipment that is past EUL and in good operating condition.
Offering	One or more DSM activities or measures which a utility may use to affect a specifically identified target market in their choices around the amount and timing of energy consumption.
Persistence	The extent to which a DSM measure remains installed and performing as originally predicted in relation to its EUL.
Portfolio	A group of DSM programs which have been selected and combined in order to achieve the objectives of a utility's DSM Plan.

Term	Description
Program	The programs outlined in Enbridge's Multi-Year Plan are comprised of one or more offerings and address the needs of a subset of Enbridge's customer base.
Program evaluation	Activities related to the collection, analysis, and reporting of data for purposes of measuring program impacts 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	Projects are identified in the tracking data based on the project code. A project may have multiple measures as indicated by sub-codes in the current data tracking system.
Rate class	The OEB establishes distribution rate classes for Enbridge. Distribution rate classes group customers with similar energy profiles.
Realization rate	A combination of adjustment factors, which represents ratios between two savings values. For example, the final realization rate is the ratio between evaluated savings and program claimed savings.
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)	Measure that replaces a failed or failing piece of equipment. (see natural replacement)
Retrofit	A measure category that includes the addition of an efficiency measure to an existing facility such as insulation or air sealing to control air leakage.
Retrofit add-on (REA)	Measure that reduces energy use by modifying an existing piece of equipment.
Scorecard	A scorecard allows for multiple different kinds of metrics such as 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-2021-0002.
Scorecard Achievement	The verified value for program-specific metric targets (annual savings, 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 125%.
Site	Sites are identified based on unique site addresses provided by 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 a site id.
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)	Improve system or system settings to exceed prior efficiency.

Term	Description
TRM	Technical Resource Manual, which is a document that identifies standard methodologies and inputs for calculating energy savings.
TSER	Telephone-supported engineering review.
Unit of analysis	The level at which the data are analyzed, which in 2023 will likely be a “measure” or sub-project level for Enbridge.
Vendors	Program trade allies, business partners, contractors, and suppliers who work with program participants to implement energy saving measures.

APPENDIX B. TECHNICAL INTRODUCTION

This study provides free-ridership-based attribution ratios from Enbridge's natural gas DSM programs delivered in 2023. The programs included are shown in Table B-1. In free-ridership-based attribution studies, Custom Market-Rate Multi-Residential (Multifamily) projects are included, but custom low-income multifamily (LI MF) projects are not. LI MF uses a deemed value for free-ridership.

Table B-1. FR by program, 2023

Program	2023 FR
Large Volume	✓
Commercial*	✓
Industrial	✓
Affordable Housing Multi-Residential	

*Custom Market-Rate Multi-Residential (Multifamily) projects are expected to be included as a part of this program.

Evaluation background

Enbridge delivers energy efficiency programs under the Demand Side Management Framework for Natural Gas Distributors (2023)[16] developed by the OEB. The OEB hired an Evaluation Contractor (EC) team led by DNV to develop an overall evaluation, measurement, and verification (EM&V) plan. The objectives of the plan were to:

- Assess portfolio impacts to determine annual savings results, shareholder incentive and lost revenue amounts, and future year targets.
- Assess the effectiveness of energy efficiency programs on their participants and/or market, including results on various scorecard items.
- Identify ways in which programs can be changed or refined to improve their performance.

Under the plan, the DNV team determined free-ridership-based attribution for custom projects implemented as part of the 2023 program year. This report is a result of that study.

The EAC consists of representatives from Enbridge as well as representatives from non-utility stakeholders, independent experts, staff from the Independent Electricity System Operator (IESO), and observers from the Environmental Commissioner of Ontario and the Ministry of Energy. The DNV team worked closely with the EAC throughout this study and received comment, advice, and input on methodology and results. We thank them for their involvement.

Methodology summary

The results presented in this report are based on data collection from the following four primary sources:

- Enbridge tracking databases
- Enbridge project documentation
- In-depth telephone interviews with a sample of participating customers
- In-depth telephone interviews with a sample of participating vendors

[16] EB-2021-0002

The data collection with samples of participating customers and vendors included telephone interviews focused on assessing free-ridership. Table B-2 shows the targeted and completed data collection activities.

Table B-2. Data collection activities*

Target Group	Activity	Targeted Measures	Completed Measures
Enbridge			
Participating Customers	In-Depth Interview	220	224
Participating Vendors	In-Depth Interview	Census of Triggered Comm & Multi-Res. And Ag Segments	31

*This table reports the number of measures targeted and completed as measures were used to design the sample before customers and sites had been identified.

At a high level, the FR study employed the following methodology:

- **Receive program data and documentation.** The evaluation started with a review of the program tracking data, which formed the basis of the sample.
- **Design and select the sample.** The tracking data was used to design and select a sample. Once the sample was selected, additional documentation was provided by the program to describe the energy efficiency measures to customers.
- **Collect data.** Data was collected to estimate FR-based attribution ratios.
- **Analyze the results.** The collected data was used to estimate FR-based attribution ratios at each site and expand the results to the population.
- **Report the results.** The final step was to report the results.

Key features of the methodology include:

- The **sample design** employed a stratified random sample that targeted 10% relative precision with 90% confidence at the program level. Details of the sampling methods are presented in the sample design memo in APPENDIX K. Final sample achievements are provided in APPENDIX D.[17]
- **Ratio estimation** was used to expand sample results to the population. The evaluation collected data on all sampled or backup projects that a customer contact could speak to rather than only the first selected. In our calculation of sampling error (±, confidence intervals, relative precision and error ratios), we used two-tailed 90% confidence limits and clusters defined by customers to appropriately estimate error when multiple units are collected from a single source.[18] The approach used is described in the scope of work in APPENDIX K.
- The **FR methodology** included data collection from participating customers and vendors. The data collection instruments and free-ridership scoring methods are provided with the scope of work in APPENDIX K. The results of this study include an update to the FR-based attribution portion of the net to gross (NTG) study performed on the 2018 programs.[19] The spillover calculations that will result from the 2023 Spillover study should be combined with the FR-based attribution results from this study to calculate the NTG ratio.

[17] This study was completed by DNV concurrent with the 2022-2023 Custom Savings Verification Study. Independent samples were selected for each study.

[18] Where a single site had two contacts, the site was used as a cluster to ensure conservative (higher) error estimates.

[19] *2018 Natural Gas Demand Side Management Free-ridership Based Attribution Evaluation*. Prepared for the Ontario Energy Board by DNV GL. March 13, 2020.

Key methodological changes from the 2017-18 NTG study

The evaluation followed the same framework as the 2017-18 NTG study, with several incremental improvements and adjustments.

1. The core approach focused on first-year gas savings rather than lifetime savings consistent with the DSM framework goals.
2. Interviews with customers occurred in two waves, the first wave was completed with customers who participated in the first three quarters of 2023 while the second wave was focused on the fourth quarter participants. This allowed for sooner after project completion interviews with both waves than was possible previously.
3. Framing questions were enhanced by utility provided documentation of several additional types of specific interactions prior to implementation of the project. These data were not used directly in scoring but allowed for more specific probes designed to improve customer recall of the project history.
4. Vendor interview approach was expanded to agriculture segment vendors.
5. Non-Commercial and Multifamily customer timing responses were assessed based on a 2-year planning horizon rather than 4 years. This change was in recognition of the fact that customers in these segments tend to have shorter planning horizons for equipment than industrial and agricultural customers. This meant that responses of 2-4 years of acceleration for projects were assessed as full credit to the program rather than partial. This approach is consistent with what was used for the Commercial and Multifamily customer timing credit in the 2017-2018 study

Understanding statistical error

Statistical error is reported for all ratio results in this report. The studies were designed with sample designs targeting 10% relative precision with 90% confidence (90/10) based on the best available assumptions at the start of the evaluation. Table B-3 describes each of the statistics provided in this report.

Table B-3. Relevant statistics

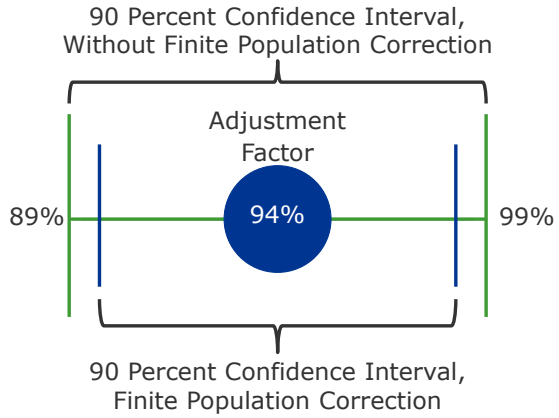
Term	Definition
Ratio/Adjustment factor	A point estimate of the evaluation findings expressed as a percent.
± or Absolute Precision	If the evaluation were repeated several times, selecting samples from the same population, 90%[20] of the time the ratio would be within this range of the ratio
Confidence interval	The upper bound is defined by the ratio plus the absolute precision. The lower bound is defined by the ratio minus the absolute precision.
Relative Precision	The relative precision is calculated as the absolute precision divided by the ratio itself. By convention, relative precisions are the statistic that are targeted in sampling (i.e., 90/10 is a relative precision metric)
Error Ratio	The error ratio is an approximation of the coefficient of variation (CV) that is used in sample design. It is calculated as a function of relative precision.
Finite population correction (FPC)	FPC is a factor that reduces the measured error of samples drawn from small populations (less than 300). FPC applies when the ratio is applied to the same population from which the sample was drawn. Statistics reported in the body of this report do not apply the FPC factor because this study is intended to support application of results to more than just the 2018 program year.

[20] 90% is the confidence limit that we are using.

Figure B-1 shows an example of:

- The adjustment factor (ratio) as a blue point
- The 90% confidence interval *with finite population correction* (blue)
- The 90% confidence interval *without finite population correction* (green)

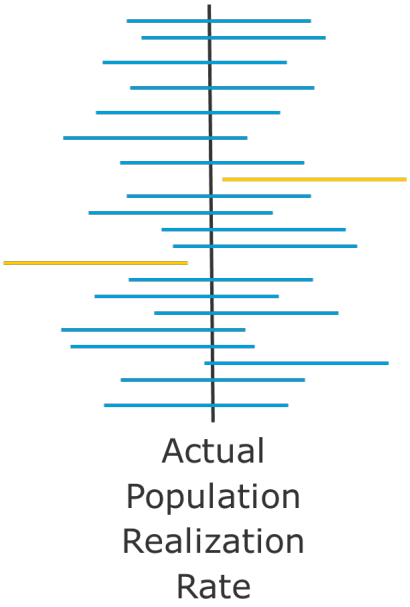
Figure B-1. Ratio diagram example



The plus/minus (±) error (%) indicated at the 90% confidence interval is the absolute difference between the estimated percentage and the upper or lower confidence bound. For example, in Figure B-1, the ratio is 94% and the non-FPC 90% confidence interval is ± 5 percentage points (i.e., 94% ± 5%).[21] Another way of saying this is that there is a 90% probability that the actual ratio for the next year's program lies between 89% and 99%. Figure B-2 demonstrates this concept by showing twenty hypothetical confidence intervals calculated from twenty different samples of the same population. Eighteen out of twenty (90%) include the true population ratio (overlap the black line representing the true ratio).

[21] The critical value for calculating the confidence interval ± for each adjustment factor is determined using Student's t-distribution and n-1 for the degrees of freedom, where n is the sample size. For two-tailed estimates (ratios that could be above or below 100%) the appropriate t-stat used to calculate precision from the standard error is close to 1.645.

Figure B-2. 90% confidence interval



Note: Each horizontal line represents a confidence interval, while the black vertical line is the actual population realization rate. Yellow confidence intervals do not include the actual ratio.

The relative precision of the ratio is calculated as 5%/94% = 5.3%.

For low ratios, relative precisions may be quite high, even when the confidence interval around the ratio is quite narrow. Consider a ratio of 5% with the same 5% absolute precision as in the above example. While the absolute precisions are the same, the latter ratio (5%) has a relative precision of 5%/5% = 100%. In absolute terms, we still are 90% confident the ratio is below 10%, despite the very high (100%) relative precision.

We reported the relative precision in all cases at the 90% confidence level. That is, whether the relative precision is large or small, we have the same 90% confidence that the range defined by the point estimate ± the absolute error captures the true unknown value. The “midpoint” estimate (the ratio) is the best (statistically most likely) estimate, while the confidence interval is calculated as an interval around that point. Thus, in all cases, we reported the best point estimate, with a symmetric 90% confidence interval (using the t-score for a two-tailed 90% confidence interval).

APPENDIX C. SPILLOVER STUDY BACKGROUND

The EAC's initial spillover discussions centered on a comprehensive study, looking at both participant and non-participant spillover across all custom projects. At the same time, there was concern regarding a study across market segments due to potential cost, complexity and complexity of spillover drivers across segments. DNV proposed to focus on the agricultural segment as it the greatest potential for quantifying a comprehensive spillover value. The EAC supported the proposal.

Choice of segment: The Enbridge Custom programs work to influence customers through multiple activities that differ somewhat across programs and offerings. The Agricultural segment was selected for this study due to three factors that made it a good candidate for quantifying spillover. First, the Agriculture segment program theory has spillover built in. For the Agricultural segment, Enbridge's program theory includes motivating energy efficiency through direct marketing to customers with ESAs and through broad outreach and marketing such as trade show/conference participation and sponsorship, magazines, and case studies. Second, the segment has a discrete list of technologies and measures that facilitate survey data collection, as opposed to wide-open questions that may result in greater non-response bias. Third, the segment has a substantial number of family-run businesses, which makes it more likely that account contacts associated with Enbridge billing are also knowledgeable about energy-using systems at the facilities.

Choice of spillover type: This study is designed to capture both non-participant and participant spillover (both like and non-like) in a single segment-wide spillover result.

As part of the program theory, spillover is anticipated to occur at participating sites with like/unlike spillover projects motivated by information from ESAs and experience with program-incentivized projects. Participant spillover was studied for the 2015 program year[22] and found to be 0.89% for the full industrial program, including, but not specific to the agricultural offering.

Non-participant spillover for the segment in a given year is expected to occur due to customers gaining insight and ideas for how to save gas from previous year Enbridge participation and sponsorship of trade shows and through word- of- mouth from participant experiences.

Approach: Enbridge provided a list of accounts with a full year of 2023 consumption who were targeted for the for the 2023 Enbridge Agricultural Custom offering. DNV attempted surveys with a census of these 423 sites. Customers representing 143 sites completed the survey. Both 2023 program participants and 2023 program non-participants were in included. Customers were asked about:

1. Whether they made changes made to gas use affecting systems in their facilities in 2023
2. What those changes were
3. What influenced their decision to make the change
4. What they would have done without the Enbridge-associated influences

From this data, DNV was able to estimate spillover savings for the Enbridge program. Survey results were translated into savings amounts using the savings per consumption ratio of measures completed in the 2023 custom agricultural program times the consumption for the surveyed site. The approach produced a reasonable savings amount, but is not expected to be accurate for each individual site. For sites that identified an increase in production due to a change in 2023, DNV asked by what percent production increased. This percent was multiplied by site consumption to approximate the savings.[23]

[22] DNV, *CPSV Participant Spillover Results*, May 23, 2018. https://www.oeb.ca/sites/default/files/OEB-CPSV-Participant-Spillover-Report.pdf

[23] In three cases, the production increase reported did not align with the changes made and DNV capped production increase savings at 25%.

APPENDIX D. FREE-RIDERSHIP FINAL SAMPLE ACHIEVEMENT

The tables in this appendix show the achieved sample for each stratum in the sample designs. The tables are specific to a program group and show the categorical stratification (grouping) and size strata (larger numbers are bigger projects). Sampling was done at the measure level. The target column shows the number of units we attempted to complete. The complete column shows the number of measures randomly selected and completed. First year natural gas savings (m^3) are also included under the header Ex Ante m^3. Note that in some cases measures beyond the target were completed. These completed measures were at sites with multiple measures in the sample.

Custom Commercial: Summary of participant data collected

Table D-1 summarizes the FR-based attribution data collection efforts for the Enbridge Custom Commercial program. The table shows the portion of the program that:

- Completed an in-depth interview
- Did not respond to an evaluation attempt at contact
- Was not contacted by the evaluation team[24]

The data collected in Table D-1 is shown as the number of customers and measures and the cumulative ex ante natural gas savings. The full sample design and achievement by strata can be found in Table D-2.

The evaluation collected FR-based attribution data for 34% of savings in the programs with a customer response rate of 13%.

Table D-1. Summary of FR data collection for Custom Commercial program

	Targeted	Completed		
Data collection category	# measures	# customers	# measures	Population m^3
Completed in-depth interview	100	83	97	9,221,576
Attempted contact, not completed		84	94	8,125,803
Not attempted		533	690	9,895,683
Total		651	881	27,243,062

[24] Sites, projects, or units of analysis where contact was not attempted were either not selected for contact in sampling or in the backup sample and were not contacted due to strata quotas being met.

Table D-2. FR sample achievement for Custom Commercial program

Segment	Measure Group	Stratum	Max M3	Target	Completed Measures	Completed M3	Population Measures	Total M3
Commercial	Boilers	1	10,767.4308	5	5	18,997	109	658,464
		2	19,008.9144	4	4	56,037	53	768,322
		3	36,359.7276	4	4	105,510	33	863,469
		4	107,134.66..	4	1	53,521	17	963,480
		5	108,377.83..	1	1	108,378	1	108,378
	Other Commercial	1	9,956.24	4	5	21,593	74	298,220
		2	16,507.78	4	4	45,006	28	358,142
		3	31,157.88	4	5	118,032	17	387,974
		4	54,855	4	3	133,196	11	476,436
		5	115,594.96	3	3	270,241	5	415,001
		6	211,110	2	1	138,696	2	349,806
	Steam Traps	1	36,660	2	2	34,540	12	191,738
		2	142,507	2	1	142,507	2	263,417
Institutional	Other Institutional	1	41,412.6	5	7	135,074	11	185,660
		2	70,162	4	4	238,891	5	301,617
		3	133,809	3	1	83,062	3	290,734
		4	167,308	1	1	167,308	1	167,308
		5	3,936,225	5	4	4,885,935	5	8,822,160
	Steam Traps	1	114,423	4	5	341,889	15	770,573
		2	406,048	2	2	527,488	2	527,488
Market Rate Multi-Family	Boilers	1	12,303.7656	5	7	54,600	182	1,068,605
		2	24,992.2092	4	4	78,416	71	1,297,053
		3	55,614.6024	4	5	216,675	42	1,469,544
		4	193,073.202	4	2	190,850	18	1,670,579
		5	248,136.31..	1	0	0	1	248,136
	Other Multi-Family	1	18,158.16	5	4	22,453	98	783,395
		2	42,673.85	4	4	113,467	34	994,987
		3	71,558.44	4	5	309,670	20	1,159,615
		4	211,257.54	4	3	389,580	9	1,162,798
		5	219,965	1	1	219,965	1	219,965
Grand Total					98	9,221,576	882	27,243,062

Custom Industrial: Summary of participant data collected

Table C-3 summarizes the FR-based attribution data collection efforts for the Enbridge Custom Industrial program. The table shows the portion of the program that:

- Completed an in-depth interview
- Did not respond to an evaluation attempt at contact
- Was not contacted by the evaluation team[25]

The data collected in Table C-3 is shown as the number of customers and measures and the cumulative ex ante natural gas savings. The full sample design and achievement by strata can be found in Table C-4.

The evaluation collected FR-based attribution data for 61% of savings in the programs with a customer response rate of 45%.

[25] Sites, projects, or units of analysis where contact was not attempted were either not selected for contact in sampling or in the backup sample and were not contacted due to strata quotas being met.

Table D-3. Summary of FR data collection for Custom Industrial program

Data collection category	Targeted # measures	Completed # customers	Completed # measures	Completed Population m^3
Completed in-depth interview	100	77	107	38,859,951
Attempted contact, not completed		44	74	17,178,980
Not attempted		95	172	7,488,025
Total		166	353	63,526,956

Table D-4. FR sample achievement for Custom Industrial program

Segment	Measure Group	Stratum	Max M3	Target	Completed Measures	Completed M3	Population Measures	Total M3
Agricultural	Heating or Water System	1	121,447	4	7	117,782	44	1,438,085
		2	258,265	4	3	457,912	10	1,847,716
		3	575,790	3	3	1,210,530	4	1,786,320
		4	1,418,983	3	3	3,304,009	3	3,304,009
	HVAC	1	47,938	5	9	169,080	56	1,195,275
		2	91,768	5	3	191,952	21	1,430,340
		3	174,515	5	4	544,065	13	1,719,757
		4	232,401	5	1	193,486	9	1,829,515
		5	293,892	5	3	827,692	7	1,818,401
		6	387,263	5	2	623,850	5	1,713,855
		7	1,531,527.79	10	8	7,174,007	10	9,265,488
	Process	1	235,567	2	1	36,851	4	409,183
		2	1,171,415	4	2	970,175	4	2,996,151
Industrial	HVAC	1	96,745	3	6	391,579	17	858,041
		2	222,346	3	3	554,017	6	1,159,581
		3	285,520	2	1	242,988	4	1,024,797
		4	385,807	2	1	326,782	3	1,063,299
		5	1,232,834	6	6	5,225,893	6	5,225,893
	Process	1	112,419	4	5	270,898	23	1,151,648
		2	266,738	3	5	965,907	8	1,600,346
		3	339,809	3	3	955,636	6	1,846,434
		4	501,761	3	2	811,903	4	1,722,333
		5	531,910	3	1	517,505	3	1,576,890
		6	744,558	4	4	2,667,172	4	2,667,172
	Steam or Hot Water System	1	115,266	4	5	242,294	36	984,439
		2	268,018	3	4	818,972	7	1,400,936
		3	577,681	3	3	1,447,213	3	1,447,213
		4	3,088,477	4	4	6,344,544	4	6,344,544
	Steam Traps	1	353,964	3	4	871,249	28	2,315,286
		2	384,008	1	1	384,008	1	384,008
Grand Total					107	38,859,951	353	63,526,956

Large Volume: Summary of participant data collected

Table D-5 summarizes the FR data collection efforts for the Large Volume program. The table shows the portion of the program that:

- Completed an in-depth interview
- Did not respond to an evaluation attempt at contact

- Was not contacted by the evaluation team[26]

The data collected in Table D-5 is shown as the number of customers and measures and the cumulative ex ante natural gas savings. The full sample design and achievement by strata can be found in Table D-6.

The evaluation collected FR data for 97% of savings in the program with a customer response rate of 74%. Both values are higher than the other two programs in this study, in part because DNV attempted to collect data with a census of participants.

Table D-5. Summary of FR data collection for Large Volume

Data collection category	Targeted # measures	Completed # customers	Completed # measures	Completed Ex ante CCM
Completed in-depth interview	20	14	20	78,092,558
Attempted contact, not completed		3	4	1,545,056
Not attempted		5	7	912,112
Total		18	31	80,549,726

Table D-6. FR sample achievement for Large Volume

Segment	Measure Group	Stratum	Max M3	Target	Completed Measures	Completed M3	Population Measures	Total M3
Large Volume	Large Volume	1	1,299,829	4	4	2,619,150	15	5,076,318
		2	1,931,534	3	3	5,281,818	3	5,281,818
		3	2,439,496	3	3	6,588,836	3	6,588,836
		4	2,554,834	3	3	7,637,901	3	7,637,901
		5	2,956,973	2	2	5,696,944	2	5,696,944
		6	15,193,375	5	5	50,267,909	5	50,267,909
Grand Total					20	78,092,558	31	80,549,726

[26] Sites, projects, or units of analysis where contact was not attempted were either not selected for contact in sampling or in the backup sample and were not contacted due to strata quotas being met.

APPENDIX E. SPILLOVER SAMPLE DISPOSITION

The study team developed a multi-modal approach to conduct the survey. The sample frame included contacts with one site, as well as contacts with two or more sites. The intent of the multi-modal approach was to cost-effectively meet the challenge of programming the survey for multi-site contacts, all while minimizing the burden on customers willing to participate in this effort. To encourage participation, respondents were offered a $100 incentive for completing the survey. For the two types of contacts, different data collection strategies were utilized:

- **Single sites:** a web survey was sent via email, followed by phone outreach to non-respondents. A survey invitation was emailed to 249 recipients beginning on September 9, 2024, and a reminder email was sent on September 23, 2024, to any non-respondents. Outbound dialing began on September 16, 2024, to any non-respondents for up to five phone attempts.
- **Multi-sites**: For contacts with multiple sites, a team of experienced interviewers attempted up to five phone calls to all 353 contacts. Interviewers conducted the survey for one site and would ask if/how their answers would vary for their other sites. A survey was submitted for each site based on the responses given during these phone calls.

Survey disposition

Of the 423 sites in the eligible sample, 254 emails were sent to all single site contacts and 423 phone calls were made to all contacts. Of those attempts, 14 of emails bounced, and 44 of phone numbers were unreachable. Further, 43 of the contacts refused. All of these factors resulted in an overall response rate of 26%. A further two sites were removed from the sample during data cleaning due to incomplete information.

Table E-1. Disposition table for survey

Disposition	Email	Phone
Total sites	249	423
Unreachable		44
Refuse		43
No response	13	131
Bounced	65	0
Contacted (bounced/refused/no response removed)	184	352
Complete	42	90
Partial complete	18	0
Surveys reported	42	90
Response rate (complete/contacted)	22.83%	25.57%
OVERALL RESPONSE RATE	**25.78%**	

DNV post-stratified the sample by 2023 program participation status and size based on 2023 m^3 consumption. Stratification by participant status was done to reduce potential bias from having higher response rates from participants than non-participants, while stratification by consumption improves the representativeness of the expanded sample. Weights were calculated as the number of sample frame sites divided by the number of completed sample sites by strata. Table B-2 shows the stratification.

Table E-2. Stratification of sample

2023 program participation status	Stratum	Completed sites	Completed m^3 consumption	Sample frame sites	Sample frame m^3 consumption
Non-Participant	1	95	54,354,140	281	156,960,782
Non-Participant	2	13	44,113,081	63	213,007,190
Non-Participant	3	9	100,215,388	25	272,581,801
Participant	1	16	20,505,795	36	55,201,315
Participant	2	4	20,813,470	12	63,009,691
Participant	3	6	69,985,064	8	86,657,529

APPENDIX F. FREE-RIDERSHIP SURVEY RESPONSES

This section presents self-reported responses from the timing, efficiency, and quantity FR question battery where customers were asked “Why do you say that?”

A “yes” in the timing, efficiency, or quantity column indicates partial or full FR-based attribution for that source based on the scored questions (not the responses here). A “no” indicates no FR-based attribution for that source. For example, in the first table, a “yes” in the timing column indicates that the respondent answered the question DAT1a and DAT1b with responses that credited the program with influencing the acceleration of the project. A “no” in the timing column indicates that the respondent did not credit the program with influencing the acceleration of the project. A “no” for timing does not preclude the same respondent indicating the program affected the efficiency or quantity/size of the same project.

Additionally, following the specific timing, efficiency and quantity questions, customers were asked to summarize the program’s effect on the timing, efficiency and amount of the project installed (Dat4). These responses are presented with the scored level of FR-based attribution: full, partial, or none.

None of the responses provided below were used in the direct scoring of surveys. For respondent confidentiality, these responses are isolated from other responses from the interview and do not reflect the full story the respondent conveyed. The responses are provided here to provide insight into how customers describe their decision making on the project relative to the program. Responses are sometimes recorded in the voice of the participant and in other cases in the third person depending on the notation approach of individual interviewers. See the scope of work (APPENDIX K) for details on how FR-based attribution was scored.

Custom Commercial program

Table D-1. Timing verbatim responses for Custom Commercial program

Timing	Dat1a_O. Why do you say that?
Yes	Because the incentive was ending, there was a time limit.
Yes	EGI incentive availability and our capital fund allotment influenced timing
Yes	Experience with <vendor> influenced our participation in the project. We saw that it would work with one of our projects.
Yes	Funding was key to make this project happen. I couldn't tell you when we would have done the project, it was not a major priority.
Yes	Funding was key.
Yes	Incentive helped move the project forward. Otherwise, we would have done it in a few years.
Yes	Incentive played an important role in presenting a stronger case but they needed to be replaced.
Yes	Incentive was the motivating factor, but would have waited a little longer.
Yes	It probably wouldn't have been installed due to high costs.
Yes	Maybe we would have installed it in 2 to 5 years, maybe even never.
Yes	Since it wasn't one of our larger buildings, we would have delayed investing in a replacement for this one.
Yes	Steam trap audit is very expensive, it would be very unlikely the project would have happened without the funding from Enbridge.
Yes	The VFDs were installed only because incentives were available; Without the incentives we would have replaced only the HVAC units
Yes	The boiler controls were installed only because incentives were available; Without the incentives we would have replaced only the HVAC units.
Yes	The boilers were still working but they were at the end of their life, so we would have had to make the change eventually.

Timing	Dat1a_O. Why do you say that?
Yes	The cost of the project made it hard to get approval from the board. We only did this because we had support from Enbridge.
Yes	The decision would have taken longer because we would have prioritized other business needs
Yes	The financial incentive wasn't there without Enbridge and we may have needed additional time to accumulate funds.
Yes	The hospital marches to its own clock and timeline.
Yes	The incentive helped gain approval to move forward quicker with the project
Yes	The incentive helped move the project high in the priority list
Yes	The incentive helped with approval, most needed to get replaced and had no remaining life.
Yes	The incentives helped us expedite the decision but we were going to make the change anyways.
Yes	The project would have been a standstill without Enbridge's support
Yes	They plan replacement well ahead of failure of course at times things fail when not expected but we would have waited for the planned replacement period.
Yes	They were still working but they were at the end of their life. Without the assistance, we would have installed a year later.
Yes	This depends on how long the boiler would have lasted.
Yes	This wasn’t a priority because it didn't pose immediate health risks. If we hadn't received funds, this would have been delayed a few years.
Yes	We don't think the issue would have been flagged without Enbridge.
Yes	We might have delayed the project without an efficient unit
Yes	We might have used it until it was older but still working
Yes	We were eligible for funding at the time.
Yes	We would have had to request more capital for funding
Yes	We would have used the equipment until efficiency levels dropped.
Yes	We wouldn't have been able to implement the project due to the cost.
Yes	We wouldn't have installed the system due to the high cost.
Yes	Without Enbridge, we would have not installed the controls or BAS. We do not have the reserve funds to complete project like these and the incentive allowed for install.
Yes	Without assistance from Enbridge, we would have fixed what was broken but with the assistance we were able to continue to go down the path to be more energy efficient.
Yes	Without the financial incentive, the ROI wasn't high enough to implement the project now. We would have delayed it for a 2 years or more.
Yes	Without the incentive it would not have been possible but maybe we would have installed it 2 to 5 years out.
Yes	Without the incentive, we would have installed a similar boiler in size/capacity about 5-6 months later
Yes	Without the rebate, the project didn't have a ROI that justified the investment.
Yes	Such a large project, I don't know when we would have been able to get it done.
No	Because of the age of the boilers.
No	Due to time sensitivity, this needed to be done.
No	Enbridge did not have an impact on our decision.
No	Enbridge helped influence if this project would be installed and when primarily due to the cost.
No	Financial assistance made the CFO happy (Some financial relief available in getting the work done that was needed anyway) but it didn’t have a major effect on our decisions.
No	Following deferred maintenance program.
No	It did not effect the timing, we had to installed a new boiler due to the old one failing.
No	It didn't have an effect on timing, eff, or amount. Our boilers were failing and needed to be replaced.

Timing	Dat1a_O. Why do you say that?
No	It was needed. It had slightly higher priority than the other project.
No	No impact of Enbridge on our decision
No	No impact of Enbridge on our decision.
No	Our board of directors were happy about the incentive but would have done this project without an incentive at the same time.
No	Our financial cycle dictates timeline.
No	Part of deferred maintenance.
No	Regardless of Enbridge's involvement we would have done the project.
No	Same time or later; Timing was determined mainly because of the performance of equipment and high gas bills.
No	System failed at the time, the first boiler failed around 2021 and the second failed towards the end of 2022. We would have found the replacement parts to keep the old boiler but they weren't available.
No	The Enbridge assistance did not affect timing, quantity, or efficiency of the heat recovery project.
No	The boiler was getting to the end of its lifespan, and it needed to be replaced asap. Enbridge's incentive had no impact on the timeline of the replacement.
No	The boilers had to be replaced regardless of the incentives. People from <vendor> had worked with Enbridge before so things went very smoothly.
No	The equipment was old and had to be replaced - at end of useful life.
No	The equipment was old and had to be replaced asap.
No	The financial incentive didn't impact our decision, we wanted to bring the system under one vendor.
No	The project would have been completed at the same time.
No	The type of insulation and repair schedule demanded a similar timeline regardless of assistance.
No	They needed to be replaced.
No	We had to complete all measures at the same time
No	We had to wait for the approval but overall the timing was as it was expected to be.
No	We have a tried and tested approach and a 5-year plan that we do our best to stick to. Enbridge's incentives would not have affected that. The incentive is seen predominantly as a nice to have bonus.
No	We needed heat
No	We typically fix steam traps when there are failures at the time. However, the studies allowed for us to identify potential failures before they occur,
No	We would have completed at the same time
No	We would have completed project at same time more or less because it wasn't costly for us
No	Without the assistance it would have been likely that we installed the same highly efficient boiler at the same time.
No	Without the assistance we may have installed a similar set of 2 condensing boilers around the same time.
No	Without the assistance, the project would have moved forward as is.
No	it made sense to do all of the measures at the same time. Failing equipment. Needed to provide more cooling per regulations/requirements.

Table D-2. Efficiency verbatim responses for Custom Commercial program

Efficiency	Dat2a_O. Why do you say that?
Yes	Enbridge did not have impact on the capacity of the boiler. The decision was always to go with high efficiency boiler due to long term cost saving calculations.
Yes	Enbridge helped reprogram the existing system, we would have continued to run the system the same way without modifications.
Yes	Expertise from Enbridge's rep was incredible.
Yes	Financial incentives help with selecting condensing boilers vs non condensing boilers.

Efficiency	Dat2a_O. Why do you say that?
Yes	Focus was on replacement for a new version rather than high efficiency, but it is a higher efficiency than the previous boiler.
Yes	From a financial perspective maybe yes a higher efficiency equipment; Better ROI
Yes	Incentives made decision to invest more into BAS with large number of sensors it can get complicated and expensive.
Yes	Incentives play a significant role to decide which projects move forward and timing, energy efficiency has improved at location of installs
Yes	It was sent with a new system tried and tested in the UK.
Yes	Might have gone with a system with less features if we didn't have the incentive.
Yes	Needed incentives to make the installation.
Yes	The funding made it a higher priority, although we would have installed the same quality.
Yes	We don't know if we would have done the project without Enbridge's assistance. Probably, a lower quality controls.
Yes	We probably would have kept the current system because it would be too expensive to upgrade without the program.
Yes	We typically wouldn't have gone with a recovery unit for better efficiency in the shoulder season. Specifically we wouldn't have installed the bypass on heat recovery with free cooling.
Yes	We would have gone for a less efficient but more affordable project.
Yes	We would have installed a similar system at the same time.
Yes	We wouldn't have done it without incentives.
Yes	We wouldn't have installed controls.
Yes	We wouldn't have installed it, and would have waited for equipment replacement.
Yes	Without incentive, we would have gone with a lower efficiency boiler.
Yes	Without the financial incentive, we would have gone for a lower quality monitoring.
Yes	Without the financial incentive, we would have kept the existing system in place. Primarily, because of costs.
No	<Vendor> brought the same solution, so we would have installed it anyways.
No	Enbridge didn't have an impact on our decision.
No	Enbridge didn't have an impact on our decision. The equipment was at the end of its useful life.
No	Experience at another project gave confidence to install this similar system.
No	Focus was on replacement for a new version rather than high efficiency, but it is a higher efficiency than the previous boiler.
No	If there was a large price difference in code vs high efficiency perhaps we would have gone with the code option, but our company is focused on lowering our carbon footprint so it’s not likely.
No	If we were going to invest our money, we would look at only high efficiency equipment.
No	Incentive doesn't impact this project.
No	It was the only option we had in the market.
No	It was the only option, there was nothing more efficient.
No	Long term cost of running it are important to us.
No	Our company goals require us to meet certain efficiency.
No	Reduce our usage and got expectations from the engineering team; Designed a system that was as efficient as possible.
No	The Enbridge assistance did not affect timing, quantity, or efficiency of the heat recovery project.
No	The consultant said it’s a good system, we didn’t hear about different quality or efficiency levels with the BAS option.
No	The incentives moved us to look for more energy efficient options and best of class.
No	The rebates are nice but we had to spec out the projects to meet our needs first, ROI, etc.

Efficiency	Dat2a_O. Why do you say that?
No	The technology doesn't scale down in cost with less size or efficiency, would have been same equipment regardless.
No	We are already installing at the highest efficiency we can get with out budget from the Ministry, without revamping the entire infrastructure.
No	We are following a regular maintenance program.
No	We cared more about having the right specs for the projects but the rebates are nice.
No	We did our own research because we wanted 95% efficiency
No	We followed the code requirements for insulation jackets on steam traps.
No	We had a company goal of carbon emission reduction. <Vendor> brought the same solution, so we would have installed it anyways.
No	We have a mechanical engineer who manages sizing to the building but does consult on sizing with the boiler manufacturer.
No	We have standards for high efficiency equipment.
No	We have to follow the preferred vendor list. It would need a similar or better gas reduction.
No	We knew what we wanted.
No	We look for energy efficiency, and then it is just deciding local vendor preferences.
No	We look for energy efficient equipment.
No	We made the decision based on our own internal research and vendor's recommendation.
No	We mirrored the system in the UK that was successful.
No	We only needed a repair so we would have done the same.
No	We repaired the steam traps that needed to be repaired.
No	We selected the boiler ahead of time.
No	We want to lower our emissions and get more energy efficiency. Without the assistance, we would have installed a similar boiler with the same capacity.
No	We wanted to lower carbon footprint with electric. Given what we did, it was not really an efficiency thing because we now have it on electric and the vendor only had one option.
No	We wanted very high efficiency.
No	We went with the most efficient option based on room size.
No	We went with the vendor recommendation.
No	We were disappointed by the low rebate.
No	We would have considered a roof of lower value.
No	We would have found the best we could get at the time, matching the first boiler.
No	We would have gone with the same efficiency.
No	We would have gone with the vendor recommendation.
No	We would have installed a similar system because we wanted the highest efficient system boiler.
No	We would have installed higher efficiency boiler if we had received more incentives.
No	We would have looked for the most efficient boilers.
No	We would have picked what our consultant suggested, no matter the incentives.
No	We would have waited more time but we would have installed a similar high-efficient system.
No	We wouldn't have installed anything less efficient. Enbridge keeps me up to date with where the market and incentives are going.
No	We've had a positive experience with Enbridge with garage conservation and energy decoupling.

Table D-3. Quantity verbatim responses for Custom Commercial program

Quantity	Dat3a_O. Why do you say that?
Yes	A steam trap audit is very expensive, it would be very unlikely the project would have happened without the funding from Enbridge. We would have either not installed any, or it would have been a lot fewer steam traps.
Yes	Incentive allowed for more area, originally looking at covering only <sqft>
Yes	We fix steam traps when there are failures at the time but we have started to predict potential failures, saving maintenance during each summer outage when we replace the traps.
Yes	We only installed the VFDs because of the incentive.
Yes	We would have done what we could afford. It's hard to say without knowing our numbers.
Yes	We would have maintained the vintage equipment and not installed the new system at all.
Yes	We would have prioritized 4-5 instead of 10-11, and we would have pushed the remaining steam traps for later in the summer.
Yes	We wouldn't have installed the electric generators.
Yes	Without the program we would have installed half. We installed 11 and without funds it would have been 5 or 6.
Yes	Without Enbridge assistance and funding, we would simply not have done it at all.
Yes	Without Enbridge, we would have had to band-aid the system so that it's functional.
Yes	Without Enbridge, we would have not installed the controls or BAS.
Yes	Without the funding for this survey, we would not know which to replace, so we would not have replaced any.
Yes	Without the program we would have replaced only one boiler instead of two.
No	All the heat pumps that needed to be replaced were replaced.
No	All the steam traps that were identified were replaced.
No	All the steam traps were insulated.
No	Enbridge did not have impact on the capacity of the boiler.
No	I think all the heat pumps that needed to be replaced were replaced.
No	It would have been sized to meet our buildings demand regardless of the incentive.
No	It's a big building so we would have gone with the same capacity.
No	It's part of a deferred maintenance program.
No	Our boilers were failing and needed to be replaced. The incentive didn't impact our decision.
No	Quantity and size installed were a result of past experience with similar measures. If we had more funds, we could invest in other sources of energy like geothermal.
No	Regardless of Enbridge's involvement we would have done the project the same way.
No	The AHU install was required for the boiler install.
No	The building had only one existing boiler and needed only one.
No	The equipment was at the end of useful life, there was no impact of Enbridge on the decision.
No	The equipment was at the end of useful life. There was no impact of Enbridge on the decision. We replaced the number needed.
No	The key benefit of financial assistance was helping us select condensing boilers vs non condensing boilers.
No	The old system had a larger capacity than necessary so we were able to lower the capacity for the new system but we would have right sized similarly without the assistance.
No	The only option was to replace the traps that were close to failure.
No	The pre-existing boiler failed and we had to replace it right away. The program didn't effect the size or quantity but it did allows us to get a higher efficiency boiler (condensing).
No	The program incentive pushed us to make the replacement change but it didn't affect the quantity or efficiency. The size is what we needed.
No	The project was about modifying our existing system and optimizing it to work better. There were not really any additions so the quantity doesn't change.

Quantity	Dat3a_O. Why do you say that?
No	The quantity is the same as it was prior. It's part of regular maintenance.
No	There are only two boilers at the facility.
No	There are only two boilers at the facility. We replaced both at same time to avoid extra costs later on.
No	There are three boilers in school, the third one was a condensing boiler that was replaced in 2013/2014.
No	There is only 1. No more was needed.
No	Two were replaced. We had one condensing boiler already. Only two ever run at the same time with a third as back up.
No	We did only what was needed.
No	We did the majority of our steam traps based on <vendor> recommendation.
No	We don't know we just took <vendor> and Enbridge's word for it that 2 would have been sufficient and our engineers approved.
No	We had to have this capacity in order to heat the building.
No	We have a mechanical engineer who manages sizing to the building but does consult on sizing with the boiler manufacturer.
No	We have annual steam trap surveys conducted at the site. I choose which ones I want to replace based on if they're in important locations or if they have high savings potential. I would do everything the same regardless of the incentive - same number, same locations, same time, same traps.
No	We installed a similarly sized capacity for the boiler relative to the old system.
No	We installed the capacity needed.
No	We installed the required number of thermostats needed.
No	We just needed the quantity we went with.
No	We need 2 boilers to meet our heating needs.
No	We need 2 boilers to meet our needs.
No	We need a back up for the building where the 2 boilers were installed.
No	We needed the amount we installed.
No	We needed the number we installed.
No	We only have one.
No	We only needed one and this was the only option on the market.
No	We only needed one boiler for our space.
No	We replaced all the boilers in the building.
No	We went with what <vendor> recommended.
No	We would have completed the project exactly the same with or without the incentive.
No	Without the incentive we would have purchased an estimated 50% fewer traps.

Table D-4. Dat4 verbatim responses for Custom Commercial program

Attribution	Dat4. Summarize the program's effect on the timing, efficiency, and amount that you installed.
Full	<company_name> save gas and electricity and with the assistance provided by Enbridge we can see greater ROI. This will help savings that can be transferred to customers. We are pleased with Enbridge's timing, and amount, as well as the efficiency of the equipment.
Full	Discovery of right projects with Green team along with funding helped avoid delaying the project.
Full	Efficiency drives replacement, not recommendations to make a change that come from Enbridge
Full	Enbridge helped influence if this project would be installed and when, primarily due to the cost. We may have done this project later without the cost, about 50/50 likelihood. There is no real influence on the efficiency or quantity because the system would be the same as it was an optimization of an existing system. Enbridge paid for our time (labor) spent optimizing their system.
Full	Enbridge worked direct with <name>.
Full	Experience at other project gave us confidence to install this similar system, which we would have done at the same time. Initial incentives helped. Boilers are ease of maintenance for our staff but AHU was influenced by incentive. Incentive plays a big part in moving project forward.
Full	Funding positively impacted timing.
Full	Incentive played an important role in presenting a stronger case but we needed to replace it.
Full	It did not affect the timing, we had to install a new boiler due to the old one failing. We probably would have gone with a lower efficiency without the incentive. Same amount with or without program.
Full	Rebate influenced our decision.
Full	Steam trap audit is very expensive, it would be very unlikely the project would have happened without the funding from Enbridge. Without funding we would have either not installed any, or it would have been much less steam traps, at a later time.
Full	The incentive helped us to do the project earlier than we would have without the incentive. We would have gone with the same quantity and likely the same efficiency.
Full	The likelihood of doing this project would be only 1% without Enbridge. Management is unlikely to want to spend the money on a project like this and the only reason it could get done is by the Enbridge's assistance and funding. Without assistance, we would have not install the project, so this does not affect the efficiency and quantity, they would simply not do it.
Full	This project was part of a larger company plan to go high efficiency. Generally speaking our company looks for opportunities where the budget allows to replace existing equipment with high efficiency equipment to reduce cost and increase return.
Full	This would not have been possible without Enbridge. If we had to do it on our own, it would have taken longer and possibly not with the same effectiveness or quantity without Enbridge.
Full	We identified the traps that needed replacement under an Enbridge funded survey. Without the funding for this survey, we would not know which to replace, so therefore we would not replace any.
Full	We installed the VFDs and boiler controls only because incentives were available. Without the incentives, we would have replaced only the HVAC units.
Full	We were doing a renovation of the labs, the vendor made us aware of this technology and we asked Enbridge if they would provide funding. We would most likely not have installed this project without funding due to the high cost. We would have maintained the existing vintage equipment.
Full	We were somewhat likely to install the boilers and would have installed them maybe 2-5 years later but we would have installed similarly high efficient boilers and would have needed to install 8. The incentive helped to keep the project moving forward.
Full	We would have implemented a similar system but 2 years later.
Full	We would have installed a less efficient AHU 2 years later.
Full	Without Enbridge, we would have not installed the controls or BAS. We do not have the reserve funds to complete project like these and the incentive allowed for install.
Full	Without the assistance, it would not have been likely that we would have installed these generators at all.
Full	incentive played an important role in presenting a stronger case but they needed to be replaced.
None	Didn't work too closely with Enbridge, other than applying for rebate. It was factored in through the contractor we chose.
None	Enbridge didn't have any effect on timing, efficiency, or quantity. Our board of director were happy about the incentive but would have done this project without an incentive at the same time, efficiency, and quantity.

Attribution	Dat4. Summarize the program's effect on the timing, efficiency, and amount that you installed.
None	Enbridge didn't have effect on the amount and efficiency of the boilers installed but they did have effect on the timing. It helped us put a push on things and finalize decisions as we wanted to get the incentives before they ran out. We would have still installed but Enbridge pushed us to consider asap.
None	Enbridge has little or no influence on this project.
None	Enbridge or incentives had no impact on decisions or timeline. Everything was already decided before the vendor reached out to Enbridge.
None	Financial assistance made the CFO happy. Some financial relief available in getting the work done that was needed anyway but it didn't have a major effect on their decisions.
None	It didn't have an effect on timing, efficiency, or amount. Our boilers were failing and needed to be replaced.
None	It would have been 80% likely that we would have installed the same boiler at the same time.
None	No, because of the deferred maintenance program
None	None decision part of regular maintenance replacement
None	System failed at the time, the first boiler failed around 2021 and the second failed towards the end of 2022. We would have found the replacement parts to keep the old boiler but they weren't available. So we found a similar system that was available but we try to get equipment that meets the program specs to get funding including a higher level of efficiency.
None	The baseline boiler was installed in 1968 and needed to be replaced. The program was helpful but didn't influence the timing/quantity/efficiency.
None	The boilers we got are good - though we would have preferred more efficient boilers - 100%. Then the installation of the boilers took a year and some issues are still outstanding so we are not operating at full 85% efficiency and maybe that's why the rebates are so low. The installation has been so slow that the warranty was extended beyond 1 year. In hindsight we should have gone directly to the manufacturer – <cpmpany_name> didn't keep to their word regarding the turnkey solution. Also, the training was zero. We had to get an electrician from the parish to tell us more about the boiler.
None	The equipment was at end of useful life. No impact of Enbridge on our decision.
None	The incentive amount only affected our decision in choosing the vendor, Project Manager at <company_name> worked with Enbridge. Customer had no interaction with Enbridge.
None	The incentive amount only affected our decision in choosing the vendor, Project Manager at <company_name> worked with the Enbridge. Customer had no interaction with Enbridge. They are the only ones that proposed it
None	The project would have been completed at the same time, same efficiency and amount.
None	There was no impact on timing, efficiency and amount because the project would have been completed the same way without Enbridge's assistance. Our interaction with Enbridge was limited to paperwork as <company_name> handled the majority of the engagement with Enbridge.
None	This is an <facility_type> facility with people on various <medications>, regulations state specific temperature ranges for the rooms and the old system was failing and not reaching required temps. The program didn't affect the timing, efficiency, quantity of equipment installed, but we appreciate the rebate.
None	We appreciate the incentive, but it does not influence which steam traps we replace and when we replace them.
None	We like the advanced feature of this product. We installed what was needed to be installed.
None	We would have been about 50/50 and we appreciate Enbridge's help with installing this. Without the assistance we may have installed a similar set of 2 condensing boilers around the same time.
None	We would have moved forward with the projects with and without Enbridge. Heat pump are really a go-to for all the clients now
None	We would have moved forward with the projects with and without Enbridge. Heat pump are really a go-to for all the clients now.
None	Without the assistance it would have been likely that we installed the same highly efficient boiler at the same time.
None	Without the assistance, the project would have moved forward as is.
None	Without the assistance, we would have installed a similar number at the same time on <company_name>'s recommendation.
Partial	As noted before, with 15 years of experience, Enbridge does not drive the replacement. We usually reached out to them knowing what we are going to install to get the incentive paperwork sent to us.
Partial	Enbridge does not drive our timing. We contact Enbridge as we plan replacements to get assistance forms.

Attribution	Dat4. Summarize the program's effect on the timing, efficiency, and amount that you installed.
Partial	Enbridge had a 40% influence on decisions.
Partial	Our ESA is very helpful and cooperating. Working on a 3 year cycle on stream trap evaluation. We only have about 60 man hours to identify what needs replacement so the studies help prioritize. We typically fix steam traps when there are failures at the time. However, the studies allowed for us to identify potential failures before they occur, saving maintenance during each summer outage when we replace the traps.
Partial	The incentive allowed the timeline to be accelerated and allowed us to cover more sq footage of the roof but we would have gone with the same R value.
Partial	The incentive helped us gain approval to move forward quicker with the project. Employees were often changing the heating temp and gas bills were high. The thermostat is controlled by only a few people via phone app. It's been working out well. We will do a savings calc after this winter to compared pre and post winters.
Partial	The incentive program influenced the number the boilers replaced and maybe could have an influence on the timeline.
Partial	The incentive was very helpful. It would have been a painful purchase without the incentive. The reps were very helpful.
Partial	The timing would have been delayed by a few months (3), we would have gone with the same steam traps (efficiency), and 50% fewer traps without incentive.
Partial	The incentives moved us to look for more energy efficient options and best of class. Makes the choice easier. It was very important the incentives go direct to the team
Partial	We had an old Siemens system in place but wanted to install a new Trane system to bring everything under one vendor. Without the assistance, we would have installed a similar system at the same time. We thought about the installation as one whole building automation system that controlled heating, cooling, lights etc..
Partial	We have been a big fan of incentive programs because they help us do these projects that are safer for our people and environment.
Partial	We wouldn't have done it at the same time.
Partial	Without the assistance, we would have been likely to replace the traps. We may have done it a few months later and we would have prioritized replacing <number>-<number> traps out of the <number> but we would have eventually replaced all <number>. Incentive helped convince management. <company_name> and Enbridge might have had conversations that would have influenced us.
Partial	Without the assistance, we would have installed a similar boiler with the same capacity a year later.
Partial	Without the incentive, we would have installed a similar boiler in size/capacity about 5-6 months later.

Custom Industrial program

Table D-5. Timing verbatim responses for Custom Industrial program

Timing	Dat1a_O. Why do you say that?
Yes	<institution> marches to its own clock and timeline.
Yes	Because of capital access, last year was a good year but this year things are tight.
Yes	Cost is very high for the survey, without the incentive, we would not do the replacements.
Yes	Costly project, it probably wouldn't have been approved without rebate.
Yes	Due to high costs, other projects would have gotten the priority.
Yes	Due to the high cost, other projects would have been prioritized if it wasn't for the incentive provided.
Yes	Enbridge's incentive helped because we would not have been able to implement the boiler controls and the type of boiler at the same time/ quality.
Yes	Financing availability and cash flow of business allows us to install measures. we had more cash flow in the years after covid but business is returning to a more typical cycle now
Yes	I only chose because of incentive
Yes	If we hadn't received funding, it probably never would have happened due to cost.
Yes	Incentive was key

Timing	Dat1a_O. Why do you say that?
Yes	It was needed but I would have had to look for other sources. I had to pitch it to ownership and it wouldn't have been accepted without paybacks. The incentive money helped ownership move forward.
Yes	It was such a large project, don't know when we would have been able to get it done without assistance.
Yes	It would not have been built without the financial and technical assistance of the program.
Yes	It's hard to say what the board would say. Oil tank would last a long time
Yes	Lack of resources would have made it later if at all.
Yes	Likely never, ROI is required to be within a short timeframe. ROI didn't make sense without Enbridge's incentive.
Yes	Major capital concerns with aging equipment at the facility so stretched thin. It was on the radar but would have been delayed.
Yes	Needed to happen. Hard to know how much later
Yes	Rebate and signoff from Enbridge on project helps significantly.
Yes	Same time or maybe a year later
Yes	Thanks to Enbridge's incentive, we were able to move the project forward one year.
Yes	The ROI with the incentive made the project a priority. Without it, the project might have been delayed.
Yes	The budgeting cycle has a two year lag, so we wouldn't have made the investment now.
Yes	The cost of insulation is high
Yes	The equipment would have started to decline after 24 months, so that was our timeline to make the change without Enbridge
Yes	The financial assistance backed up the business case to make the project now instead of 2-5 years later.
Yes	The funding stimulus was there and it was worth taking advantage of to make the energy improvement
Yes	The incentive allowed us to hit the ROI within the corporate standard.
Yes	The incentive was essential to the timing and type/ efficiency of the measure installed.
Yes	The project would have been forgotten without Enbridge's collaboration in lieu of other action items. At best it would have been delayed.
Yes	They would have somewhat likely have done the project eventually. Not sure how long they would have waited.
Yes	This project wouldn't have been prioritized without the incentive.
Yes	This wasn't a priority for us. I can't tell you when/if we would have done it without Enbridge.
Yes	We did it because we were eligible for funding. The report said 30-45% failure rate on existing. So did not make sense to repair the existing steam traps. Last steam trap survey was 4 yrs old.
Yes	We didn't have the resources
Yes	We had to take action before winter.
Yes	We lacked the resources.
Yes	We might not have learned about it without the advisors.
Yes	We never would have done it because we needed the boiler to run all the time.
Yes	We only did this because we had support from Enbridge
Yes	We only did this because we had support from Enbridge.
Yes	We would have delayed the project for a year or more because senior management weren't convinced.
Yes	We would have monitored our consumption over time to confirm if it would have been worth it to install the curtains.
Yes	We would have needed additional time to get the funds to finance the project.
Yes	We would have replaced the existing controls.
Yes	We would have taken longer due to high cost
Yes	We would have waited a year to see what the program offering's looked like at that time.

Timing	Dat1a_O. Why do you say that?
Yes	We would have waited longer without the incentive because of costs
Yes	We would have waited on this particular building because it's not one of the larger buildings, less savings, etc.
Yes	We wouldn't have done the replacement on both tanks at the same time if we hadn't had the financial incentive.
Yes	We wouldn't have replaced it without assistance
Yes	With the calculations provided by Enbridge we were able to see the savings for this measures as well as the cost incentives. This helped move the project forward.
Yes	Without Enbridge modeling help it would have taken me more time on my own to run my own model.
Yes	Without Enbridge, we would have installed vent seals in phases, gradually over a longer period of time
Yes	Without Enbridge, we would have monitored our consumption over time to confirm if it was worth to install the curtains.
Yes	Without Enbridge, we would have implemented the project in less than four years but the incentive helped move things along faster.
Yes	Without the assistance, we would have been less likely to install the controls. We may have done it later and would have installed 1 or 2 instead of all 3.
Yes	Without the financial incentive we might have never made the change.
Yes	Without the funding assistance, we would not have completed the survey every year. It would have been 1 year later because we would switch to a survey every other year.
Yes	Without the incentive it would not have been possible to do it this year but maybe we would have installed it 2 to 5 years out.
Yes	we would have waiting longer without the incentive
No	Approvals were delaying the project but we had the same time frame in mind.
No	Because this type of project needs to be completed every 5 years or so. I think we still would have replaced it but with double poly.
No	Because we were boxed it, the project had to get done because we needed to run the engine because of the arrangement with our electricity supplier we needed the heat sink.
No	Enbridge's incentive helped because we would not have been able to implement the boiler controls and the type of boiler at the same time/ quality.
No	Funding might have been less and we would have reviewed the project for any possible reduction but we were trying to install everything at the same time.
No	Had to wait for the approval but the timing was as it was expected to be.
No	In need of replacement
No	Incentive had no influence on our timing. The incentive amount was very little compared to overall project cost.
No	It had to be done.
No	It was 50/50 if we were going to install it but would have installed a similar process at the same time with a similar amount of efficiency. The funding helped install it.
No	Submitted for approval in 2021, would have happened same time
No	The decision was made based on what was best for business
No	The incentive and aid from Enbridge had little/no influence on our timing because the financial incentive was s very little compared to overall project cost
No	The incentive helps us make the change faster and simultaneously, instead of spread out throughout the year. We would have done it either way.
No	The steam traps would have been replaced regardless of the incentive.
No	The upgrade was scheduled to happen anyways
No	Timing and efficiency was not impacted because it was a new building and the building needed to be opened.
No	We don't know if we would have had the capital to implement the project in the same time frame without Enbridge's help.
No	We had been considering the project for a while, energy savings were an afterthought.

Timing	Dat1a_O. Why do you say that?
No	We had planned to do the steam straps at this time, however the Enbridge audit allow us to have regular updates on which steam traps to replace next.
No	We had to do the project at that time either way.
No	We needed to install a boiler
No	We needed to install the air compressor for funding alongside the VFD install
No	We were going to do everything as we did regarding timing, efficiency and quantity but they were helpful.
No	We would have done it at the same time because we only have one major shutdown per year.
No	We would have had to install the same quantity at the same time due to the project timing
No	We would have installed curtains at the same time but would have been more at the shading criteria.
No	We would have installed two of the four air curtains at the same time, but the incentive helped us do all four.
No	Winter time is when I can install it.
No	Without the technical assistance, we may have gone to our contractor to get a recommendation on what to install. They may have recommended something similar to install at the same time but not sure.
No	would have had to install the controls regardless of the programs help
No	would have needed to install something at the same time but would have gone with double layer

Table D-6. Efficiency verbatim responses for Custom Industrial program

Efficiency	Dat2a_O. Why do you say that?
Yes	Enbridge helped select the control that I was looking for.
Yes	Enbridge's incentive helped because we would not have been able to implement the boiler controls and the type of boiler at the same time/ quality
Yes	Enbridge's incentive helped because we would not have been able to implement the boiler controls and the type of boiler at the same time/ quality.
Yes	Financial assistance was key to decision around the project
Yes	Fine tuning on the controls at the time, what we actually installed was not the standard in the industry
Yes	Incentives allowed us to afford a better model of curtains. We would have installed a cheaper one.
Yes	Investment allowed for a significant reduction in natural gas consumption. Without incentive we would have continued to consume natural gas which was contrary to the objective.
Yes	Most of our crops are low light so we would have gone with more shading than with R value.
Yes	Probably, without the investment the efficiency we calculated as part of the cost-effectiveness of the project would have decreased. Since we did a cost-effectiveness analysis putting all together, we would have made the same decision.
Yes	Savings were key to the decision, and we didn't know about the savings prior to this.
Yes	The funding allowed for a better job on the insulation than we would have picked otherwise.
Yes	The funding helped us get a thicker material than we would have afforded otherwise.
Yes	The incentive helped us get to a higher efficiency.
Yes	The incentives allowed me to acquire a higher quality controls.
Yes	The knowledge for installing it was key to success.
Yes	The knowledge provided by Enbridge, demonstrating the savings of a new boiler convinced us to invest in it. The financial assistance was key in this decision too.
Yes	The program allowed additional efficiency and convinced us to install more insulation.
Yes	The project wouldn't have moved forward without the financial and technical assistance.
Yes	The rebate outweighed the extra cost on the difference between efficiency levels.
Yes	We probably would have done the same as what we had before, insulation with lower R value.

Efficiency	Dat2a_O. Why do you say that?
Yes	We still would have replaced it but with double poly.
Yes	We were convinced to go thicker with Enbridge's recommendation.
Yes	We would have done a similar scope without the assistance.
Yes	We would have gone for a lower quality option if it wasn't for the rebate.
Yes	We would have gone for a potentially more expensive option. Enbridge helped us not overspend and get something beyond what we needed to do the job.
Yes	We would have gone with a lesser efficiency, we needed the funding to upgrade.
Yes	We would have gotten less efficient equipment, and the process would have been more manual and less efficient due to missing controls.
Yes	We would have installed a double layer roof without the incentive.
Yes	We would have installed a less efficient air compressor.
Yes	We would have installed a roof with less layers without the incentive.
Yes	We would have installed a warehouse alternative that had a longer lead time and less savings because it was less expensive.
Yes	We would have installed something of lower quality to adjust for our budget.
Yes	We would have installed something of lower quality to adjust for our budget. The assistance with installation was essential to us.
Yes	We would have kept the existing system or upgraded to something less extensive.
Yes	We would have kept the existing system.
Yes	We would have kept the existing systems.
Yes	We would have looked for similar or lower quality equipment, with less advanced controls due to costs.
Yes	We would have made an upgrade to a less efficient equipment without the program.
Yes	We would have probably gone with 1-inch thickness to budget for other priorities.
Yes	We would have replaced it with the same type of equipment, but smaller and less efficient due to cost.
Yes	We wouldn't have done this project without the program.
Yes	We wouldn't have implemented anything.
Yes	We wouldn't have installed insulation if it weren't for the incentive. If we did, we would have used a lower value one.
Yes	We wouldn't have upgraded but have repaired the equipment.
Yes	Without Enbridge's financial and technical assistance we wouldn't have implemented the project at all.
Yes	Without assistance, we would have gone for a lower quality project.
Yes	Without the financial incentive we would have gone with less advanced controls.
Yes	Without the grant, we wouldn't have replaced it for some time, and likely for a lower quality equipment.
Yes	Without the reassurance and knowledge shared by Enbridge we would have gone a cheaper route but it wouldn't have been as effective.
Yes	Without the technical and financial assistance, we would have installed a standard condenser that is significantly less efficient. In part, due to its high cost.
No	We got the funding internally to install what we scoped.
No	Because the size of the system was dependent on the amount of energy from the engines so we couldn't change this.
No	Financial assistance allowed us to improve quality.
No	From our conversation with the vendors, the equipment chosen was the only option that met our needs.
No	Hard to say, maybe not as robust as what we were expected to end up with.
No	If we had waited longer we would have secured more advanced controls but this was the best in the market for efficiency at the time of purchase.
No	If you're going to do it, you better do it right.

Efficiency	Dat2a_O. Why do you say that?
No	Insurance provider has minimum requirements for roof installations we have to meet.
No	It was the most compatible option for us.
No	Once the project was approved we were going to move forward with the properly engineered project to comply with company policies.
No	Since we expanded the farm we installed the same system.
No	The curtains were the best to retain the heat we required in the greenhouse and for the crops. The rebate was to small to drive our decision.
No	The engineering guideline required the same.
No	The equipment was the one recommended by <vendor>.
No	The financial assistance allowed us to improve the quality.
No	The high energy savings meant we would have picked the same option regardless of Enbridge's involvement.
No	The incentive allowed us to get more sophisticated equipment to monitor feed intake but we would have chosen something similar.
No	The internal engineering team made the decision.
No	The scope of the project was not influenced by the incentive or assistance. We would have it anyways.
No	This was the highest upgrade we could with <vendor> .
No	We didn't have many options.
No	We hadn't considered installing door sensors to ensure doors are closed properly throughout the facility.
No	We looked at many but needed one with control to put air back into the building.
No	We needed the correct R value to make it work but would have chosen the same insulation
No	We shouldn't have chased a higher efficiency for more dollar incentive, just needed to hit our thermal efficiency number.
No	We were looking at efficient measures to reduce our usage.
No	We would have done it the same.
No	We would have implemented a lower quality product than the one we were able to obtain thanks to the financial and technical assistance provided by Enbridge.
No	We would have installed a similar thickness to what was recommended by the contractor.
No	We would have made the upgrade but the incentives pushed us to it more.
No	We would have picked same ability but less quantity if we didn't have the incentive.

Table D-7. Quantity verbatim responses for Custom Industrial program

Quantity	Dat3a_O. Why do you say that?
Yes	At the time we would not have been able to do all 4 curtain and would have completed 2.
Yes	The incentive helped improve the footage because we are now spending less out of pocket.
Yes	The pre planning was extensive, we wouldn't have had the accurate calculations that proved and convinced us to install more insulation.
Yes	The project wouldn't have been done at all without the program.
Yes	They would have only done about 15% of the original project, significantly less insulation. 15m instead of 100m.
Yes	We spent a lot of time with Enbridge reviewing the equipment.
Yes	We would have done 1 or 2, instead of 3.
Yes	We would not have installed it without the assistance.
Yes	Without funding, we wouldn't have installed a new system until the current equipment failed.

Quantity	Dat3a_O. Why do you say that?
Yes	Without the incentive it's likely there would have been no changes until the equipment was closer to failure.
Yes	Without the incentive we would have maybe installed one or none of the oven controls.
Yes	Without the program, it would have been likely that we would have replaced the steam traps but we would have replaced about 10-20% less.
Yes	Would have installed more because of their help. Some the existing heaters still in use because of their locations, we replaced the ones that were most easy to access.
No	Continued participation allows us to better assess which steam traps to replace next. Year over year the quantity of steam trap replacements declines, due to continued participation.
No	Heat exchangers don't really have a large range of technologies available. So we would have landed on a similar solution.
No	I would have done the same system if I didn't have the incentive.
No	If we are going to do the job we would do it right and insulate the whole pipe. However the program promotes a higher R value insulation than we would have gone with if we were going to install insulation.
No	If we were going to do this project we would have done the same area/size.
No	If we're going to do it we are going to do the whole area.
No	Incentives did not affect the quantity; certain steam traps needed to be replaced.
No	It's a finite amount required.
No	It's the amount required for the area.
No	Quantity and size would have been the same but quality would have been different.
No	Quantity would not have changed whether we received assistance or not.
No	Rebate didn't impact the decision making process because it was just a small percent of the cost.
No	That was the surface area that needed to be insulated.
No	The building needed the two boilers.
No	The incentive form Enbridge had little influence on the decision making process. We had to select from a limited range of capacities/size.
No	The number of door sensors would have been the same with the assistance.
No	The number of unit heaters needed was determined by the HVAC company and had nothing to do with me or Enbridge.
No	The number of units would have been the same.
No	The number was preset by how many curtains were needed.
No	The process was binary. Either install it or not. There wasn't a different quantity or size that we could have gone with.
No	The scope and numbers of sensors would have stayed the same.
No	The square footage to be done would have been the same.
No	We always do this amount
No	We had the controls scoped out for us at the start of the project.
No	We have waste steam that needs to be captured. We had 100 steam traps and we replaced some while some are new ones.
No	We installed the same system to the newly expanded section.
No	We need at least the one to control the system.
No	We needed this quantity of units for the new greenhouse, even without the program.
No	We would have done all 12.
No	We would have done the increase in phases, over a longer period of time.
No	We would have done the same amount of pipe insulation.
No	We would have done the same thickness.

Quantity	Dat3a_O. Why do you say that?
No	We would have gone with the same quantity.
No	We would have installed the same number due to mechanical requirements.
No	We would have installed the same quantity no matter what due to the process.
No	We would have installed the same quantity and size regardless of the incentive because of the high carbon tax costs we had with the previous equipment.
No	We would have installed the same system.
No	We would have needed to cover the same amount of area.
No	We would have still had to install the one.
No	Without the support and incentives the upgrades wouldn't have been done at all anytime in the foreseeable future.

Table D-8. Dat4 verbatim responses for Custom Industrial program

Attribution	Dat4. Summarize the program's effect on the timing, efficiency, and amount that you installed.
Full	Enbridge has a very positive effect on the timing, efficiency and amount. The reps are super knowledgeable and have helped out tremendously. I grow plants and I'm not an energy specialist.
Full	Enbridge may have impacted timing, not necessarily efficiency or amount. If they were not there we would have sought out others.
Full	Enbridge supported the internal work by providing guidance on features and grant.
Full	Enbridge works closely with our company and comes frequently to the site to help with energy use. We were looking for ways to improve our process and get help with our capacity needs. They came up with a few different ideas including the one they installed and looking at strainers or filters. Enbridge helped influence our decision to pick what was installed (the tank) as it would be a good long term cost savings, where the other ideas would increase maintenance costs. We may have done this same project without the funding, 50/50 chance because other projects may have come before this one. Basically, we have limited funding available for a long list of projects and this one may have been pushed down the list or others been selected as more important. This also influences the timeline for the project. It may have been several years before we did this project without Enbridge's financial help.
Full	Enbridge's incentive helped because we would not have been able to implement the boiler controls and the type of boiler at the same time/ quality. We would have also been in a financially tight situation after installing the glass roof. We had a great experience with Enbridge previously and they were able to help us again.
Full	Greater efficiency possible with the financing from Enbridge. It got us over the hurdle. We had the confidence to invest. We speak very highly of the Enbridge.
Full	In working with Enbridge we were able to increase our insulation from 1-inch to 2-inches. Alot of these initiatives with Enbridge are brought to completion with their support and them checking up with us. Without them things can be left on the backburner and delayed. With Enbridge, we were able to complete it in a timely manner and complete our desired efficiency and amount.
Full	Incentives were the biggest influence.
Full	It would be conflict of interest to suggest a vendor they did give suggestions of features that would be desirable.
Full	Mainly completed for natural gas reduction and other benefits. Without the support and incentives, the projects were unlikely to be done in the foreseeable future.
Full	Same timing.
Full	The Enbridge program allowed for these two projects to be completed at a higher efficiency or provide more energy savings. Quantity - the controls would have been installed but with the incentive there is increased energy efficiency. For the insulation measure it was only completed due to the incentive. Timing, the controls would have been installed, but not the insulation without the programs influence.
Full	The funding was key to getting approval for the project that allows us to improve our energy efficiency, which is very important to our organization.
Full	The program had a significant impact on these measures being installed. This is a new <number> acre greenhouse. It would not have been built without the financial and technical assistance of the program. We don't know how long we would have waited to build it if there wasn't program assistance. The program allowed to additional efficiency for all three measures. The pre build calcs propelled the decision to go with

Attribution	Dat4. Summarize the program's effect on the timing, efficiency, and amount that you installed.
	higher efficiency on all the measures (thickness of insulation, the hoist vs no hoist for a second laying of berries to be grown, and the control would have been far less advance without the programs help.
Full	This project was Enbridge driven.
Full	We installed vent seals with the help of funding from Enbridge. Without the incentives, the equipment would have stayed the same and the same quantity, they would just do it over a longer period of time in phases, or not at all. About a 25% likelihood of doing the project. The contact said you either do it or you don't, the efficiency and quantity do not change.
Full	We would have installed 50/50 sensors and 2 years later. Probably, fewer sensors too.
Full	We would have waited longer without the incentive, but it didn't effect the efficiency or amount of pipe insulation.
Full	We would not have installed it without the assistance of Enbridge. Maybe if we monitored for 3-5 years, we would have considered installing it.
Full	We wouldn't have done the project without Enbridge's help. Not sure how many years we would have waited.
Full	Without the assistance we wouldn't have installed a condense boiler. We might have installed a used less efficient boiler at the same time. We needed to install 2 boilers when we install everything else in the building.
Full	Without the incentive we would have not likely installed the measure. Maybe we would have installed it 2 to 5 years later but the incentive allowed us to prioritize it.
None	Basically, no rebate. It's a small percentage of project cost.
None	Curtains were the best to retain the heat they required in the greenhouse and for the crops.
None	Enbridge helped us more with the endwall because we didn't know it would fall under the incentive. He got it really working well and they both did a phenomenal job efficiency and quantity wise anyway.
None	Enbridge's assistance was very good in helping us understand and file for the incentive. We were going to do everything as we did regarding timing, efficiency and quantity but they were helpful.
None	It was 50/50 if we were going to install it but we would have installed a similar process, at the same time, with a similar amount of efficiency. The funding helped install it.
None	Of the 3 projects, this third project would have been the first to be on the chopping block. We hadn't considered installing door sensors to ensure doors are closed properly throughout the facility.
None	The influence was helpful financially.
None	The same number of boilers would be installed. We had to select the biomass from a limited range of capacities/size
None	We made decisions that were best for the business with little to no influence from Enbridge.
None	We would have done the same quantity, at the same time without the program. However, we have participated in this program for years (for steam traps) so there is program influence, since the projects are often back to back years. We had already planned the quantity and timing for this 2023 project so we would have done it regardless of the incentive.
None	Without the assistance, there would have been 50/50 chance. Approvers would have requested incentive in order to move forward.
None	Without the assistance, we would have been likely to install the 5 steam traps at the same time.
Partial	<name> made the major impact. I likely would have figured it out but it would have taken me longer. With <name>'s experience I was able to get everything done quickly. She even gave us advice to improve our thermostats and that impacted our operations across Canada. The incentive did not change the timing efficiency or amount installed but <name> made the experience easier and gave us guidance on the integrated control and smart thermostats, the associated technology and advantages.
Partial	Enbridge had a major influence in our decision for this measures. Without their support we may not have moved forward with this measure in 2023. Maybe at a later date
Partial	Enbridge helped us confirm our guidelines on the right path, and increase the size of the installation, although the timing and efficiency was not impacted because it was a new building
Partial	Enbridge's funding helped this project get approval due to the high cost. it is still very likely we would have done the project. The quantity would have stayed the same number of heat exchangers due to the way the <industry> process works, the main change would have been size and efficiency. We would have installed smaller heat exchangers with less efficiency.

Attribution	Dat4. Summarize the program's effect on the timing, efficiency, and amount that you installed.
Partial	It is difficult to know/calculate if without the incentive we would have had to go with a lower efficiency. The way it was calculated was all together so I am not sure. We would have had to install the same quantity at the same time due to the project timing (building of new greenhouse).
Partial	It made the project get done a year earlier, we would have gone with safe efficiency without the program and amount.
Partial	The program motivated the company to install them earlier and a higher efficiency, although they would have somewhat likely have done the project eventually. Not sure how long they would have waited.
Partial	The program was very influential in getting us to get the oil tank insulated. Without the project the tanks could have gone many years not being insulated. Out of the 15 large 34 oil tanks, three did not have insulation. We were spending $70,000/month in energy to heat the oil tanks so the oil would flow during the winter.
Partial	The wall needed to be insulated. We could have been done it a bit later but the funding provided at that time helped move the project forward
Partial	They were key to the decision
Partial	We would have been somewhat likely to install the same exchanger about a year later than we would have since we got the incentive. Probably would have landed on selecting a similar exchanger to meet our needs.
Partial	We would have installed curtains at the same time but would have been more at the shading criteria. We need the shading for the low light crops so we would have needed to install it no matter what but would have focused on shading material rather than heat retention.
Partial	We would have installed exactly the same system regardless of Enbridge's assistance, same efficiency, same quantity. The only change is it may have been up to 1 year later due to the high cost. Enbridge helped us install it at an earlier time.
Partial	We would have installed two of the four air curtains at the same time, but the incentive helped us do all four.
Partial	We would have needed to install something at the same time but would have gone with double layer.
Partial	Without the assistance it would have been likely that we would have installed a cheaper, less efficient set of curtains at the same time.
Partial	Without the assistance, approvers might have delayed asking to get an incentive for approval.
Partial	Without the assistance, it would have been hard to convince management to move forward. We needed to install the air compressor for funding alongside the VFD install.
Partial	Without the assistance, we would have been less likely to install the controls. We may have done it later, and would have installed 1 or 2, instead of all 3.
Partial	Without the funding assistance, we would have not completed the survey every year and would have taken longer to identify which of the 12 traps were failing but still would have tried to replace all 12.
Partial	Without the program, it would have been likely that we would have replaced the steam traps but we would have done it maybe a year later, and would have replaced 10-20% less. In other words, would have replaced only 8 instead of 10 overall.
Partial	Without the program, we would have done only about 15% of the project, and maybe in a year or so.
Partial	Without the technical assistance, we may have gone to our contractor, <contractor_name>, to get a recommendation on what to install. They may have recommended something similar to install at the same time but not sure. Financial incentive was small but the project was also inexpensive. Enbridge's support helps get necessary approvals and lends legitimacy to the project for company high ups.

Large Volume

Table D-9. Timing verbatim responses for Large Volume

Timing	Dat1a_O. Why do you say that?
Yes	Because it's a top tier project it would have still been done at that time.
Yes	Funding for a project is always helpful to accelerate things.
Yes	If we did it later, it would have had to wait a year until the scheduled outage to do the replacement.
Yes	It wasn't an obvious solution and without the suggestions and incentives from Enbridge. They set us down the path.

Timing	Dat1a_O. Why do you say that?
Yes	The incentive influenced the project but it also depended on the facilities' shutdown period.
Yes	The incentive sped it up due to the high cost.
Yes	Without Enbridge's funding, we would have delayed it a year.
No	Done routinely every year based on reset budget.
No	No impact on project going ahead or timing.
No	Our timeline was based on the availability of engineers.
No	The project justified itself financially and otherwise before the incentive. The Enbridge incentive made the project more compelling, but we had already decided to go ahead.
No	The steam trap repairs and replacements are on a set schedule.
No	The timing of the project would have been the same.
No	The timing would have happened at the same time.
No	This is something we do every year.
No	Timing wouldn't change to much because cleanings are based on the availability of staff.
No	We clean the heat exchangers based on a routine schedule
No	We clean these heat exchangers on a regular schedule.
No	We do it routinely every year based on reset budget.

Table D-10. Efficiency verbatim responses for Large Volume

Efficiency	Dat2a_O. Why do you say that?
Yes	We would have done fewer bundles or delayed the project.
Yes	We wouldn't have implemented the project without Enbridge's assistance.
Yes	Without Enbridge's financial assistance, we would have done less cleanings because that's what the budget allowed.
No	Boiler projects are fairly standard.
No	It was based on the needs of the plant.
No	Replacements are standard practice. We replace like for like.
No	The heat exchangers would have been cost justified without the financial incentives.
No	The scale of the project would have been the same.
No	The scope would have been the same without assistance.
No	This cleaning is something we do every year.
No	We had to abide to <company_name> specs , so we couldn't deviate from these.
No	We only did this because we had support from Enbridge.
No	We scoped out the size of the project and were able to justify the financials with the current scope.
No	We use various analysis tools to determine which heat exchangers have the most severe fouling and this analysis, and the associated cost considerations, drives which exchangers get cleaned.
No	We would have cleaned fewer heat exchangers without Enbridge's assistance.

Table D-11. Quantity verbatim responses for Large Volume

Quantity	Dat3a_O. Why do you say that?
Yes	The incentives helped us do more steam traps than we would have otherwise.
Yes	We would have clean 5 instead of 6 cleanings.
Yes	Without the Enbridge incentives we would have cleaned fewer (e.g. 15 instead of 18).
No	Our heat exchangers cleaning is based on analysis done on fouling rates, therefore we don't need incentives to justify it.
No	The number of steam traps get built into our maintenance budget and so this money is already allocated before consideration of the rebates.
No	We had done a lot of research to make sure that the new 9,000 hp compressor could match all the necessary functions of the old 11,000 hp compressor.
No	We use various analysis tools to determine which heat exchangers have the most severe fouling and this analysis, and the associated cost considerations, drives which exchangers get cleaned.

Table D-12. Dat4 verbatim responses for Large Volume

Attribution	Dat4. Summarize the program's effect on the timing, efficiency, and amount that you installed.
Full	The Enbridge money allows us to do more heat exchange cleaning for the following year. We have also reduced the intervals between cleanings, and the extra money from Enbridge makes it easier for us to practice more frequent cleanings.
None	Directly, the incentives did not have much impact on the steam trap project per se but the financial incentive helps us afford other EE projects.
None	No impact on project going ahead, timing or size of project.
None	The Enbridge incentives had no impacts on the timing or scale of the project.
None	The Enbridge incentives really had no impact on the timing or scale of the heat exchanger project.
None	The timing would have happened at the same time and the scale of the project would have been the same. At the time of this decision, there was some uncertainty of the incentive about the financing.
None	We meet with Enbridge regularly and this project came on their capex project list and we alerted them. The project became more concrete, Enbridge reps told us how much dollar incentive we would receive. However, the timing, efficiency, and size of the project would have been the same.
Partial	Enbridge incentives gave us the ability to do more heat exchangers cleanings than we would otherwise be able to afford with their opex budget. Timing wouldn't change too much because cleanings are based on the availability of staff.
Partial	The incentives are helpful in justifying the projects to go forward, especially in cases where the financials are borderline rather than delaying the projects.
Partial	This Enbridge program is mentioned in the steam trap project kickoff meeting, it gives this project a bigger push, and by broadcasting that to each business team to help put light on the project .
Partial	We have a great partnership with Enbridge and work with them to come up with different EE projects and bounce ideas off of them.

APPENDIX G. ATTRIBUTION RESULTS WITH ADDITIONAL STATISTICS

The results in this section are not applied to calculate savings totals. These results are different aggregations of the data that provide additional information to the programs and stakeholders. In the tables, results with less than five completes or absolute precision (±) greater than 20% are not shown, but the categories remain in the table to provide context for the results that can be reported.

The final table in each section has the application domain, Segment, which is the same domain as in the body of the report. Unlike the body of the report, these values are reported with finite population corrected (FPC) errors. FPC errors provide a more appropriate estimate of error for applying results onto populations that were part of the sample frame, i.e. the 2023 program year.

Overall ratios in these tables are the sample weighted average and not used in calculating net savings for the programs.

Custom Commercial Program

Table E-1. Applied domains with additional statistics for Custom Commercial program

Segment	Free-ridership-based attribution	Sample customers	Sample measures	±FPC on	± FPC off	Population measures	Percent population m^3 savings
Commercial	66%	32	38	12%	13%	363	22%
Institutional	74%	19	24	14%	29%	42	41%
Market Rate Multi-Residential	66%	32	35	9%	10%	476	37%
Custom Commercial - Overall	69%	83	97	7%	12%	881	100%

Table E-2. Targeted sample domain for Custom Commercial program

Segment	Free-ridership-based attribution	Sample customers	Sample measures	± FPC on	± FPC off	Population measures	Percent population m^3 savings
Commercial - Boilers	68%	14	14	20%	21%	212	12%
Commercial - Other Commercial	58%	16	21	15%	20%	137	8%
Commercial - Steam Traps	***	3	3	7%	8%	14	2%
Institutional - Other Institutional	81%	15	17	14%	31%	25	36%
Institutional - Steam Traps	***	7	7	24%	29%	17	5%
Market Rate Multi-Residential - Boilers	65%	17	18	11%	11%	314	21%
Market Rate Multi-Residential - Other	68%	15	17	15%	18%	162	16%
Custom Commercial - Overall	60%	83	97	7%	12%	881	100%

Custom Industrial Program

Table E-3. Applied domains with additional statistics for Custom Industrial program

Segment	Free-ridership-based attribution	Sample customers	Sample measures	± FPC on	± FPC off	Population measures	Percent population m^3 savings
Agricultural	63%	31	49	8%	17%	190	48%
Industrial	64%	46	58	7%	13%	163	52%
Custom Industrial - Overall	63%	77	107	6%	11%	353	100%

Table E-4. Targeted sample domain for Custom Industrial program

Segment	Free-ridership-based attribution	Sample customers	Sample measures	± FPC on	± FPC off	Population measures	Percent population m^3 savings
Agricultural - New Construction	42%	9	18	12%	25%	79	19%
Agricultural - Retrofit	79%	25	31	5%	14%	111	29%
Industrial - HVAC	70%	14	17	8%	19%	36	15%
Industrial - Process	74%	19	20	11%	19%	48	17%
Industrial - Steam or Hot Water System	70%	14	16	5%	28%	50	16%
Industrial - Steam Traps	***	5	5	26%	29%	29	4%
Custom Industrial - Overall	63%	77	107	6%	11%	353	100%

Large Volume

Table E-5. Applied domains with additional statistics for Large Volume

Segment	Free-ridership-based attribution	Sample customers	Sample measures	± FPC on	± FPC off	Population measures	Percent population m^3 savings
Large Volume	28%	14	20	4%	16%	31	100%

APPENDIX H. FREE RIDERSHIPSENSITIVITY ANALYSIS

Five sensitivity analyses were performed to assess the influence of DNV assumptions in the participant FR scoring method. These scores are not intended for application in determining program net savings. We grouped the five sensitivity tests into three dimensions, two of which we tested in two ways:

1. What is the sensitivity of the attribution score to our assumption of 2 years for the acceleration period? We tested this two ways:

    1a. Using an assumption of 1 year rather than 2 years when the acceleration period is equivalent to a “never would have implemented” response (100% FR-based attribution) for all measures in all programs. Mathematically, this increases attribution and helps inform us how much the assumption matters.

    1b. Using an assumption of 4 years rather than 2 years when the acceleration period is equivalent to a “never would have implemented” response (100% FR-based attribution) for all measures in all programs. Mathematically, this decreases attribution and helps inform us how much the assumption matters.

2. What is the sensitivity of the attribution score to the scoring approach for efficiency?

    2.Giving 100% FR-based attribution to programs for customers who say they would have done a different efficiency than what they did, rather than FR-based attribution that ranges from partial to full based on a later response. Mathematically, this increases attribution and informs us how much the assumption matters.

3. What is the sensitivity of the attribution score to the scoring methodology change from previous studies to the current study? We tested this two ways:

    3a. Calculate results using the life cycle net savings (LCNS) scoring method. This is consistent with the sensitivity test #1 in the 2017-18 FR evaluation. This will test the sensitivity of results to the combined effect of measure life weighting of results and the different treatment of acceleration period savings.

    3b. Calculate results using the life cycle net savings (LCNS) scoring method and include vendor attribution. This is consistent with the sensitivity test #1 in the 2017-18 FR evaluation, but adds back in vendor effect. This will test the sensitivity of different methodologies for participant scoring to adding in vendor effect.

Across the programs, the high-level findings from each test are:

1: Tests 1a and 1b indicate that changing the “never would have implemented” assumption would have a significant effect on the industrial and large volume segments, suggesting that we should include future research to verify the assumed planning horizon for these projects. Changing the assumption from 2 years to 4 years had a larger effect than changing from 2 years to 1 year, though the ratios still changed by 9%–10%.

2: Test 2 indicates that the specific scoring of the efficiency question has relatively little effect on any segment. This may argue for using a simplified approach in future net-to-gross research in order to reduce survey length.

3: Test 3a shows a statistically significant large effect for Large Volume, but not as much of an effect on other programs and segments. The primary difference in the approaches is the incorporation of measure life both in the weighting of results and the individual measure free-ridership score. The muted difference in the LCNS vs the Y1NS in the scores is likely due in part to having the assumption of 2 years for “never would have implemented.” Since more projects are scored as “never,” the difference in score between the two methods is not as significant as it was with a 4-year assumption. Test 3b provides a way

for readers to see how comparable the LCNS results are for the full standard approach including vendor surveys, which is the likely approach that would have been taken if CCM remained the key metric for program goal achievement.

In Table F-1, the first column (standard approach, vendor) is the official free-ridership based attribution that corresponds to the body of the report, shown here at the segment level. To ascertain the results of the sensitivity analysis, the reader should compare columns (standard approach 1 year, standard approach 4 year, no partial efficiency, and LCNS no vendor) to the second column (standard approach, no vendor):

- The first column (standard approach, vendor) to the second column (standard approach, no vendor), to show the effect of including the results of the vendor survey.
- The second column (standard approach, no vendor) to the next four columns (Test 1a, Test 1b, Test 2, and Test 3a) to show the effect of the sensitivity analysis.
- The final column (test 3b) to the adjacent column (test 3a) to see the effect of including the results of the vendor survey in the LCNS method.
- The final column (test 3b) to the first column (standard approach, vendor) to see the relatively apples to apples comparison of the 2024 standard approach and the LCNS method when both include the results of the vendor survey.

Table F-1 shows the results of the sensitivity analysis by sector for the programs. None of the sensitivity tests 1, 2, or 3 produced a result that is statistically different from the “standard, no vendor” result (at 90% confidence), with the exception of the LCNS method (test 3a and 3b) vs standard approach for the Large Volume program. Enbridge motivated many measures in Large Volume to be accelerated between one and 23 months, which results in more savings in the standard scoring of this study than LCNS, which provides a literal years accelerated scoring for partial attribution that is relative to the measure life in LCNS, rather than 24 months as scored in the standard approach.

All segments showed some sensitivity (4%–17%) to the timing assumption for what constitutes an equivalent to “never” response (Test #1b). This is shown as a decrease in the FR-based attribution on test #1 vs standard. This indicates that across all segments a significant portion of participants indicated acceleration of between 2-4 years. Similarly, most segments, except for Institutional, showed some sensitivity to the timing assumption of 1 year (Test #1a).

Test #2, which removes baseline from the efficiency scoring by giving 100% credit for any project where the customer would have done a different efficiency from what they did, increases the FR-based attribution by 0% to 3%. None of the segment scores was particularly sensitive to this assumption.

Test #3a shows the LCNS method having a significant effect on Commercial and Large Volume projects, with less of an effect on Multifamily and Industrial projects. The smaller effect on multifamily and industrial is an indication that attribution/free ridership in these sectors tends to be more binary, with low frequencies of partial attribution.

Test #3b provides a view of what the LCNS effect is once vendor surveys are taken into account. The vendor surveys increase the LCNS in a similar pattern to what we see in the standard method.

Table F-1 Sensitivity analysis for Enbridge custom program segments

Program	Segment	Standard Approach: Year 1 Net Savings, Vendor	Standard Approach: Year 1 Net Savings	Test 1a: 1 year acceleration = Never	Test 1b: 4 year+ acceleration = Never	Test 2: No Partial Efficiency Score	Test 3a: Lifecycle Net Savings Method	Test 3b: Lifecycle Net Savings Method, Vendor
Commercial	Commercial	66%	51%	56%	46%	52%	43%	55%
	Institutional	74%	74%	74%	57%	74%	74%	74%
	Market Rate Multi-Family	66%	35%	38%	31%	38%	29%	60%
Industrial	Agricultural	63%	63%	66%	59%	70%	54%	54%
	Industrial	64%	64%	74%	53%	66%	62%	62%
Large Volume	Large Volume	28%	28%	44%	20%	28%	11%	11%

APPENDIX I. FREE-RIDERSHIP SURVEY DATA QUALITY CONTROL

This appendix includes summaries of survey responses used to conduct quality control (QC) on the scored FR-based attribution responses. The QC process involves comparison of scored question responses to responses to other questions in the same interview. Interviews with potentially conflicting responses are reviewed by the project manager (PM), who reads the entire interview before determining if an adjustment to a score is required. The options for adjusting a score include:

- Drop the measure from the sample – for very muddled responses
- Replace the inconsistent response with a "Don't Know" (effectively using the average if it is clear that there should be some FR-based attribution for the component, but unclear how much)
- Adjust the flagged score to more accurately reflect the intent of the respondent (employed in cases where there is overwhelming evidence of intent; for instance, the open-ended response says clearly what the score should be)

Table G-1 provides the count of measures adjusted for each utility and whether the adjustment increased (Inc) or decreased (Dec) FR-based attribution for that measure. In total, 17 out of 225 FR-based attribution scores were adjusted through this process, including 1 measure which was dropped. The percent of adjusted scores (8%) is consistent with the prior studies. Two measures had more than one dimension corrected.

Table G-1. PM quality assurance adjustments

PM Quality Assurance Status			Overall		
			Inc	Dec	Total
Total Measures Completed from FR IDIs					225
Not Adjusted					210
PM Adjustments from QA	Dropped				1
	Assign DNK Attribution due to unclear amount.	Timing	4	0	4
		Efficiency	0	0	0
		Quantity/Size	0	0	0
	Adjust Score Attribution Clear based on open, conflicted with scored response	Timing	5	1	6
		Efficiency	4	1	5
		Quantity/Size	3	1	4

APPENDIX J. SPILLOVER MEASURE SAVINGS DETAIL

Table J-1 shows the individual non-Enbridge program measures identified through the survey by measure type with the individual measure savings associated.

Table J-1. Individual spillover measures

Measure type	m^3 savings	CCM savings
Boiler controls	1,252	25,047
Boiler controls	7,338	146,758
Boiler controls	20,729	414,577
Boiler controls	345,580	6,911,600
Boiler economizer	11,100	222,008
Boiler economizer	26,861	537,222
Boiler economizer	77,934	1,558,686
Boiler system insulation – fittings	1,531	21,441
Boiler system insulation – fittings	8,737	122,316
Boiler system insulation – fittings	25,349	354,887
Boiler system insulation - pipes	1,531	21,441
Boiler system insulation - pipes	8,737	122,316
Boiler system insulation - pipes	8,973	125,628
Boiler system insulation - pipes	25,349	354,887
Boiler system insulation - tank	2,760	55,200
Boiler system insulation - tank	15,745	314,908
Boiler/furnace	5,529	110,570
Boiler/furnace	9,785	195,690
Boiler/furnace	12,746	254,920
Boiler/furnace	15,531	310,628
Boiler/furnace	47,676	953,529
Boiler/furnace	60,476	1,209,529
Boiler/furnace	216,184	4,323,684
Boiler/furnace tune-ups	49	985
Boiler/furnace tune-ups	1,137	22,750
Boiler/furnace tune-ups	1,334	26,688
Boiler/furnace tune-ups	1,493	29,861
Boiler/furnace tune-ups	1,598	31,950
Boiler/furnace tune-ups	1,992	39,832
Boiler/furnace tune-ups	2,013	40,265
Boiler/furnace tune-ups	2,219	44,379
Boiler/furnace tune-ups	3,037	60,750
Boiler/furnace tune-ups	3,072	61,435
Boiler/furnace tune-ups	7,349	146,981
Boiler/furnace tune-ups	8,813	176,258
Boiler/furnace tune-ups	9,031	180,613
Boiler/furnace tune-ups	10,154	203,089
Boiler/furnace tune-ups	11,072	221,443
Boiler/furnace tune-ups	12,206	244,123
Boiler/furnace tune-ups	27,804	556,081
Burner upgrades or new installs	1,252	25,047
Burner upgrades or new installs	7,338	146,758
Burner upgrades or new installs	21,241	424,820
Climate control upgrades	10,168	152,525
Climate control upgrades	25,410	381,150
Climate control upgrades	45,196	677,941

Measure type	m^3 savings	CCM savings
Climate control upgrades	49,365	740,479
Climate control upgrades	111,231	1,668,465
Climate control upgrades	113,979	1,709,689
Climate control upgrades	521,693	7,825,388
Climate or system controls	6,720	100,802
Climate or system controls	10,168	152,525
Climate or system controls	12,196	243,922
Climate or system controls	25,741	386,117
Climate or system controls	78,971	1,184,561
Climate or system controls	115,310	1,729,643
Climate or system controls	695,207	10,428,101
CO_2 condenser	26,861	537,222
CO_2 condenser	79,860	1,597,198
Destratification fans	22,307	334,608
Doors	1,996	19,962
Doors	11,388	113,881
Doors	33,041	330,411
Doors	34,253	342,526
Equipment for ag process, e.g. biomass combustor, optimization	131,846	1,318,463
Greenhouse energy curtains for roof	16,528	165,280
Greenhouse energy curtains for roof	25,273	252,730
Greenhouse energy curtains for roof	32,129	321,288
Greenhouse energy curtains for roof	48,182	481,822
Greenhouse energy curtains for roof	90,596	905,960
Greenhouse energy curtains for roof	131,864	1,318,639
Greenhouse energy curtains for roof	132,284	1,322,841
Greenhouse energy curtains for roof	141,480	1,414,797
Greenhouse energy curtains for roof	299,245	2,992,452
Greenhouse glazing for walls	4,173	83,452
Greenhouse vent seals	14,461	216,915
Greenhouse vent seals	29,581	443,712
Heating system upgrade from steam to hot water	15,531	310,628
Loading dock door sealing	1,996	19,962
Loading dock door sealing	11,388	113,881
Loading dock door sealing	33,041	330,411
Loading dock door sealing	34,253	342,526
Other heat recovery	737	14,737
Other heat recovery	12,196	243,922
Production increase	2,756	13,778
Production increase	5,480	27,402
Production increase	10,158	50,789
Production increase	11,036	55,180
Production increase	17,520	87,600
Production increase	19,307	96,533
Production increase	20,462	102,308
Production increase	23,902	119,510
Production increase	40,893	204,464
Production increase	42,071	210,355
Production increase	49,410	247,052
Production increase	54,270	271,351
Production increase	55,208	276,040
Production increase	55,783	278,914

Measure type	m^3 savings	CCM savings
Production increase	73,309	366,543
Production increase	104,595	522,973
Production increase	106,056	530,279
Production increase	124,561	622,803
Production increase	133,763	668,813
Production increase	150,071	750,355
Production increase	154,095	770,474
Production increase	226,747	1,133,735
Production increase	316,090	1,580,451
Production increase	346,450	1,732,250
Production increase	352,300	1,761,500
Production increase	369,336	1,846,680
Production increase	382,879	1,914,393
Production increase	450,115	2,250,573
Production increase	461,679	2,308,394
Production increase	972,384	4,861,922
Production increase	990,596	4,952,979
Production increase	1,073,154	5,365,772
Roof insulation	3,449	86,226
Roof insulation	26,078	651,953
Roof insulation	57,089	1,427,216
Wall insulation	3,449	86,226
Wall insulation	7,059	176,484
Wall insulation	19,676	491,909
Wall insulation	40,249	1,006,227
Wall insulation	57,089	1,427,216
Wall insulation	59,182	1,479,548
Windows	731	14,628
Windows	3,048	60,964
Windows	4,173	83,452
Windows	12,106	242,128

Table J-2 shows an aggregated view of results by measure type, including percent of measure type savings influenced by Enbridge.

Table J-2. Influence on measure categories

Measure type	Sample customers	Sample sites	Reported measures	Weighted m3 savings	Percent weighted m3 savings	Percent Weighted m3 savings of Measure Type		
						Direct influence	Indirect influence	No influence
Production increase	28	32	32	18,577,990	59.9%	1%	17%	82%
Greenhouse Energy Curtains for Roof	9	9	9	2,993,858	9.7%	30%	25%	45%
Climate Control Upgrades	7	7	7	2,535,480	8.2%	65%	3%	33%
Climate or System Controls	7	7	7	1,663,771	5.4%	2%	0%	98%
Boiler controls	4	4	4	1,046,667	3.4%	0%	0%	100%
Boiler	7	7	7	935,255	3.0%	5%	0%	95%
Wall Insulation	6	6	6	538,323	1.7%	8%	4%	88%
Equipment for ag process, e.g. biomass combustor, optimization	1	1	1	389,987	1.3%	0%	50%	50%
Boiler tuneups	16	17	17	375,734	1.2%	2%	10%	88%
Boiler economizer	3	3	3	315,935	1.0%	19%	0%	81%
Roof Insulation	3	3	3	256,201	0.8%	0%	30%	70%
CO2 condenser	2	2	2	240,122	0.8%	25%	0%	75%
Loading Dock Door sealing	4	4	4	230,576	0.7%	0%	0%	100%
Doors	4	4	4	230,576	0.7%	11%	0%	89%
Boiler System Insulation - pipes	4	4	4	125,710	0.4%	0%	16%	84%
Greenhouse Vent Seals	2	2	2	120,034	0.4%	0%	0%	100%
Boiler system insulation – fittings	3	3	3	99,168	0.3%	0%	20%	80%
Burner Upgrades or New Installs	3	3	3	73,201	0.2%	30%	0%	70%
Destratification fans	1	1	1	65,982	0.2%	0%	0%	100%
Windows	4	4	4	56,377	0.2%	17%	0%	83%
Heating system upgrade from Steam to HW	1	1	1	45,940	0.1%	100%	0%	0%
Boiler system insulation - tank	2	2	2	43,591	0.1%	81%	0%	19%
Other heat recovery	2	2	2	38,254	0.1%	0%	0%	100%
Greenhouse Glazing for Walls	1	1	1	9,388	0.0%	100%	0%	0%

APPENDIX K. KEY DOCUMENTS

Four key documents previously reviewed by the EAC preceded this final report: the scope of work, which includes details on the methodologies and scoring used; the sample design memo; and the interview guides for participants and vendors.

Scope of work

Scope of Work for OEB FR 2023 - FINAL

Sample design memo

OEB FR 2023 - Sample Design Memo

Participant IDI guide

OEB FR 2023 - Participant IDI

Vendor IDI guide

OEB FR 2023 - Vendor IDI

Agricultural Spillover Scope of Work

Scope of Work for OEB Spillover 2023

Agricultural Spillover survey guide

OEB 2023 Ag Spillover Survey

About DNV

DNV is an independent assurance and risk management provider, operating in more than 100 countries, with the purpose of safeguarding life, property, and the environment. Whether assessing a new ship design, qualifying technology for a floating wind farm, analyzing sensor data from a gas pipeline, or certifying a food company's supply chain, DNV enables its customers and their stakeholders to manage technological and regulatory complexity with confidence. As a trusted voice for many of the world's most successful organizations, we use our broad experience and deep expertise to advance safety and sustainable performance, set industry standards, and inspire and invent solutions.

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