DNV·GL

2018 Natural Gas Demand Side Management Free Ridership Based Attribution Evaluation

Ontario Gas DSM Evaluation Contractor

Ontario Energy Board

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SAFER, SMARTER, GREENER

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1 INTRODUCTION

To encourage Enbridge Gas Distribution, Inc. (Enbridge) and Union Gas Limited (Union) 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 2017 and 2018 calendar years, programs delivered by Enbridge and Union 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 and Union DSM programs, the OEB sponsors studies to verify the energy savings achieved. Specifically, this study researches 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 two other studies[1] to produce verified net cumulative gas savings for the utilities' 2017 and 2018 Custom programs. This study was completed by DNV GL concurrent with the 2017/2018 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 a capital investment, 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.

[1] *2017-2018 Natural Gas Demand Side Management Custom Savings Verification.* Prepared for The Ontario Energy Board by DNV GL, February 24, 2020.
CPSV Participant Spillover Results. Prepared for The Ontario Energy Board by DNV GL, May 23, 2018.

- **Free ridership based attribution:** The portion of a program's verified energy savings that they 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 ENBRIDGE C&I CUSTOM PROGRAMS

Enbridge's custom DSM programs for commercial and industrial (C&I) 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 and financial incentives based on overall natural gas savings realized by the customer rather than a per-unit incentive.[2]

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 the 2015-2020 DSM framework, 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 2018 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.[3] 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 2-1 shows the FR based attribution ratio by domain for the Enbridge Custom C&I programs. The table shows the FR based attribution ratio, 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.

The ratio result is based on an overall sample size of 141 customers and 154 measures. Additional details on stratification, sample size, and population size are provided in Appendix C. Additional statistical details for the results are provided in Appendix E.

The Enbridge free ridership based attribution rate includes the effect of indirect utility influence on projects through vendors. Influence on projects through vendors increased the Commercial measure type free ridership based attribution rates by 6% for Boilers (from 36% to 42%) and Ventilation (8% to 14%) and 10% for "Other." Multi-Residential rates by 19% for Heating and 27% for "Other."

[2] Enbridge's Annual Report provides a more detailed description of the program and can be found here: https://www.oeb.ca/sites/default/files/2016-EGDI-DSM-Annual-Report_20181117.pdf

[3] *2017-2018 Natural Gas Demand Side Management Custom Savings Verification.* Prepared for The Ontario Energy Board by DNV GL, February 24, 2020.

Table 2-1. Free ridership based attribution ratio for Enbridge Custom C&I programs*

Segment - Measure Type	Free Ridership Based Attribution	+/- at 90% Cofidence	Population CCM Savings	Percent Population CCM Savings
Commercial Boilers	42.37%	11%	60,672,478	10%
Commercial Other	25.65%	7%	35,315,552	6%
Commercial Ventilation	14.12%	5%	28,854,855	5%
Industrial	50.62%	8%	282,799,242	48%
Multi-Residential Heating	57.67%	11%	114,449,741	20%
Multi-Residential Other	69.73%	9%	63,506,532	11%
Enbridge C&I Custom - Overall	49.90%	5%	585,598,400	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.

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.

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 Section 2.2 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 weighted cumulative savings shows the portion of population savings represented by that category.

The table shows that approximately the majority (63%) 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 56% of the program savings were accelerated by the program. Efficiency affects approximately 26% of the program savings, and the program influenced quantity for approximately 13% of program savings.

Table 2-2. Overview of the sources of attribution for Enbridge Custom C&I programs*

Timing	Efficiency	Quantity	Sample Customers	Sample Measures	Percentage of Total Sample Weighted CCM Savings
Yes	Yes	Yes	Null	Null	5%
		No	13	14	16%
	No	Yes	12	12	6%
		No	37	40	28%
No	Yes	Yes	Null	Null	0%
		No	7	7	5%
	No	Yes	5	5	2%
		No	68	71	37%

Patrial 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.

2.2.1.1 Timing component

Respondents answered a sequence of questions that addresses the timing of the equipment installation. (See Appendix I 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).[4] 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.

Timing was the component most strongly influenced by the utility. More than 80 customers accounting for 45% of program savings said they would have installed their measure(s) at the same time. Projects representing approximately 29% of savings received full attribution by answering that they never would have installed the measure (9% of savings), would have delayed the project by 48 months or more (14% of savings), or would have delayed the project by between 24 months and 48 months (commercial and multifamily customers only). The remaining 27% of savings received partial timing attribution (Table 2-3).

[4] See the Scope of Work attached in Appendix I for the detailed scoring algorithm.

Table 2-3. Determining the Acceleration period, Enbridge Custom C&I programs*†

DAT1a. Without the utility when would you have performed the measure? DAT1b. Approximately how much later?					
DAT1a	DAT1b	Timing Attribution	Sample Customers	Sample Measures	Percentage of Total Sample Weighted CCM Savings
Same Time	N/A	0%	80	84	44%
Earlier	N/A	0%	Null	Null	1%
Later	Months <24	ER baseline credit for months accelerated	14	15	10%
	24<= Months <48	100%+ ER baseline credit	11	11	6%
		ER baseline credit for months accelerated	5	6	8%
	Months >=48	100%+ ER baseline credit	10	12	14%
	Don't Know/Refused	ER baseline credit for avg. of DAT1b	5	5	3%
Never	N/A	100%	11	12	9%
Don't Know/ Refused	N/A	ER baseline credit for avg. of DAT1a	8	8	6%

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.

2.2.1.2 Efficiency Component

Respondents answered a sequence of questions that address the utility's influence on the efficiency level of the installed equipment. (See Appendix I 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 (61% 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 24% of program savings. Most of these indicated that the utility moved them from a standard baseline efficiency level to the level of efficiency that they installed.

Table 2-4. Determining Efficiency Attribution, Enbridge Custom C&I programs*†

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 Customers	Sample Measures	Percentage of Total Sample Weighted CCM Savings
Same	N/A	0%	94	97	61%
Lower	Baseline Efficiency	100%	10	11	13%
	Between Baseline and Installed Efficiency	50%	6	6	8%
	Don't Know/Refused	Average of Dat2b	Null	Null	3%
Higher	N/A	0%	Null	Null	1%
Don't Know/Refused	N/A	Average of dat2a	5	5	2%
Not Applicable	N/A	Not Asked	29	29	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.

2.2.1.3 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 I 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. Seventy-five customers accounting for 47% of program savings said they would have purchased the same quantity of equipment without the program (Table 2-5). Most of the remaining customers (14% of savings) received partial attribution. Another 40% of savings were from measures for which quantity is not applicable.

Table 2-5. Determining quantity/size attribution, Enbridge Custom C&I programs*†

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 Customers	Sample Measures	Percentage of Total Sample Weighted CCM Savings
Same	N/A	0%	75	80	47%
Less/Fewer/Smaller	Don't Know/Refused	Average of Dat3b	Null	Null	1%
	Partial change	0%<Value<100%	5	5	5%
Larger Boiler	Don't Know/Refused	Average of Dat3b	Null	Null	0%
None	N/A	100%	5	5	4%
Don't Know/Refused	N/A	Average of Dat3a	9	9	4%
Not Applicable	N/A	Not Asked	51	52	40%
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.

3 UNION C&I CUSTOM PROGRAMS

Union's custom DSM programs for commercial and industrial (C&I) customers encourage customers within this sector 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.[5]

A subset of the projects in this program is part of the multifamily segment. The free ridership based attribution portion of the evaluation included custom projects from the Market-Rate Multifamily (MR MF) section of the program. Under the the 2015-2020 DSM framework, low income projects use a deemed value for Low Income Multifamily LI MF free ridership, so the LI MF segment was not included in the FR based attribution evaluation.

All projects implemented as part of these programs and claimed in 2018 as custom projects are included in the scope of the free ridership (FR) based attribution study.

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.[6] 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 customer segment for the Union Custom C&I programs. The table shows the FR based attribution ratio, statistical precision at the 90% confidence interval, the program-claimed population 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.

The ratio result is based on an overall sample size of 70 customers and 87 measures. Additional details on stratification, sample size, and population size are provided in Appendix C. Additional statistical details for the results are provided in Appendix E.

The Agricultural customer segment had the highest FR based attribution at 50%, representing the largest portion of the program at 49% of program savings. The combination of high FR based attribution and large percent of population savings allowed the overall program to rise above poor results in other segments, such as the 4% FR based attribution (representing 11% of savings) in the Industrial Other segment.

[5] Union's 2016 Annual Report provides a more detailed description of the program and can be found here: https://www.oeb.ca/sites/default/files/2016-Union-DSM-Annual-Report-20181130.pdf

[6] *2017-2018 Natural Gas Demand Side Management Custom Savings Verification.* Prepared for The Ontario Energy Board by DNV GL, February 24, 2020.

Table 3-1. Free ridership based attribution ratio for Union Custom C&I programs*

Segment - Measure Type	Free Ridership Based Attribution	+/- at 90% Cofidence	Population CCM Savings	Percent Population CCM Savings
Agricultural	50.16%	13%	707,932,787	49%
Commercial & Multifamily	28.62%	13%	120,228,342	8%
Industrial HVAC	39.88%	12%	213,589,410	15%
Industrial Other	4.11%	3%	152,680,320	11%
Industrial Steam/Hot Water	28.98%	10%	252,890,716	17%
Union C&I Custom - Overall	38.21%	7%	1,447,321,574	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.

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.

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 the majority program savings (66% of sample weighted savings) are at least partially influenced by the program. 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 was

the next most common, with respondents reporting that approximately 39% of the program savings were from measures where the utility influenced an improved efficiency.

Table 3-2. Overview of the sources of attribution for Union Custom C&I programs*

Timing	Efficiency	Quantity	Sample Customers	Sample Measures	Percentage of Total Sample Weighted CCM Savings
Yes	Yes	Yes	6	7	14%
		No	10	11	10%
	No	Yes	5	5	7%
		No	17	19	20%
No	Yes	Yes	Null	Null	2%
		No	10	10	13%
	No	Yes	Null	Null	1%
		No	28	33	34%

Patrial 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.

3.2.1.1 Timing Component

Respondents answered a sequence of questions that address the timing of the equipment installation. (See Appendix I 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" were asked "how much 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.

Timing was the component most strongly influenced by the utility. Thirty-eight customers, accounting for 49% of program savings, said they would have installed their measure(s) at the same time. Projects representing approximately 9% of savings received full attribution by answering that they never would have installed the measure (5% of savings) or would have delayed the project by 48 months or more (4% of savings). The remaining 41% of savings received partial timing attribution (Table 3-3).

[7] See the Scope of Work attached in Appendix I for the detailed scoring algorithm.

Table 3-3. Determining the acceleration period, Union Custom C&I programs*†

DAT1a. Without the utility when would you have performed the measure? DAT1b. Approximately how much later?					
DAT1a	DAT1b	Timing Attribution	Sample Customers	Sample Measures	Percentage of Total Sample Weighted CCM Savings
Same Time	N/A	0%	38	44	49%
Earlier	N/A	0%	Null	Null	0%
Later	Months <24	ER baseline credit for months accelerated	12	14	18%
	24<= Months <48	ER baseline credit for months accelerated	7	8	11%
	Months >=48	100%+ ER baseline credit	5	6	4%
	Don't Know/Refused	ER baseline credit for avg. of DAT1b	Null	Null	5%
Never	N/A	100%	8	8	5%
Don't Know/ Refused	N/A	ER baseline credit for avg. of DAT1a	Null	Null	8%
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.

3.2.1.2 Efficiency Component

Respondents answered a sequence of questions that address the utility's influence on the efficiency level of the installed equipment. (See Appendix I 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, affecting over one-third (39%) of the program savings (Table 3-4). Forty-two percent of program savings received zero attribution because the respondents indicated they would have installed the same level of efficiency without the utility. Another 19% of savings were from measures for which efficiency levels is not applicable, such as operational improvements, leak repairs or steam trap replacements.

Of note in this table is the row for greenhouse components. For agriculture measures where more than one technology was included in the bundle (and documentation provided to the evaluation team listed it as part of the measure scope), the evaluation asked about the efficiency of each sub-measure. This approach appeared to produce more reliable results than if we had asked about the bundle of measures as a single item as customers were better able to parse their decision making on each component.

Table 3-4. Determining efficiency attribution, Union Custom C&I programs*†

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 Customers	Sample Measures	Percentage of Total Sample Weighted CCM Savings
Same	N/A	0%	37	43	42%
Lower	Baseline Efficiency	100%	6	7	6%
	Between Baseline and Installed Efficiency	50%	8	9	6%
	Average Score of Greenhouse Components	Average of sub-measure scores	8	8	21%
	Don't Know/Refused	Average of Dat2b	Null	Null	4%
Higher	N/A	0%	Null	Null	0%
Don't Know/Refused	N/A	Average of dat2a	Null	Null	3%
Not Applicable	N/A	Not Asked	14	14	19%

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.

3.2.1.3 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 I 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 influenced approximately one-quarter (23%) of the program savings (Table 3-5). Approximately one-third (30%) of program savings received zero attribution because the respondents indicated they would have installed the same quantity without the utility. Another 47% of savings were from measures for which quantity is not applicable.

Table 3-5. Determining quantity/size attribution, Union Custom C&I programs*†

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 Customers	Sample Measures	Percentage of Total Sample Weighted CCM Savings
Same	N/A	0%	29	30	30%
Less/Fewer/Smaller	Don't Know/Refused	Average of Dat3b	Null	Null	3%
	Partial change	0%<Value<100%	Null	Null	9%
None	N/A	100%	5	5	7%
Don't Know/Refused	N/A	Average of Dat3a	Null	Null	5%
Not Applicable	N/A	Not Asked	37	43	47%

■ 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 UNION LARGE VOLUME

Union encourages the adoption of energy efficient equipment, technologies, and actions via its Large Volume program. The Large Volume program in 2018 was applicable to customers in Rate T2/Rate 100.

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 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.[8]

Custom projects implemented as part of this program and claimed in 2018 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.[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 4-1 shows the FR based attribution ratio for the Union Large Volume program. The table shows the FR based attribution ratio, statistical precision at the 90% confidence interval, the program-claimed population CCM savings, and percent of program savings.

The ratio result is based on an overall sample size of 16 customers and 23 measures. Additional details on stratification, sample size, and population size are provided in Appendix C. Additional statistical details for the results are provided in Appendix E.

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.

[8] Union's 2016 Annual Report provides a more detailed description of the program and can be found here: https://www.oeb.ca/sites/default/files/2016-Union-DSM-Annual-Report-20181130.pdf

[9] *2017-2018 Natural Gas Demand Side Management Custom Savings Verification.* Prepared for The Ontario Energy Board by DNV GL, February 24, 2020.

Table 4-1. Free ridership based Attribution ratio for Union Large Volume*

Segment	Free Ridership Based Attribution	+/- at 90% Cofidence	Population CCM Savings	Percent Population CCM Savings
Union - Large Volume	14.49%	15%	643,724,391	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.

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 weighted cumulative savings shows the portion of population savings represented by that category.

The table shows that one-third of program participation (~33% of savings) was at least partially influenced by the utility. Timing is the most common reflection of program influence, with respondents reporting that approximately 31% of the program savings were accelerated by the program. The utility influenced the efficiency levels of approximately 10% of the savings and the quantity/size of approximately 7%.

Table 4-2. Overview of the sources of attribution for Union Large Volume*

Timing	Efficiency	Quantity	Sample Customers	Sample Measures	Percentage of Total Sample Weighted CCM Savings
Yes	Yes	Yes	Null	Null	3%
		No	Null	Null	5%
	No	Yes	Null	Null	3%
		No	5	6	19%
No	Yes	No	Null	Null	1%
	No	Yes	Null	Null	1%
		No	9	12	67%

Patrial 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.

4.2.1.1 Timing Component

Respondents answered a sequence of questions that address the timing of the equipment installation. (See Appendix I 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).[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.

Timing was the component most strongly affected by the utility. Eleven out of 23 surveyed customers accounting for 69% of program savings said they would have installed their measure(s) at the same time. Eight customers indicated some amount of utility acceleration on at least one measure, mostly between 1 and 48 months (Table 4-3).

[10] See the Scope of Work attached in Appendix I for the detailed scoring algorithm.

Table 4-3. Determining the Acceleration period, Union Large Volume*†

DAT1a. Without the utility when would you have performed the measure? DAT1b. Approximately how much later?					
DAT1a	DAT1b	Timing Attribution	Sample Customers	Sample Measures	Percentage of Total Sample Weighted CCM Savings
Same Time	N/A	0%	11	14	69%
Later	Months <24	ER baseline credit for months accelerated	Null	Null	9%
	24<= Months <48	ER baseline credit for months accelerated	Null	Null	5%
	Don't Know/Refused	ER baseline credit for avg. of DAT1b	Null	Null	12%
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.

4.2.1.2 Efficiency Component

Respondents answered a sequence of questions that address the utility's influence on the efficiency level of the installed equipment. (See Appendix I 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 9% of the program savings (Table 4-4). Nearly three-quarters of program savings received zero efficiency attribution.

Table 4-4. Determining Efficiency Attribution, Union 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 Customers	Sample Measures	Percentage of Total Sample Weighted CCM Savings
Same	N/A	0%	10	14	74%
Lower	Between Baseline and Installed Efficiency	50%	Null	Null	3%
	Don't Know/Refused	Average of Dat2b	Null	Null	5%
Don't Know/Refused	N/A	Average of dat2a	Null	Null	1%
Not Applicable	N/A	Not Asked	6	6	16%

■ 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.

4.2.1.3 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 I 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. Nine customers accounting for 41% of the program savings said they would have purchased the same amount of equipment without the utility

(Table 4-5). Seven percent of savings were influenced by the utility, while 52% were from measures for which quantity is not applicable.

Table 4-5. Determining quantity/size attribution, Union 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 Customers	Sample Measures	Percentage of Total Sample Weighted CCM Savings
Same	N/A	0%	9	9	41%
Less/Fewer/Smaller	Don't Know/Refused	Average of Dat3b	Null	Null	4%
	Partial change	0%<Value<100%	Null	Null	3%
Not Applicable	N/A	Not Asked	8	11	52%
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.

5 FINDINGS AND RECOMMENDATIONS

The table in this section present the key findings and recommendations from the study. The tables show 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 tables. All recommendations address energy savings and program performance.

Table 5-1. Energy savings and program performance recommendations

#	Energy Savings and Program Performance		Applies to			Primary Beneficial Outcome			
	Finding	Recommendation	Union	Enbridge	Evaluation	Reduce Costs	Increase Savings	Customer Satisfaction	Decrease Risk
1	FR based attribution in some segments of the utilities' programs is low and variable	Evaluate free ridership for the programs annually and couple the free ridership evaluation with process evaluation			✓		✓		
2	Relative precision targets were not met for some targeted segments.	Error ratios from this report should inform sample design for future evaluation. Response rates from this report should inform the size of the backup sample for future evaluation.			✓	✓			✓
3	FR based attribution for the programs came primarily through acceleration	Align the program design with cumulative net goals	✓	✓			✓		
4	Some customers receive funding from multiple third-party sources	Consider the potential effect of multiple third-party incentives on free ridership			✓				✓

#	Energy Savings and Program Performance		Applies to			Primary Beneficial Outcome			
	Finding	Recommendation	Union	Enbridge	Evaluation	Reduce Costs	Increase Savings	Customer Satisfaction	Decrease Risk
5	Projects with very long and very short simple payback periods often have high free ridership.	Consider establishing a policy that defines an eligibility floor and cap based on simple payback period for energy efficiency projects.	✓	✓			✓		✓
6	Union's Large Volume program has a very low FR based attribution.	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	✓				✓	✓	✓

#	Energy Savings and Program Performance		Applies to			Primary Beneficial Outcome			
	Finding	Recommendation	Union	Enbridge	Evaluation	Reduce Costs	Increase Savings	Customer Satisfaction	Decrease Risk
7	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.	✓	✓		✓	✓		
8	Union Agriculture FR based attribution is the highest among the Union programs.	Continue the proactive approach to DSM marketing in this sector.	✓				✓	✓	✓
9	The assumption for "never would have implemented" has a significant effect on free ridership based attribution.	Consider studying the typical planning horizons for each of the customer segments.			✓				✓
10	The treatment of efficiency in the scoring has a relatively small effect free ridership based attribution.	Consider simplifying the efficiency question sequence in future research to reduce survey length.			✓			✓	
11	The current Lifecycle Net Savings method of free ridership based attribution has a large effect on free ridership based attribution	Continue to use the Lifecycle Net Savings method as long as the primary metrics for the program are based on Cumulative gas savings.			✓				✓

5.1 Energy Savings and Program Performance

1. **Finding:** FR based attribution in some segments of the utilities' programs is low and variable.

   Recommendation: Consistent annual 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: Effective free ridership management will allow the programs to increase their net savings significantly in future years.

2. **Finding:** Relative precision targets were not met for some targeted segments. Error ratios from the evaluation were as high or higher than in the 2015 study and response rate was lower.

   Recommendation 1: Error ratios from the results provided in this report should be used to inform sample design for future evaluation years.

   Outcome 1: Better defined error ratios for the measures in the programs will allow more efficient sample design for future evaluations, improving precisions and reducing costs.

   Recommendation 2: Response rates from this evaluation should be considered in planning the amount of backup sample required for future studies.

   Outcome 2: A larger backup sample will provide more assurance of meeting sampling targets if response rates continue to be lower than in previous years. Approaches to increase response rates should be considered.

3. **Finding:** FR based attribution for the programs came primarily through acceleration rather than changes in efficiency or quantity. Acceleration is less valuable to programs that are seeking to meet cumulative net goals, because savings often drop after the acceleration period is over. 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.

   Recommendation: To align the programs with cumulative net goals, the utilities should seek to:

   - Continue promoting long life measures and consider discontinuing promotion of short-lived measures
   - Proactively upsell equipment purchases from standard to efficient products
   - Stop providing incentives for standard efficiency products even in non-replace on burnout situations
   - Target hard to reach customers who have not participated in the past
   - Continue to identify unique solutions that save energy at customer plants
   - Expand promotion of energy efficiency measures with low market penetration (such as heat reflector panels)
   - 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.
   - Adopt lessons learned from the Enbridge Commercial and Multifamily approach to market, working proactively with vendors
   - Increase focus on promoting novel energy saving solutions to industrial customer problems. Several customers indicated that the project would not have happened without the utility because Union or Enbridge identified a solution that they had not considered

   Outcome 1: Focusing on proactive sales rather than reactive will help increase FR based attribution.

Outcome 2: Effective free ridership management will allow the program to increase net savings significantly in future years.

4. **Finding:** Some customers receive funding from multiple third-party sources (eg. IESO, municipalities, national and provincial carbon abatement programs/cap and trade), to complete the same energy efficiency measure. Both parties may claim the same changes in energy use, resulting in overlap when aggregated across fuels at the provincial level.

   Recommendation: Develop policies to collaborate across electric and gas projects to avoid double-counting fuel savings and increases from energy efficiency measures.

   Outcome: More accurate energy and carbon savings estimates across the province.

5. **Finding:** Projects with very long and very short simple payback periods often have low FR based attribution. However, from a customer service standpoint, it may be difficult for utilities to deny incentives to customers unless they have pre-established rules to point to.

   Recommendation: Consider establishing a policy that defines an eligibility floor and cap based on simple payback period for energy efficiency projects.

   Outcome: The rule will give utilities a guideline to restrict the program to projects that are more likely to result in FR based attribution. It will also allow the utilities to reject potentially poor projects without a large effect on customer satisfaction.

6. **Finding:** Union's Large Volume program has a very low FR based attribution.

   Recommendation 1: FR based attribution is one metric with which to judge a program, but low-cost programs with high savings totals and high free ridership can still deliver significant volumes of cost-effective savings. The Union Large Volume has low program costs relative to the net CCM saved. The program still provides cost effective net savings despite having low FR based attribution.

   Recommendation 2: This evaluation did not include a process evaluation. Union should consider conducting a process evaluation focused on how to reduce the rate of free ridership. Three options that the Union might consider are:

   - Consider the benefit-cost of eliminating maintenance and like-for-like measure replacements, as they are associated with high free ridership.
   - Use an application process that includes a committee review that can reject free rider projects. This option has been successful for government run programs, but would likely prove hard for utilities to manage as it can negatively affect customer satisfaction
   - Develop clear payback criteria such as "initial payback must be longer than X years and the incentive paid must reduce payback below Y years." This has the advantage of being a rule that account representatives can explain when talking to customers.
   - Consider the non-energy benefits realized by the customer when approving projects under a FR based attribution criterion. The non-energy benefits of many projects in the large industrial segment often large compared to the energy saving benefits, so simple payback criteria will not eliminate all free rider projects. Promote awareness of this issue among the implementation team.

   Outcome: Effective free ridership management may allow the program to increase its net savings significantly in future years.

7. **Finding:** Vendor attribution increased attribution significantly for the Enbridge multifamily program and moderately for the Enbridge commercial program. Participants of all programs indicated vendor involvement at key decision-making junctures, suggesting that if Enbridge and Union are able to influence vendor recommendations, there may be an opportunity to increase indirect influence on participants in all segments.

   Recommendation: 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: Effective leveraging of vendors could both increase FR based attribution and program uptake.

8. **Finding:** Union Agriculture FR based attribution is the highest among the Union programs. Customers reported that Union account representatives recommended novel solutions for specific problems and appear to be a conduit for disseminating information on best practices.

   Recommendation: Continue the proactive approach to DSM marketing in this sector. Union appears to be playing a role in reducing information barriers which is leading to increased uptake of energy efficiency measures in this growing sector.

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

9. **Finding:** The sensitivity testing shows that the assumption for "never would have implemented" has a significant effect on free ridership based attribution.

   Recommendation: Consider studying the typical planning horizons for each of the customer segments to verify if the 2 year or 4 year assumptions are consistent with participating Ontario businesses in each segment.

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

10. **Finding:** The sensitivity testing shows that the treatment of efficiency in the scoring has a relatively small effect free ridership based attribution.

    Recommendation: Consider simplifying the efficiency question sequence in future research to reduce survey length.

    Outcome: Reduced customer burden during interviews.

11. **Finding:** The sensitivity testing shows that the current Lifecycle Net Savings method of free ridership based attribution has a large effect on free ridership based attribution relative to the simpler Year 1 Net Savings method.

    Recommendation: Continue to use the Lifecycle Net Savings method as long as the primary metrics for the program are based on Cumulative gas savings.

    Outcome: More accurate estimates of cumulative net savings for the programs.

6 APPENDICES

Appendix A Glossary of Terms and Key Concepts

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 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.
Baseline, base case	Energy use or 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.
Capacity expansion (CE)	Measure that allows the customer to increase production or productivity
CCM	Cumulative Cubic meters (cumulative m^3)
Code	Measure required by regulations for safety, environmental, or other reasons
C&I	Commercial and Industrial
Cost Effectiveness	Ration of the stream benefits and costs for a given set of measures, programs, or portfolios. Two primary cost effectiveness ratios are calculated, PAC and TRC+.
Custom Program Savings Verification (CPSV)	Activities related to the collection, analysis, and reporting of data for purposes of verifying gross custom program savings impacts.
Customer - Enbridge	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, account numbers, and utilities. Customers can only be identified for records for which we received contact information (i.e. records associated with account number that have measures in the sample or backup sample).
Customer - Union	Unique customers can be identified based on the customer ID and the contact information provided by Union. A customer may have multiple site addresses, decision makers, customer IDs, and utilities. Customers can only be identified for records for which we received contact information (i.e. records associated with customer ID that have measures in the sample or backup sample).
Demand side management (DSM)	Modification of perceived customer demand for a product (in this case, energy) 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 criteria.
Dual Baseline	Savings calculation approach which addresses or combines the savings associated with early replacement and the savings after the early replacement period.
Early replacement (ER)	Measure that replaces a piece of equipment that is not past its EUL and is 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 remaining useful life, or RUL.
Energy Advisors	Energy Advisors are utility and/or program staff who provide information to customers about energy saving opportunities and program participation. This

	term includes, but is not limited to, Enbridge's Energy Solutions Consultants and Union's Account Managers
Estimated useful life (EUL)	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. Synonym for verified gross savings.
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.
Free ridership based attribution	The portion of a program's verified energy savings that they 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
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.
Incremental cost	The difference in purchase price (and any differences in related installation or implementation costs), at the time of purchase, between the efficient measure 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	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. Can be claimed, gross, or net. Sometimes referred to as just "cumulative" or "lifetime."
Maintenance (Maint.)	Repair or maintain, restore to prior efficiency
Measure – Enbridge	Measures are identified in the tracking data as a unique combination of project ID and measure ID. Multiple measures may belong to the same project.
Measure – Union	Measure refers to a project ID and line ID in the tracking data. Multiple measures may belong to the same project.
Measurement and Verification (M&V)	Verification of savings using methods not including attribution/free ridership assessment.
Metric	Metrics used within OEB Order and Decision to describe program achievement units.
MF	Multifamily (multi-residential).
New construction (NC)	New buildings or spaces
Non-early replacement period (non-ER period)	Years after the ER period up to the EUL
Normal replacement	Measure that replaces a piece of equipment that has reached or is past its EUL

<table>
<tr><td>(NR)</td><td>and in good operating condition</td></tr>
<tr><td>Persistence</td><td>The extent to which a DSM measure remains installed, and performing as originally predicted, in relation to its EUL</td></tr>
<tr><td>Program</td><td>Programs as listed within the OEB Decision and Order. Generally sub-units of Scorecards; for example, Commercial and Industrial Prescriptive Program within the Resource Acquisition Scorecard.</td></tr>
<tr><td>Program evaluation</td><td>Activities related to the collection, analysis, and reporting of data for purposes of measuring program impacts from past, existing, or potential program impacts</td></tr>
<tr><td>Program spending</td><td>Amount spent for implementation of programs, not including portfolio overhead. This value can be divided into spending for program measures and incentives, as well as program specific overhead.</td></tr>
<tr><td>Project - Enbridge</td><td>Projects are identified in the tracking data based on the project ID. A project may have multiple measures as indicated by measure IDs in the current data tracking system.</td></tr>
<tr><td>Project – Union</td><td>Projects are identified in the tracking data based on project ID. A project may have multiple measures as indicated by line IDs in the current data tracking system.</td></tr>
<tr><td>Remaining useful life (RUL)</td><td>The number of years that the existing equipment would have remained in service and in good operating condition. This is the same as ER Period.</td></tr>
<tr><td>Realization Rate</td><td>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.</td></tr>
<tr><td>Replace on burnout (ROB)</td><td>Measure that replaces a failed or failing piece of equipment</td></tr>
<tr><td>Retrofit add-on (REA)</td><td>Measure reduces energy use through modification of an existing piece of equipment</td></tr>
<tr><td>Rounding</td><td>The EC used the following rules for rounding values in terms of achievements, spending and budgets, targets, and adjustments.
<table>
<tr><th>Variable</th><th>Rule</th><th>Example</th></tr>
<tr><td>PY Achievement - large numbers</td><td>Rounded to 0 digits beyond decimal.</td><td>π*1000=3141.00000</td></tr>
<tr><td>PY Achievement - percents</td><td>Rounded to 4 significant digits</td><td>2/3 = 66.66% or .66660000</td></tr>
<tr><td>Spend and budget</td><td>Rounded to dollar</td><td>$100.66 = $101.00</td></tr>
<tr><td>Target</td><td>Rounded same as inputs (large numbers or percentages)</td><td>See above</td></tr>
<tr><td>Adjustments</td><td>Rounded same as inputs (large numbers or percentages)</td><td>See above</td></tr>
</table></td></tr>
<tr><td>Scorecard</td><td>Approach used to allow the gas utilities to be rewarded for undertaking important activities other than strictly reducing natural gas consumption, such as increasing customer participation in programs or installing energy efficiency measures with a long life. A scorecard approach allows for taking multiple metrics into consideration.

Each utility has a scorecard identified for each program year, which can be found in the Ontario Energy Board Decision and Order EB-2015-0029/EB-2015-0049</td></tr>
</table>

Scorecard Achievement	The verified value for program-specific metric targets (CCM, applications, etc.) of each scorecard identified by the Annual Scorecard. This is the value that is verified as the achieved value by the Annual Verification report and used for calculation of the shareholder incentive.
Shareholder Incentive	As part of the current DSM Framework, the OEB determined it was appropriate to make an annual shareholder incentive available. Each gas utility is eligible to receive a total annual maximum shareholder incentive of $10.45M, similar to the shareholder incentive at the start of 2012. The shareholder incentive is not part of the gas utilities' DSM budget. The incentive available to the gas utilities will not increase or decrease relative to approved DSM budgets, and is not increased annually for inflation.
Site	Sites are identified based on unique site addresses provided by Union and Enbridge through the contact information data request. A site may have multiple units of analysis, measures, and projects. Sites can be identified by the evaluation only for records for which we receive contact information – i.e. records associated with account number (EGD) or customer ID (Union) that have projects in the sample or backup sample.
System optimization (OPT)	Improve system or system settings to exceed prior efficiency
TRM	"Technical Reference Manual" – Generally accepted acronym and term for document that identifies standard methodologies and inputs for calculating energy savings.
TSER	Telephone Supported Engineering Review
Unit of Analysis – Enbridge	The level at which the data are analyzed, which in 2017 is a "measure" or sub-project level for Enbridge
Union Influence Factor	Factor applied by Union to a small number of projects. The factor reduces ex ante (claimed) savings to account for anticipated partial free ridership.
Unit of Analysis - Union	The level at which the data are analyzed, which in 2017 is a project for Union. A project is equivalent to a measure for Union as the database did not have a sub-project level.
Vendors	Program trade allies, business partners, contractors and suppliers who work with program participants to implement energy saving measures

Appendix B Technical Introduction

This study provides free ridership based attribution ratios from Enbridge's and Union's natural gas DSM programs delivered in 2018. The programs included are shown in Table 6-1. In free ridership based attribution studies, custom market-rate multi-residential (Multifamily) projects are included but custom low income multi-residential (LI MF) projects are not. LI MF use a deemed value for free ridership.

Table 6-1. FR Based Attribution by program

Program		FR
Union Custom	Large Volume	✓
	Commercial & Industrial*	✓
Enbridge Custom	Commercial*	✓
	Industrial	✓

*Custom Market-Rate Multi-Residential projects are included as a part of this program.

Evaluation Background

Enbridge and Union deliver energy efficiency programs under the Demand Side Management Framework for Natural Gas Distributors (2015-2020)[11] developed by the OEB. In April 2016, the OEB hired an Evaluation Contractor (EC) team led by DNV GL 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 GL team determined free ridership based attribution for custom projects implemented as part of the 2018 program year. This report is a result of that study.

The EAC consists of representatives from Union and 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 GL 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:

- Union and Enbridge tracking databases
- Union and Enbridge project documentation
- In-Depth Telephone Interviews with a sample of participating customers
- In-Depth Telephone Interviews with a sample of participating vendors

The data collection with samples of participating customers and vendors included telephone interviews focused on assessing free ridership. Table 6-2 shows the targeted and completed data collection activities.

[11] EB-2014-0134

Table 6-2. Data collection activities*

Target Group	Activity	Targeted Measures	Completed Measures
Enbridge			
Participating Customers	In-Depth Interview	169	154
Participating Vendors	In-Depth Interview	Census of Triggered EGD Comm & Multi-Res.	34
Union			
Participating Customers	In-Depth Interview	124	110
Participating Vendors	In-Depth Interview	0	0
Overall			
Participating Customers	In-Depth Interview	2293	254
Participating Vendors	In-Depth Interview	Census of Triggered EGD Comm & Multi-Res.	34

*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 I. Final sample achievements are provided in Appendix C.[12]
- **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-percent confidence limits and clusters defined by customers to appropriately estimate error when multiple units are collected from a single source.[13] The approach used is described in the scope of work in Appendix I.

[12] This study was completed by DNV GL concurrent with the 2017-2018 Custom Savings Verification Study. Independent samples were selected for each study.

[13] Where a single site had two contacts, the site was used as a cluster to ensure conservative (higher) error estimates.

- 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 I. The results of this study include an update to the FR based attribution portion of the net to gross (NTG) study performed on the 2015 programs.[14] The spillover results from the 2013-14 Spillover study[15] should be combined with the FR based attribution results from this study to calculate the NTG ratio until an update to the spillover study is performed.

Methodological Changes from the 2015 NTG Study

The evaluation followed the same framework as the 2015 NTG study, with several incremental improvements.

1. Interviews with customers occurred in 2019 and included only participants from the 2018 program year. Interviewing customers more promptly after measure implementation improves customer recall of decision-making processes and influences. 2017 projects were not included with the understanding that the program design and operations were consistent across the years, so results from a study of 2018 would be applicable to 2017.
2. Overall interview length was reduced by reducing the length of the framing portion of the interview guide and limiting the number of measures included in a single survey.
3. Framing questions were enhanced by utility provided documentation 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 influence triggers were adjusted to fit the new framing approach and enhanced by an improved understanding of the program designs.
5. Vendor interview approach was able to be tailored only to the Enbridge commercial and multi-residential vendors. This approach allowed for more specific reference to elements of the program design that are not a part of the design for other segments and programs.
6. The scoring approach for the vendor interview targeted Enbridge's effect on the vendor's actions rather than asking the vendor about their opinion of the program's effect on customer outcomes.
7. 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.

Understanding Statistical Error

Statistical error is reported for all of the 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 6-3 describes each of the statistics provided in this report.

[14] *2015 Natural Gas Demand Side Management Custom Savings Verification and Free-ridership Evaluation*. Prepared for the Ontario Energy Board by DNV GL. August 15, 2017.

[15] *CPSV Participant Spillover Results.* Prepared for The Ontario Energy Board by DNV GL, May 23, 2018.

Table 6-3: Relevant statistics

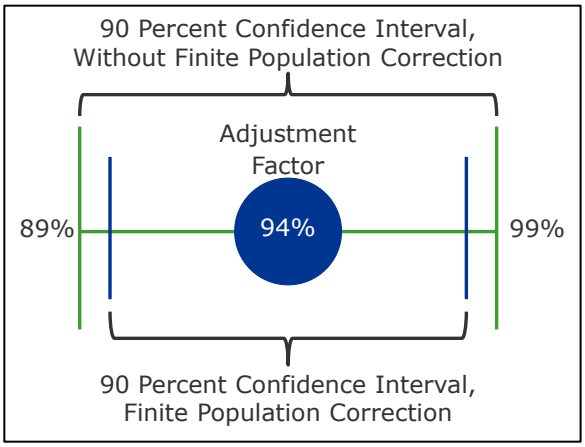
Term	Definition
Ratio/Adjustment factor	A point estimate of the evaluation findings expressed as a percent.
+/- or Absolute Precision	If the evaluation were repeated several times, selecting samples from the same population, 90%[16] of the time the ratio would be within this range of the ratio
Confidence 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.

Figure 6-1 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)

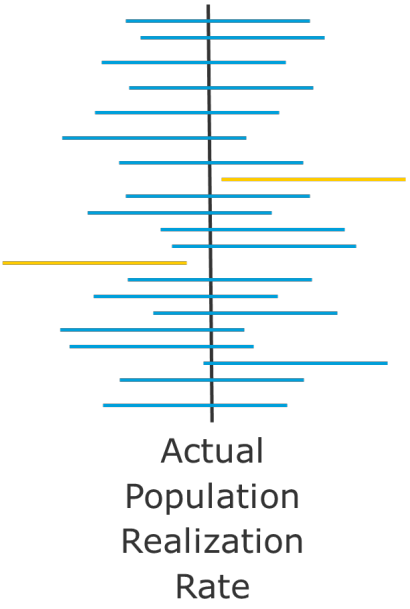
[16] 90% is the confidence limit that we are using.

Figure 6-1. 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 6-1, the ratio is 94% and the non-FPC 90% confidence interval is ± 5 percentage points (i.e., 94% ± 5%).[17] 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 6-2 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).

Figure 6-2. Ninety Percent 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.

[17] 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 2-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.

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 2-tailed 90% confidence interval).

Appendix C 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. Cumulative cubic meters (CCM) of natural gas savings are also included under the header Ex Ante CCM. Note that in some cases measures beyond the target were completed. These completed measures were at sites with multiple measures in the sample.

Enbridge Custom C&I: Summary of participant data collected

Table 6-4 summarizes the FR based attribution data collection efforts for the Enbridge Custom C&I 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[18]

The data collected in Table 6-4 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 6-5.

The evaluation collected FR based attribution data for 55% of savings in the programs with a customer response rate of 31%.

Table 6-4. Summary of FR data collection for Enbridge Custom C&I programs

Data Collection Category	Targeted	Completed		
	# Measures	# Customers	# Measures	Ex Ante CCM
Completed In-Depth Interview	169	141	154	301,933,182
Attempted Contact, Not Completed		309	407	115,653,511
Not Attempted		115	135	168,011,707
Total		480	696	585,598,400

[18] 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 6-5. FR Sample Achievement for Enbridge Custom C&I programs

Segment	Measure Group	Stratum	Max CCM	Target	Completed Measures	Frame Measures	Completed CCM	Total CCM
Commercial	Boilers	1	355,950	4	4	34	935,325	6,979,100
		2	633,450	4	3	17	1,480,425	8,123,350
		3	873,150	4	4	11	2,900,450	8,296,200
		4	1,681,750	4	4	8	5,672,375	10,244,100
		5	1,883,700	4	4	6	7,274,550	10,919,500
		6	2,201,700	4	3	4	6,503,553	8,397,553
		7	4,975,175	2	2	2	7,712,675	7,712,675
	Other	1	174,054	4	5	53	387,582	3,859,518
		2	427,275	4	4	17	1,136,451	4,738,016
		3	732,420	4	4	10	2,371,776	5,630,061
		4	1,189,908	4	3	7	3,207,558	6,816,009
		5	1,543,890	3	3	4	4,118,198	5,322,578
		6	4,090,880	3	3	3	8,949,370	8,949,370
	Ventilation	1	268,320	3	3	19	344,970	2,631,285
		2	474,105	3	3	8	1,242,990	3,055,845
		3	734,790	3	5	6	3,024,570	3,676,170
		4	936,150	3	1	3	936,150	2,586,165
		5	6,427,665	5	4	5	14,358,510	16,905,390
Industrial	Other	1	1,306,940	4	4	36	2,529,885	14,710,030
		2	3,183,525	4	4	8	7,909,890	18,027,200
		3	5,779,395	3	2	4	10,732,860	20,766,805
		4	21,228,675	4	4	4	50,170,425	50,170,425
	Process	1	1,834,720	3	4	21	3,354,660	15,169,120
		2	3,274,980	3	3	8	7,358,120	20,740,580
		3	4,857,940	3	4	5	16,593,600	20,773,600
		4	6,873,200	3	2	3	10,396,300	17,269,500
		5	20,905,860	4	3	4	38,198,760	59,104,620
	System Maintenance	1	832,458	3	5	17	1,850,306	5,638,872
		2	1,956,306	3	3	5	3,614,082	6,827,034
		3	2,949,114	2	1	3	2,515,030	7,786,604
		4	13,847,162	4	3	4	21,282,324	25,814,852
MR MF	Boilers	1	392,875	5	6	72	1,045,350	15,016,142
		2	649,275	5	5	35	2,335,040	17,577,497
		3	975,875	5	3	23	2,221,200	19,030,400
		4	1,632,800	5	6	17	7,806,500	20,976,300
		5	2,319,275	5	5	12	9,866,226	23,077,094
		6	3,541,825	4	4	8	12,741,626	23,113,541
		7	3,997,575	1	1	1	3,997,575	3,997,575
	Other	1	114,226	5	5	96	264,570	4,292,438
		2	306,795	4	3	30	462,360	5,306,471
		3	1,193,835	4	2	10	1,338,690	6,416,955
		4	1,294,035	1	0	1	0	1,294,035
	Ventilation	1	562,965	4	2	26	838,215	6,049,950
		2	758,040	4	2	11	1,397,685	7,442,775
		3	1,512,405	3	3	8	3,362,760	8,709,825
		4	2,028,135	3	3	4	5,191,665	7,089,375
		5	3,070,650	3	0	3	0	8,565,900
Grand Total					154	696	301,933,182	585,598,400

Union C&I: Summary of participant data collected

Table 6-6 summarizes the FR based attribution data collection efforts for the Union C&I 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.[19]

The data collected in Table 6-6 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 6-7.

The evaluation collected FR based attribution data for 55% of savings in the programs with a customer response rate of 32%.

Table 6-6. Summary of FR data collection for Union Custom CIMF programs

Data Collection Category	Targeted	Completed		
	# Measures	# Customers	# Measures	Ex Ante CCM
Completed In-Depth Interview	100	70	87	799,832,852
Attempted Contact, Not Completed		152	198	179,638,925
Not Attempted		57	73	467,849,797
Total		**229**	**358**	**1,447,321,574**

[19] 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 6-7. FR Sample Achievement for Union Custom C&I programs

Segment	Measure Group	Stratum	Max CCM	Target	Completed Measures	Frame Measures	Completed CCM	Total CCM
Agricultural	GH - Heating or Water System	1	1,575,238	4	4	53	1,004,277	34,451,385
		2	4,089,915	4	4	18	10,585,660	46,153,297
		3	7,648,760	3	2	8	13,640,258	45,954,970
		4	13,834,838	3	1	5	9,878,271	53,536,639
		5	36,269,380	4	4	4	109,447,525	109,447,525
	GH - New Build	1	25,068,700	4	3	7	66,728,739	119,633,279
		2	38,386,754	3	2	4	67,080,860	124,650,694
		3	50,365,532	2	1	2	39,718,084	90,083,616
	GH - Other	1	1,306,140	4	3	32	2,432,435	16,209,112
		2	2,968,500	4	4	10	6,959,830	19,702,735
		3	6,371,700	3	1	4	4,272,780	20,526,040
		4	10,495,875	3	1	3	10,096,900	27,583,495
Commercial & Multifamily	All	1	1,056,060	4	6	38	1,526,737	14,507,222
		2	2,270,460	4	3	11	3,704,066	17,701,646
		3	4,378,080	3	2	6	7,662,660	20,190,230
		4	6,587,300	3	2	4	11,495,620	23,024,844
		5	17,805,840	4	4	4	44,804,400	44,804,400
Industrial	HVAC	1	1,690,780	4	4	47	1,813,735	27,772,020
		2	4,857,600	3	3	12	11,403,160	36,248,020
		3	13,416,920	3	3	4	29,215,720	39,567,560
		4	28,254,375	5	4	5	91,048,390	110,001,810
	Other	1	4,826,360	3	4	10	8,402,198	19,943,600
		2	7,476,560	3	2	3	12,555,740	17,417,140
		3	54,888,000	4	3	4	105,387,600	115,319,580
	Steam or Hot Water System	1	1,914,100	3	3	33	1,702,540	21,561,339
		2	3,480,260	3	4	12	8,996,722	29,706,752
		3	6,236,420	3	3	6	15,719,360	30,224,700
		4	7,848,980	2	3	4	21,373,620	29,222,600
		5	61,000,360	5	4	5	81,174,965	142,175,325
Grand Total					87	358	799,832,852	1,447,321,574

Union Large Volume: Summary of participant data collected

Table 6-8 summarizes the FR data collection efforts for the Union 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[20]

The data collected in Table 6-8 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 6-9.

The evaluation collected FR data for 87% of savings in the program with a customer response rate of 84%. Both values are higher than the other two programs in this study, in part because DNV GL attempted to collect data with a census of participants.

Table 6-8. Summary of FR data collection for Union Large Volume

Data Collection Category	Targeted	Completed		
	# Measures	# Customers	# Measures	Ex Ante CCM
Completed In-Depth Interview	24	16	23	558,933,115
Attempted Contact, Not Completed		3	17	84,791,276
Total		19	40	643,724,391

Table 6-9. FR Sample Achievement for Union Large Volume

Segment	Measure Group	Stratum	Max CCM	Target	Completed Measures	Frame Measures	Completed CCM	Total CCM
Large Volume	All	1	4,656,400	3	5	15	8,571,024	27,052,253
		2	5,851,320	3	4	6	21,441,531	31,609,984
		3	10,275,066	3	2	4	20,416,986	35,762,910
		4	12,064,530	3	2	3	23,469,828	35,534,358
		5	16,396,719	2	1	2	16,396,719	28,647,859
		6	18,504,312	2	1	2	18,504,312	34,984,312
		7	193,073,300	8	8	8	450,132,715	450,132,715
Grand Total					23	40	558,933,115	643,724,391

[20] 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 D 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 I) for details on how FR based attribution was scored.

Enbridge Custom C&I Programs

Table 6-10. Timing Verbatim Responses for Enbridge Custom C&I programs

Timing	Dat1a_O. Why do you say that?
No	'Enbridge had no effect
No	(not sure) that was the need
No	- Because we conducted the audits at that particular time and during the audits, everything runs at 100% capacity so we would have repaired or replaced anything which was not working well during the audits
No	- It was the need of the hour and the owners needed to have better performance of their organization - Their budget worked out at that particular time, the project was in the pipeline but got delayed as it turned out to be expensive earlier
No	A lot easier to do the installation at the phase of construction we were at - it was a good opportunity to install the <measure> then.
No	Because it need replacing.
No	Because of the long term savings in terms of Operation & Maintenance
No	Because our financial position was such that we could afford this work at this time
No	Because the <other source of> funding was already awarded and Enbridge didn't offer as much as the <other source of funding> did.
No	Because ultimately the goal is to save steam loss and to save energy and based on our audits at that time It was the need to go ahead with the steam trap replacements
No	Boilers need to be installed before winter! Needed to do the project then with or without Enbridge.
No	Building requirements. Project would have been installed regardless of the incentive.
No	Enbridge did not really influence the timing; they were not involved in the project. <Vendor> told us how much the incentive would be and we used that in the business case to calculate ROI. But we wanted to proceed with the project and would have done so even without the incentive; that just made it a little easier to justify the project.
No	Enbridge had no impact on anything. It was a business decision based on taking on a new tenant and the timing of that. The incentive was just a bonus.

Timing	Dat1a_O. Why do you say that?
No	End of their useful life
No	Energy Efficiency was primary motivator.
No	Equipment was at the end of the useful life
No	Failing steam traps needed to be replaced immediately regardless of incentives. Incentives were a good bonus for the company.
No	Good payback period, didn't rely on the incentive
No	Had to replace the <measure> anyway. And the incentive was only about ***% of project budget, so it did not really influence the decision one way or another.
No	In addition to Enbridge incentives, there was a large grant that was providing most of the funding for the equipment replacement; that grant had sunset provisions.
No	Initially we decided we were going to buy the unit instead of renting. We decided and put the plan proposal in unit owner meeting. Took up collection from unit owners. Then we start going to install. Takes about 1 year to do that. Once we decided in October 2017, then did the PO. None of this timing was affected by Enbridge.
No	Installing it at all # sites.
No	Installing it at all <#> sites. Save on consumption
No	It apart of our sustainability approach - we need to have these <measures> for our operational approach.
No	It had to be replaced and we began moving forward even before we knew about incentives
No	It needed to be done as soon as possible. Incentive was just a bonus.
No	It was a part of a greater project and there was a pretty strict timeline to be done by.
No	It was time to replace the boiler; it was old, and it was inefficient.
No	It would have been the same time because we had $<#> million from provincial cap and trade program which dwarfed the Enbridge incentives
No	Needed to present to management before heating season.
No	Needed to resolve the problem with the boiler before winter.
No	Save on consumption.
No	The <measures> would have been replaced anyway and we needed to do so before the heating season began.
No	The boilers in this apartment building were old, prone to failure, expensive to keep repairing. The boiler replacement had to happen before the heating season began.
No	The boilers needed to be replaced anyways, since they were very old, and they were replaced as soon as the budget was allocated.
No	The bulk of our funding came from <another source of funding> and so the Enbridge incentives were much smaller and not the driver of the timing
No	The decision was already made to replace the boilers. Enbridge's incentive was an added benefit.
No	The equipment needed to be replaced regardless of the incentives, the incentives were not enough and there was too much paperwork to make it useful
No	The heating system had to be replaced before winter and we did not want to spend another season with temporary, makeshift replacements.
No	The incentive provided by Enbridge was an added benefit. We would have installed the new boiler systems anyway, because the boilers were very old.
No	The incentive was only an added benefit. The project would have been installed regardless of the incentive, since the boilers might fail.
No	The old boiler needed to be replaced.
No	The project had already been proposed and approved internally, the incentive had no influence on timing.
No	The project should have even been done earlier, but it was not. When we decided to get a new boiler in Feb 2019 we needed to move quickly to get everything approved and ready for the 19/20 winter
No	The project would have been installed regardless of the incentive.
No	The timing of the <measure> was the same as the boiler replacements, which was driven by **********
No	This project needed to happen, it was funded for 2018 so it had to happen in 2018.
No	This project was part of a much larger whole-building renovation, and we had a lot of problems with leaking. It happened when it had to happen.
No	This was apart of the whole project, part of the renovation.
No	Timing of installation was important; it had to be done when it was done. It was part of a larger project to rehab the <building> and included lighting upgrades as well.
No	Unit past end of life and needed replacement. Replaced <#> of the <#> <measures>. These <#> were the originals from when the building was built.
No	Wanted to save gas <While waiting for feedback from head office, we learned about incentive.>

Timing	Dat1a_O. Why do you say that?
No	We already planned and approved the project. We saw savings from the <similar measures> and were going ahead with the work with or without Enbridge.
No	We had to replace the boiler when we did.
No	We had to sign off on this before the end of July because tariffs were going up and rebates were going to be taken away.
No	We started the installation at the end of the heating season last year (spring of 2018) so we could have it done by the beginning of that heating season. (Boilers provide DHW and space heating.) Going another winter with only <#> boilers and no safety reserve <was not> an option; we had to have the new boilers and could not wait.
No	We wanted the new equipment being installed at the building to be integrated with the <measure> sooner rather than later.
No	We wanted to go earlier as we saw the need but did not pursue it earlier as we did not have the time to do it.
No	We were already on this path.
No	We would have gone with the routine plan
No	We would have installed the <measures> at the same time. We installed when we did because we were already doing work in the apartment units. We would have installed then rather than waiting to take advantage of savings sooner rather than later.
No	When the building's boiler failed suddenly, we had no choice but to install the replacement right away.
No	When we do projects, <the projects> will go forward with or without funding.
No	While waiting for feedback from head office, we learned about incentive. <similar on other measure> same
No	With **********, we had to act right away (we were using space heaters to keep buildings warm in interim).
No	because incentives were applied after the project was already complete
No	because the install had to be done with winter approaching, if not for incentive maybe we would have fixed the part
No	boiler was coming close to needing replacement
No	decision was not revolving around whether Enbridge is there or not.
No	equipment needed to be upgraded soon anyways
No	needed to be done anyways
No	part of lease agreement/negotiations, had to be completed
No	project would have been done anyways, role Enbridge played was too minor
No	scheduling needed to be done anyways
No	that was the need of the hour, it definitely needed the replacement
No	the upgrades were going to happen anyways regardless of Enbridge
Yes	- was researching to find better alternatives for the existing setup - spend 6-8 months to review all designs - prepared proposals to present situation based revenue
Yes	- would have proposed it based on personal thought process
Yes	Because of the incentive opportunities. The guarantee that we will be getting it. It pads payback calculation.
Yes	Because of the rebates, it pays for 50% of the project
Yes	Because steam traps are not a higher priority
Yes	Because the prioritization of things here - it's a tight cash environment. The incentives helped put the project at a palatable ratio. The assistance was the icing on the cake.
Yes	Because the project came without budget; the incentives were the only thing that made it possible.
Yes	Cost, the incentive helped to pursue this project at that particular time
Yes	Didn't affect timing, would have waited without the financial incentive.
Yes	Enbridge had no effect on the decision making but their incentive decreased the payback period by 50%. Ultimately the decision would have been up to the executive leadership.
Yes	Enbridge originally brought the idea to <us>, project might never <have been done> otherwise
Yes	Financial requirements of the greenhouse would have been too large at that time.
Yes	Gas consumption was high so would have looked for savings solutions
Yes	Hard to say. I need to look at the numbers and depends on the numbers of the job.
Yes	If we could not have proven there were significant energy savings, we would have done it later.
Yes	Incentives and help from Enbridge speeds up processing and company decision making.
Yes	It was something that we have to do as there was a need to do the changes to address the needs and also improve their facility
Yes	It would have taken longer because we would have needed to fund our own studies and approval for the project may have taken longer due to longer payback.

Timing	Dat1a_O. Why do you say that?
Yes	Later to never, added on after 2 other projects (5-10 yrs later)
Yes	Maybe could have pushed them 5 more years if the payback wasn't there while making other building improvements.
Yes	Might very well have waited until the carbon surcharge in Canada, but it had to be done by then. The incentive let them do it when we did.
Yes	Money, so that we can get a proper budget in place
Yes	Need to check documentation
Yes	Same reasoning as before, there were other competing projects that had better ratios so the incentives helped.
Yes	Sooner or later. But eventually would, the site would not have considered high efficiency equipment. but would have installed a minimum bid code compliant equipment because we had to replace the failing equipment after a year or two.
Yes	Still thought of installing it but need 2 seasons (2 yrs) for proof of concept
Yes	That fit into the schedule that we were looking at, but Enbridge did accelerate the [internal] approval of the project based on higher returns.
Yes	That wasn't part of the plan. It was only after talking to Enbridge that we decided to install the <measure>. The incentive played a major role.
Yes	The <measures> could have run the same way for 20 years. There was no need to install them.
Yes	The energy savings along with the payback period for the project was the decision making criteria for this project
Yes	The financial benefit received from Enbridge was the main driving factor of installation. They may not have installed at all without the incentive.
Yes	The heating system had to be replaced before winter but their tech assistance and financial assistance definitely aided in making a timely decision. Their contact at Enbridge was good at ushering them to the correct engineering firm, helping them navigate the process, etc. He also facilitated the process very well.
Yes	The incentive and the payback period associated was the key driver as far as installing the project is concerned. If the incentive was not available and if the payback period was not attractive, then the project wouldn't have been installed.
Yes	The incentive helped justify the upgrade w/ immediate increase in gas savings and quicker payback on the project.
Yes	The incentive is important to our planning process, especially to making decisions on timing. The incentive lets us replace equipment on our own schedule rather than responding to an equipment burn-out.
Yes	The incentive provided by Enbridge was the trigger for installing the project immediately. Without the incentive, the project would have been installed anyway, but not in the short term, and the site would have waited for a couple of years before installing it.
Yes	The incentives and the consolation / analysis from Enbridge helped speed up the process of expansion and <installing the measure>. We would have moved forward with the <measure> anyway but we would have taken up to 2 years longer to do things themselves and fund it.
Yes	The incentives increased the ROI enough to justify doing the project in 2018.
Yes	The program had to be done before a certain time - there were time constraints when the program was available. That helped me convince other people to do the project when we did.
Yes	The project would have been installed anyway, but could have possibly been delayed by about a year owing to cost.
Yes	The replacement would have been done in phases owing to budget constraints and not all at once if there was no incentive.
Yes	The reserve fund would have provided us with enough money only to keep the old boilers running. I have to convince the board of directors that the return on investment is there. The incentive is huge for that.
Yes	The site contact that we would have never installed the <measure> without the incentive if it was 2 years ago. But now, after realizing the importance of energy <the measure>, we would install it with or without the utility's incentive.
Yes	The system was running fine, and there was no need to replace it. It was done only because there was an incentive.
Yes	The unknown on the ROI, so probably later. <Name> took care of all of this.
Yes	There are motivating people at Enbridge - you have to complete your project to get the incentive so there's motivation to get it done. Financially motivated.
Yes	There were financial motivations to do it earlier.
Yes	Things had been done to understand what was needed, and the process was moving for some of the boilers in need of repair. Enbridge offered to triple incentive if we made decision within 30 days, and we

Timing	Dat1a_O. Why do you say that?
	chose to speed up process
Yes	Things might not have gone too quickly, but there was concern incentives might have gone away. Wanted to make sure to grab Enbridge incentives especially.
Yes	Try to get everything we can to get out of the traps
Yes	We had the idea in mind to install new boilers, but the project did not seem to be of any urgency and we could have waited.
Yes	We pushed to get this done because the incentives were being discontinued. Gas savings <are> not a lot of money, and not good for creating a business case for buying this equipment.
Yes	We would have used the previous boiler until it failed.
Yes	We would like to extend the life of the older equipment. Ultimately the decision for the time of installation would have been based on temperature condition, condition of the existing equipment, building envelope or any other need of the hour
Yes	We would not necessarily do a steam trap project every year without the incentives.
Yes	When machines were at the end of their useful life
Yes	When the machines were at the end of their useful life.
Yes	Without the Enbridge's incentive, the management would not have approved installing the new expensive <measure>
Yes	Would have needed to test it which would have taken at least 2 production seasons (years)
Yes	Would have waited for <measure> to fail
Yes	because rebates help pay for contractor to assess the traps
Yes	may have been delayed due to cost
Yes	project would only have been done if there had been a total equipment failure
Yes	rebate sped the process up somewhat
Yes	the Enbridge incentives did help move the budgeting process along

Table 6-11. Efficiency Verbatim Responses for Enbridge Custom C&I programs

Efficiency	Dat2a_O. Why do you say that?
Yes	A lower-efficiency unit was the original plan; the incentive paid for the efficient upgrade.
Yes	Big price difference between 85% and 95% boilers, and we probably would've gotten the 85% because it would have worked for this specific building. The incentive helped we get up to the 95% and we are definitely seeing it in the lower gas bills.
Yes	Depends on the ROI of each project
Yes	Don't know
Yes	Enbridge made us aware of technologies that we weren't aware of.
Yes	Higher efficiency of boiler allowed same amount of heat to be delivered with fewer input BTUs
Yes	Incentive allowed for high quality and <implementing more of the measure>
Yes	Incentive helped.
Yes	It is easier to replace in kind, and financially it is cheaper.
Yes	It would've been status quo - we wouldn't have change anything.
Yes	Might have gone with lower efficiency; the incentive had an impact on that.
Yes	Not aware of being able to do <an alternative method>.
Yes	Since we are <business type> and do not have budget to install high-end systems
Yes	The <measure> were the ones proposed by the contractor.
Yes	The <measure> would not have been done
Yes	The financial incentive made for an attractive return on investment.
Yes	The incentive helped cover the incremental cost of the <measures>.
Yes	Wanted to get a larger boiler, but were told we did not need it. Then the incentive really helped them get a more efficient boiler because it allowed them to install the best recommendation.
Yes	We would not have installed at all.
Yes	We would not have made any changes so we would not have saved any natural gas.
Yes	Without Enbridge, would not have thought because it's a small part of cost. Biggest cost is <materials>.
Yes	Would have looked for an alternative **********.
Yes	came up with the idea in the brainstorming session with Enbridge rep.
Yes	project may not have been done without contractor/Enbridge
No	'Enbridge had no effect
No	- The need of the hour and would have opted for the best efficient solution
No	- that was the system was setup
No	<An earlier install at another site was high efficiency and cost more. Asked for clarify but stuck to same

Efficiency	Dat2a_O. Why do you say that?
	overall eff>
No	<I> go for the best and efficient alternative which can save money and also improve the overall performance of the production
No	<Our> goal is to be as efficient as possible.
No	<We go> with what fits our need best, and Enbridge's help did not influence the efficiency
No	<We knew what we> wanted and opted for the same equipment
No	<the measure> was going to be done no matter what
No	An earlier install at another site was high efficiency and cost more.
No	Based on the engineer's recommendation.
No	Because regardless of incentives, we have a pretty good long term analysis and through this analysis, we would have gotten to the same decision.
No	Because that's what they had already decided to go with
No	Because this is the typical <measure> for greenhouses. If we went with a <better measure>, we were paying more for the same outcome, and if you go <worse measure>, you are not <implementing the measure> correctly.
No	Because we're constrained by the number***** we have to perform. ********** Our priority is not to save gas but to deliver the proper amount of <thing> to the facility. The energy savings were nice, but getting rid of the ********** to minimize facility problems was the main goal.
No	Building requirements
No	Bulk of the funding came from another source
No	Efficiency was the goal from the start, and we already decided we wanted this plant to be better than the best. We worked in a collaborative effort to find the most efficient <measure> possible.
No	Enbridge didn't have any effect about this.
No	Enbridge had no effect
No	Enbridge had no impact on anything.
No	Enbridge had nothing to do with this.
No	Enbridge was not a factor in the decision making and all our decisions were based on our contractors recommendations
No	Energy conservation is a high priority here so it would have been the same with our without Enbridge.
No	Facility requirements
No	Facility requirements, since most applications are high temperature requirements for which condensing boilers are not suited.
No	Followed recommendations of <name> consultants.
No	Happy with the design choice recommended by <engineering firm>
No	If the new proposed system was not more efficient than the older one then instead of installing a new one, I would have done repairs to the older system and not installed the new system
No	Improve drying process a few every year across all <#> plants
No	Just the same.
No	Like to like, we would have installed the same equipment.
No	Long time to think about question. If there were more incentives, we would have installed something better, but at this level we probably would have installed something at about the same level of efficiency.
No	Needed to provide the proper environment **********, based on input from the manufacturer and local agricultural experts. We installed the <measure size> that was called for and would have done so without help from Enbridge.
No	Not applicable. **********
No	Same boiler at <nearby building>. Less on <measure>. There might have been cheaper option selected. Didn't think about an alternative.
No	Saving money and energy were the reasons we installed the <measure>; Enbridge may have affected the timing of the project but not the scope.
No	Still needed the same efficiency results and needed proper <measure> regardless of incentives.
No	That was what was recommended to the Board by our consultants.
No	The boiler system that we put in was spec'd by the engineering firm.
No	The design was pretty well fixed with what we wanted to do, so Enbridge would not have influenced the overall design.
No	The facility wanted to install a high efficiency boiler anyways.
No	The installed system is a high efficiency system (mostly a condensing boiler)
No	The new <measures> are high efficiency <measures>, and <we> wanted to install them for the energy savings
No	The project was driven by the cap and trade $ not the Enbridge $
No	The project would have been installed anyway, since there was a similar system that was already

Efficiency	Dat2a_O. Why do you say that?
	operational.
No	The site contact was primarily concerned about the potential gas savings and other operational parameters such as reduced maintenance costs. So, we would have installed similar high efficiency equipment with or without the incentive. The time horizon might have differed though.
No	The site knew what they wanted and opted for the required equipment.
No	The size of the system had been specified by the engineer
No	The steam traps used for our applications do not have any lower quality options
No	There is standard practice that the site follows with regard to installing <measure>.
No	They weren't in the calculation there. The savings were the reason we went with an energy-efficient system- hydro and gas are getting more expensive.
No	Those are the ones we preferred - based off our **** needs
No	Wanted to hit the incentive requirements for efficiency but would have installed similar <measure>.
No	We absolutely would have bought the same high-efficiency boiler. Everybody wants to save money and energy. Cost savings and energy efficiency are driving forces.
No	We already knew we wanted something very efficient to help save money in the long run
No	We already planned and approved the project with a design already chosen.
No	We estimate that efficiencies may have improved by the time it would have taken us to get the project approved without incentives.
No	We had already decided to achieve the greatest efficiency possible before we became aware of the incentives.
No	We had consultants on board, and we chose the higher efficiency boilers. It's just the nature of the business, things become more efficient so you upgrade when you're doing these projects.
No	We needed the same efficiency results and needed to properly <implement the measure> without skimping.
No	We recognize the benefit of the package we put in for long-term savings.
No	We used the <measure> recommended by our contractor; Enbridge had no effect on that decision.
No	We wanted to install this anyway - and this size was the right size for our building.
No	We wanted to select a good boiler that was going to last. Want to make sure it can operate for years to come.
No	We will always look for the best option to achieve higher overall performance and it is our ongoing effort to keep on enhancing our system & making the buildings more efficient
No	We would have gone with what was recommended by vendor and Enbridge if it saves gas. Said same but might have meant less.
No	We would have likely come to the same conclusion about what to install but just installed at a later time.
No	We would not have done any less efficient.
No	Went with vendor's recommendation. The <measure> had to be pretty much a drop-in replacement, so Enbridge was not really a factor. We already knew we wanted <the measure>.
No	Without Enbridge, we probably would not have done the project at all.
No	Would have gone with high efficiency because we were supposed to be as efficient as possible.
No	Would have gone with what the engineer recommended regardless of incentive.
No	all three proposed systems had equivalent energy savings, role Enbridge played was too minor
No	because incentives were applied after the project was already complete
No	boiler had to be replaced regardless of incentives
No	boiler needed to be a certain specification no matter what
No	decision was not revolving around whether Enbridge is there or not, we wanted to go for best efficient option that made sense for that particular facility
No	equipment had to operate within given specs so it had to be similar
No	general policy is to achieve energy efficiency
No	part of the lease negotiation
No	save on consumption
No	save on consumption, Improve <a few measures> every year across all *** plants
No	the company has a policy to install high efficiency equipment, so this would have been done anyways
No	the upgrades were going to happen anyways regardless of Enbridge
No	there was no need to replace it.
No	was going to get most efficient install possible regardless of incentives
No	wasn’t considered
No	would have installed higher eff either way because wanted to improve on 30 yr old boiler

Table 6-12. Quantity Verbatim Responses for Enbridge Custom C&I programs

Quantity	Dat3a_O. Why do you say that?
Yes	Because of the lack of financial support
Yes	Couldn't afford it
Yes	Didn't recall *****. HVAC Vendor might know. *********
Yes	Don't know. The incentives were likely necessary to install the <measure> ,but amount of<measure> that were needed to match the number of <related facility feature> units. They would have not needed any more or any less.
Yes	I would try to get the same number of the replaced but would not be able to get the approval for the replacement without the Enbridge's rebates
Yes	It is hard to say, Enbridge gave us the information from the study. Without Enbridge we would not have known it needed to be replaced.
Yes	It would have depended on the cost. If it was over our budget, it would have been delayed or we wouldn't have done as many. But I can't say whether it would have been over our budget because we factored in the Enbridge incentives from the beginning
Yes	The audit funding helped us get the consultation, and ultimately the smallest and most efficient boiler.
Yes	The incentive allowed them to do the entire <##> area, rather than half now and half at some later date. The original capital improvement project specified replacement of half of the existing <measures> in 2018, and the remaining half later.
Yes	The replacement would have been done in phases owing to budget constraints and not all at once if there was no incentive.
Yes	This program allowed us to finish all <measure opportunities>, but we got to pick and choose when to install them based on our budget.
Yes	We will definitely be replacing the traps which have 100% failed but with Enbridge, it will help us to go an extra mile.
Yes	We would have bought a cheaper version.
Yes	We would have used the previous boiler until it stopped working.
Yes	rebates help contractor to assess condition of steam traps
No	**********
No	<I> would have reviewed a number of alternatives to improve our performance and made a proposition to go for the best alternative for our overall organization.
No	<We were> primarily concerned about the potential gas savings and other operational parameters such as reduced maintenance costs. So, we would have installed similar high efficiency equipment with or without the incentive. The time horizon might have differed though.
No	Always replace the same number every year; ******
No	As that capacity was working fine for the building
No	As that was the need for the system and this were the ones which didn't need replacement but for the benefit of **********.
No	As the replaced ones were malfunctioning or at the end of their useful life so we definitely needed replacement for the proper and better performance of the whole system.
No	Because Ultimately the goal is to save steam loss and to save energy and based on our audits at that time It was the need to go ahead with that particular amount of steam traps
No	Because that was our main <part of system> - going to <take care of> all of it, not just a quarter of it.
No	Both <measures> would have still needed to be insulated.
No	Building requirements
No	Consultants made this decision.
No	Depends on the audit, whatever is not working, we will replace
No	Enbridge did not change my decision about capacity.
No	Enbridge had no effect
No	Enbridge had no effect on the decision making surrounding the type or quantity of equipment but our incentive decreased the payback period by ***%. Ultimately the decision would have been up to the executive leadership.
No	Enbridge had no effect on the project.
No	Enbridge had nothing to do with that decision.
No	Enbridge has no effect on capacity.
No	Enbridge was not a factor in the decision making and all our decisions were based on our contractors recommendations
No	End of useful life, We install the capacity that is needed on their buildings
No	Engineer designed the appropriate size and didn't want to go bigger or smaller than their recommendation.
No	Facility requirements, since most applications are high temperature requirements for which high

Quantity	Dat3a_O. Why do you say that?
	efficiency condensing boilers are not suited.
No	I could reduce the capacity a bit because they are high-efficiency. But Enbridge did not affect the decision to install high-efficiency boilers.
No	It was the facility's requirements.
No	It was the size specified by the engineer - we didn't have a choice
No	Just the way the business does things around here.
No	Like I said, we had consultants.
No	My designers chose the capacity. Nothing to do with Enbridge at all.
No	Needed to meet demand of the building
No	Needed to meet sizing requirements, which have not changed.
No	No <additional> equipment were installed. <measure> replaced, and there were no quantity decisions - just replace x <units> with x <units>.
No	Normally the engineering team will decide the capacity of the boiler based on the need & the demand of the building The reason behind going for larger capacity is the reasoning that if the boilers are not high efficiency boilers than we need to have larger capacity to satisfy the load
No	Number of spaces that need <measure> remain the same regardless of Enbridge.
No	Our contractor did load calcs and determined that the existing capacity met the load requirements.
No	Our loads haven't changed, so we chose to go with the same capacity we had before.
No	Recommendation of the engineer, and the building load requirements.
No	Same as efficiency, hit incentive requirements but similar.
No	That particular capacity works for the facility
No	That was the need and the efficient alternative
No	The boiler sizing is the boiler sizing, and would not have been impacted by Enbridge incentives or any discussions I had with them.
No	The old boiler was larger, but from what <respondent> knew from how the project manager and engineers operated they picked the right size, and efficiency was the only difference.
No	The plan was to replace the existing equipment 1:1 with new equipment with the same heating capacities.
No	The rebate was not a factor in my decision. We learned about the rebate after we decided how many to do. If I had known about [the rebates] earlier, I would have done more.
No	They had no effect on the size of the boiler.
No	This capacity was the design capacity. Consultants recalculated BTU requirements as part of the project and determined that a boiler of the same capacity was appropriate.
No	This was what we needed regardless of Enbridge.
No	This would have been up to the design engineer and just the heating load of the building - would've been the same with or without Enbridge.
No	To satisfy the need and to improve the production
No	We could not skimp on <the measure>. It may have taken them longer to , <implement it> but by the end of it, we would have <implemented> all ***** as necessary.
No	We did not want to do half a job just to save money; the entire ***** system needed to be <done>, so that's what we did.
No	We needed to replace the dead boiler.
No	We needed what we needed, and relied on a professional to make the decision for us. Enbridge did help influence quantity of boilers
No	We replaced any number of traps that needed to be replaced.
No	We went with a lower capacity than original boiler. Leaned on *** consultant for engineer recommendation. So we would have gone with the same smaller capacity boiler ie the same capacity.
No	We would choose the most aggressive that we could. I don't see us being in a situation where we could cut the <measure> down to x but not all the way.
No	We would have installed the same boilers with or without Enbridge; we installed the capacity that meets our heating and DHW demand.
No	We would have only installed what we need.
No	Would have changed <#> but would have taken longer. Half of them in 2018 and see if there was more money to replace more later.
No	because incentives were applied after the project was already complete
No	boiler install was fixed, had to be done anyways
No	boiler needed the same capacity no matter what
No	Enbridge had no effect, <measure> replacement was needed
No	just needed the same capacity as before
No	that was the need

Quantity	Dat3a_O. Why do you say that?
No	the boiler needed to be a specific capacity and that was met regardless of Enbridge
No	the company has a policy to install high efficiency equipment and the equipment was a good fit for location
No	unit had to meet the correct specifications given by the engineering department

Table 6-13. Dat4 Verbatim Responses for Enbridge Custom C&I programs

Attribution	Dat4. Summarize the program's effect on the timing, efficiency, and amount that you installed.
Full	- Incentive played a huge role and it spurred the immediateness of going for the project - Helped through the whole process
Full	- It was great, helpful and productive - With the help of Enbridge's financial and non-financial aid, they were able to improve their efficiency and that also contributed in their overall profits - The project would not have been possible without Enbridge
Full	- The incentive was really helpful as it lead them to pursue the project at that particular time
Full	- Their incentive played a role in defining the timing of the project - The process of the incentive application was smooth and easy, Enbridge's rep guided them along the way - They would want to have the best efficient system but the incentive in the picture made their decision making process easier in terms of going with the high efficiency boiler
Full	<Vendor> recommended the new <measure> and we went with their recommendation.
Full	Accelerated it because it made the payback better to get it sooner. Didn't want to wait for incentive to not be there. Additional incentive was not larger enough to go with higher efficiency.
Full	Enbridge makes it really easy to do these projects. Enbridge can confirm our organizations numbers - estimated savings, they are a third party confirmation that can say - we will save money in the end. There are monetary considerations too, my job is to have the most energy efficiency as possible, and I can see this through our energy bills. We need to lower these bills. It's easy to raise money to start a new project, but its hard to raise money for ongoing costs, like utility bills. Enbridge helped make a case for installing high efficiency equipment. They also verify that these energy savings are real.
Full	Enbridge played a pivotal role. The incentives and technical help (especially with calculating savings) made it possible to take on this project at all.
Full	Enbridge proposed the project in the first place and account rep was very helpful with the incentive process. There were some issues with communication but overall the project went smoothly.
Full	Enbridge was 100% necessary to enable the project and it was positive at every turn.
Full	Enbridge's incentive along with the incentive provided by the City of Toronto were very important parameters in terms of setting the ball rolling for installing the project.
Full	Enbridge's involvement let them buy higher efficiency equipment by boosting the ROI; it allowed them to install sooner than they otherwise would have.
Full	Enbridge's main effect was the rebate offering at the time. Without the effect would have installed at a later time at the end of their useful life.
Full	Good company to work with, it took a long time to get checks 6-7 months, too long!! But we got it anyway, and it was good of Enbridge to help people to conserve. He hopes other utilities do the same. Incentives helped get the project going much sooner.
Full	Having the Enbridge incentive improved the business case and allows the company to move forward with projects easier. So it might have pushed the project up from a timing perspective.
Full	Incentives helped them install the boiler. The financial incentives are the number one driver of the project being pursued.
Full	Indicated these two separate projects were referring to same overall process and that these should be taken in tandem. Property management was influenced by Enbridge financial incentives in terms of time and quantity.
Full	Installed 8 new boilers, Enbridge was very professional and their offer to triple the incentives worked to speed things up greatly
Full	Natural Gas isn't a large cost item in the industry. Enbridge had a big effect of what we went to save. Enbridge Consultant wants to save more energy and we worried more about paving and other items day in and day out. If he wasn't there at Feb 2018 meeting, we wouldn't have done it. We would have done something because they're always looking to save cost but not sure what.

Attribution	Dat4. Summarize the program's effect on the timing, efficiency, and amount that you installed.
Full	Overall program, Enbridge and Union help with business planning every year. Bosses ask if Enbridge is involved and what incentives, quarterly workshops are useful as well. Gets the mind thinking of how you reduce your carbon footprint. Union was better but now Enbridge is better. Union was more adaptable before the merge. Rep interactions are helpful.
Full	The incentive provided by Enbridge was very important as it was the main reason for installing the system.
Full	The incentives definitely helped, but no other comment.
Full	The main driving factor for the company is the financial benefit including the incentives that would help justify the upgrades. They would not have installed the <measure> if not for the incentives received.
Full	The major impact was with the timing. The incentives available helped the owner pull ahead the capital related to what was originally planned. And the other two components, Enbridge had no effect.
Full	They realized they were wasting gas with one building when Enbridge did a site visit and started to consider ways to improve. Gas isn't high on the cost savings list but Enbridge ESC helped them think about solution. The financial incentives made it viable and are now looking at economizers to further improve their efficiency because of Enbridge.
Full	We involve Enbridge at the beginning of every gas project. They provide all kinds of assistance including savings analysis, incentive calculations, and technical consulting. Without Enbridge we might have had to wait for the next annual cycle to replace this equipment, and we would certainly have gone with lower-efficiency equipment and stuck with <baseline measure>.
Full	We would have installed the boilers at least 3 years later if not for the incentives.
Full	Without Enbridge, we probably wouldn't have gone with a higher-efficiency upgrade, nor would we have installed it as fast. For us to get from project inception through execution in 3 years is remarkable.
Full	Without the incentive, we would not have completed the project for several years.
Full	Without the study that Enbridge helped us with, we wouldn't have known about this system. And without the incentive, this project would <have> never have gotten off the ground.
None	- Enbridge's rep's talk in a seminar led them to know more about the different incentives and to work closely with them - Their advice and feedback was helpful throughout the process - But ultimately the installment decision relied on the need of the hour
None	- For this particular project, Enbridge's incentive was an add-on - They had conversations with the Enbridge's Rep regarding their no. of projects to understand how the incentives be applicable for their different projects
None	- Overall the decision regarding the timing, efficiency and the amount of the steam trap replacements that were installed was based on the personal initiatives that were taken and the audit - Enbridge's incentive were helpful and they deeply appreciated the program
None	<Vendor> had more of an influence on this project, Enbridge incentives were a bonus.
None	As a collective, Enbridge has been very effective timewise with vendors and suppliers. And I have been working with Enbridge for 30+ years. They're great. But for this project, they incentives may have helped, but we needed to do this project anyway.
None	As mentioned in discussion of the boiler measures, the incentives had no influence on the project since the timing was mandatory and the system had already been specified before we became aware of the incentives
None	Enbridge Incentives didn't factor in, the Board wanted to lower energy savings and reduce O&M over the long term and went with what the engineer recommended.
None	Enbridge did not have much affect on our decision to replace the <measures>. We were planning to replace the <measures> anyway regardless of incentive and the incentive was a bonus.
None	Enbridge didn't have any effect at all; as far as I know, they weren't involved in the planning, and the incentive wasn't a deciding factor either. We did this project because we had to do it. The project cost $*****and the incentive was $*****. It was useful but not a deciding factor.
None	Enbridge didn't have any effect on when or what we installed, but I'd like to say they were fantastic, extremely efficient and helpful. Enbridge saw the incentive payment as a priority for us, and they were quite helpful throughout the entire process.
None	Enbridge had little to no effect on the decision. Rebate incentives that were available were soon being lost, influenced us to install in July, but I don't think Enbridge had a decision on giving out rebates. I think only the government has control over that.
None	Enbridge had minimal effect on the installation, the project would likely have been done anyways

Attribution	Dat4. Summarize the program's effect on the timing, efficiency, and amount that you installed.
	since the old equipment was at the end of its life and the decision was primarily based on the vendor and their products
None	Enbridge had no bearing on the project at all
None	Enbridge had no effect on the timing, efficiency, or size of boiler that they installed.
None	Enbridge had no impact at all on these projects
None	Enbridge had no impact on anything.
None	Enbridge had no real effect on the outcome of the project, but the incentives helped justify the installation to the board of directors
None	Enbridge had not bearing on the project at all
None	Enbridge helped us to refined their decision and Enbridge backed our decisions
None	Enbridge influenced us financially. This helped us save money and move the project along. We were going to do this anyways, but Enbridge helped.
None	Enbridge is responsive and helpful. But overall, we would have gotten to the same decisions with or without Enbridge's input. The incentives help; the incentives aren't big enough to make a huge financial impact. But the incentives look good to the public. When you're using government money, it's good for people to see you're taking advantage of these types of programs.
None	Enbridge made the paperwork and project documentation aspects easier but overall did not effect the outcome of the project
None	Enbridge only got involved after the installation. Consultant reached out to Enridge after installation because the pressure on the new boiler wasn't high enough, so Enbridge was involved to correct this.
None	Enbridge really didn't have an effect on the timing or efficiency. We have a corporate policy of treating our birds as humanely as possible; this entire project was designed to maximize their comfort and minimize our operating costs.
None	Enbridge really had no impact on the timing or the equipment. The incentive and the energy savings are good, but we had to do this ***** upgrade.
None	Enbridge reps helped make things move along smoothly. We offered good information and were helpful in seeing the project through. However, we would have installed the <measure> with or without Enbridge because the payback was expected to be good regardless.
None	Enbridge was helpful in notifying them about the rebate (except they only knew about it after the project was complete)
None	Enbridge's incentive assisted with business case but did not make decision. Didn't change the timing other than making sure application was in before we started. We would have installed high efficiency and the capacity that was needed for the building without incentive.
None	Enbridge's incentives were used to fund other projects <at location>l. The <measures> were "low hanging fruit" and would have been done anyways regardless of rebates.
None	Enbridge's rebate program was helpful and did assist the project moving forward, however it did not really impact the design decisions
None	Enbridge's rebates certainly helped but did not really influence the course of the project.
None	Enbridge's support did help us, but I think the scope of the project would've been the same with or without the funding.
None	Enbridge is helpful but we approached them after learning about the technology and would have installed it either way
None	Final payments are still waiting to be paid out. There are issues with the *** system concerning <feature> that the vendor *** is still trying to resolve. We have not received help from Enbridge regarding this because it is a technical issue that we are having <contractor> resolve.
None	For this specific project the incentives didn't play a factor in any of our decision making due to the catastrophic failure of the boiler which made the timing mandatory and their decision to go with most efficient option (condensing boilers) before we were even aware of the incentives.
None	In this case, Enbridge had a fairly mild effect, from the money point of view. From the perception point of view, Enbridge was really influential. Enbridge sent us a notification that said <#> trees were saved by installing these new boilers. We posted this fact on a flyer, and people were really happy about saving trees! They didn't understand/care about emissions or consuming less energy, but people were excited about saving trees. Now people are waiting for us to make more improvements. Enbridge gave us feedback in a more understandable way and this was helpful.
None	Incentive amount was not an influence (large capital project with small incentive proportionally, **********. Engineer from Enbridge did not have knowledge of this very custom furnace or niche industry, so it was a learning experience for him as well. <Enbridge ESC> was very helpful with paperwork and getting rebates though.
None	It would be no effect.

Attribution	Dat4. Summarize the program's effect on the timing, efficiency, and amount that you installed.
None	On the <measure>, Enbridge didn't really do much. The incentive was minor. We'd have gone ahead as we did even without any help from Enbridge.
None	Overall Enbridge was really helpful
None	Same as above. The incentive was helpful but not required.
None	She said that the Enbridge incentives was not the driver for this project but the benefits were that the Enbridge $ were useful for funding subsequent EE projects in other buildings since the capital budget for EE projects is limited
None	She said that the Enbridge incentives were not a driver of this particular project but was useful for subsequent projects in other buildings since their capital budget for EE projects is limited
None	The Enbridge contributions (both financial and non-financial) were helpful, but the main funding was from a grant that was about to expire. So the work needed to be completed before that happened.
None	The boilers were at the end of their useful life and Enbridge was not involved. Would have installed the same efficiency and capacity regardless but wanted to hit incentive requirements.
None	The savings were a bonus, we would have done exactly what we did without Enbridge.
None	The upgrades were going to be done anyways for financial/energy savings reasons. The incentive offered by Enbridge barely covered the consultant's fees to apply for the rebates. All 3 proposed systems had the same savings and costed about the same, just had different features so the decision ultimately came down to user preference.
None	There were health and safety concerns about having HVAC equipment running even when the facilities are unoccupied. There was also a concern about gas usage and effect on the environment. The site contact had been thinking about the <measures> for a while and needed to bring up to management before the heating season started. The cost savings and incentives helped sell it to management to go through with the project. They likely would have installed <the measures> anyway but the incentives made it an easy sell.
None	Timing, efficiency, rebates - they were willing to provide rebates for our project. Timing: preapproval process, had to wait for Enbridge to approve us before continuing our project. Efficiency- the higher the efficiency, the higher the rebate offered. But we would've bought the boiler we did without the rebates
None	We didn't have much contact with Enbridge, we just used them for the incentive. They reviewed our system so we could get the incentive right at the end I think.
None	We would have replaced the steam traps regardless of whether or not there were incentives. However, the incentives were a nice bonus to the company which covered 50% of the cost.
None	We've been looking for ways to improve our drying process in all 35 plants. Plant production manager (Interviewee) designs the process in house, reviews during winter, and looks to implement it in spring across all sites.
None	Working with Enbridge went smoothly and their involvement didn't hinder anything.
None	incentives not enough to matter, not a huge part of the project, goes for the incentives after the project is finished
None	install would have been done anyways, incentives are more trouble than they're worth, too much paperwork
Partial	- He admired and loved the program, work, guidance and people from the Enbridge's initiative - The knowledge base of the representatives was really helpful during their whole project lifecycle - They were able to process high volume of product due to the installed measures - They were encouraged to feel responsible for a high level environmental stewardship
Partial	- The incentive fast tracked the project otherwise they would have delayed the project for the next year to get it on a proper budget - It was a great financial help for the project
Partial	Didn't affect the timing of the boiler replacement, but it allowed them to upgrade to an HE condensing boiler.
Partial	Enbridge assisted in getting the project in and running. Helped also with projects located at <similar projects>. Contributed to installing high efficiency to sell less gas. We appreciate Enbridge's financial incentive. It shortened the payback period by 6 months.
Partial	Enbridge definitely played a role
Partial	Enbridge definitely played a role.
Partial	Enbridge did accelerate the [internal] approval of the project based on higher returns.
Partial	Enbridge did not effect the timing, efficiency, or amount installed.

Attribution	Dat4. Summarize the program's effect on the timing, efficiency, and amount that you installed.
Partial	Enbridge didn't have anything to do with it, company was just replacing seals.
Partial	Enbridge had no effect on the decision making surrounding the type or quantity of equipment but their incentive decreased the payback period by 50%. Ultimately the decision would have been up to the executive leadership.
Partial	Enbridge had some influence - this project was going to happen with or without them. They had some input, and they assisted with the review.
Partial	Enbridge incentives helped prioritize the project to management, Enbridge also assisted in the application process which was helpful
Partial	Enbridge made it possible to install a smaller and more efficient boiler than the alternatives considered with just the internal <extrenal> consulting. <Consultant> and Enbridge showed them about the incentives and potential units. Interviewee was happily surprised Enbridge wanted to help them install something that would use less gas.
Partial	Enbridge's assistance calculating the energy savings was particularly helpful. Also knowing what the rebate was ahead of time helped in the planning process.
Partial	Enbridge's incentives programs helped speed up the installation and expansion of the <facilities>. The time frame was made shorter instead of having to take longer without the financial help. Enbridge made the process very easy and convenient, making the amount of work required on their end much less.
Partial	Enbridge's rebate allows the company to hire a contractor who assesses the quality of the steam traps on a yearly basis, this would probably be done less frequently without the rebates.
Partial	Generally, Enbridge works closely with <respondent> throughout any energy project. At a minimum, Enbridge helps them figure out what incentives might be available. Then they work with their contractor and Enbridge to make sure the project qualifies. On larger projects Enbridge will offer submetering and other project assistance. They're usually part of the project from beginning to end. *********
Partial	Good apartment owners are always looking to invest in the asset and keep the equipment current to minimize maintenance and operating costs. It's important to have an incentive program that helps with the capital outlays, meeting carbon footprint requirements, etc. Enbridge's incentive adds into the overall calculation of return on investment and lifecycle of equipment, allowing us to meet other goals ("greater good", in this context meaning environmental impacts) than just operating the building.
Partial	Incentives were very important. The savings certification from Enbridge via the contractor also helped justify the expense.
Partial	Not sure Enbridge influenced us at all unless they influenced the HVAC company.
Partial	Once they saw there was an incentive, there was no hesitation to proceed; it may even have accelerated the decision to implement the project. Enbridge had no effect on the "efficiency or amount" (project scope)
Partial	Overall Enbridge was really helpful, and they were really accessible with information. <Happy that> they were able to get more efficient boilers and says it has noticeably lowered gas bills.
Partial	Overall program, Enbridge and Union help with business planning every year. Bosses ask if Enbridge is involved and what incentives, quarterly workshops are useful as well. Gets the mind thinking of how you reduce your carbon footprint. Union was better but now Enbridge is better. Union was more adaptable before the merge. Rep interactions are helpful.
Partial	The end of the day, I don't think they had much of an effect on the specific system. They had an effect on the project itself in that if the incentive dollars weren't there it may have been postponed. I just sent my Enbridge rep the estimate, he sent me back what the incentive dollars would be and then I sent him the final bill when we were done.
Partial	The incentives were beneficial. But the project would have been done anyways.
Partial	The incentives were likely necessary to install the <measure>. Installed because of prior incentives received for the <measure> for other properties. The incentives Enbridge offers are especially helpful for larger projects such as boiler replacements.
Partial	The technical and financial assistance provided by Enbridge was critical in the installation of the project. Although the equipment would have to be replaced anyway since it was at the end of its useful life, the incentive provided by Enbridge and the assistance the site had with respect to the audit ********** and calculating savings helped to speed up the process and ensured that the project was installed at the earliest and that the installation proceeded smoothly.
Partial	Their tech assistance and financial assistance definitely aided in making a timely decision. Our contact at Enbridge was good at ushering us to the correct engineering firm, helping us navigate the process, etc. He also facilitated the process very well.
Partial	There was a little delay in the process with Enbridge as their assigned Enbridge contact person got replaced during the process.

Attribution	Dat4. Summarize the program's effect on the timing, efficiency, and amount that you installed.
Partial	They are well connected, they can give examples like other industries do, they validate your assumptions (energy efficiency and cost).
Partial	They gave us guidance on available technologies, validation on cost savings and energy efficiency. Motivation on moving faster to get it installed based on financial incentives.
Partial	We heard Enbridge had a program, we heard we could get 60%-70% money back if we installed. So we went forward with <measure> .
Partial	We put all the decisions is the hands of <vendor>. We trusted the <vendor> to work with Enbridge to get the cost savings that <vendor> promised us.
Partial	We thank Enbridge a lot, they provide incentives for the financial aspects and technical expertise for other areas. Thank you!
Partial	We would have taken longer to get through the process without Enbridge. The consultation and incentives helped speed up the process which may have taken up to 2 years longer if we did things on our own.
Partial	With the incentive, they were able to do it a couple of years sooner, allowing energy savings in shorter term rather than longer term.
Partial	Without Enbridge, respondent would be doing the survey, paying half of it is nice but the results are where it counts. Without Enbridge, respondent would try to replace the same number but it would take longer.
Partial	the project would have happened either way but Enbridge helped guide the process and speed up the completion timeline

Union Custom C&I Programs

Table 6-14. Timing Verbatim Responses Union Custom C&I programs

Timing	Why do you say that?
Yes	Again, the advice and the incentive from Union take a lot of the risk out.
Yes	Because it takes time for developing the design and biding process
Yes	Because working with Utility Rep helps them calculate business case and get incentives so projects can be moved up since they are cheaper.
Yes	Budgets concerns and incentive helped
Yes	Business case was around saving money and needed 2 yrs payback, without incentive it was 5 yrs. Incentive produced a 2 yr payback period. No age to report.
Yes	Cost
Yes	Equipment was approaching end of useful life and needed to upgrade but could have put off for 4-5 years
Yes	Financial help let us get there sooner.
Yes	Financial. The incentive helped us decide to go ahead with it, and to go ahead with it when we did.
Yes	Funding goals would not have been met.
Yes	Helped with payback
Yes	I don't recall just how important Union Gas was in the timing decision.
Yes	I would have let another winter go by because of the costs. I didn't know what the value was of this project - it was my first year there.
Yes	Incentive shortened payback period. would have done later based on market forces.
Yes	Incentives help push projects to higher priority.
Yes	Incentives help us with the capital costs with these projects.
Yes	It was expensive, and I don't know that I would have built it without all the incentives.
Yes	It would have required a commitment from management; I am not sure if we would have gotten that commitment.
Yes	Just because of the opportunity with the incentive; it was available, and it made this <measure> more affordable.
Yes	Lack of financial support will generate a delay in the whole decision making process
Yes	Money helped accelerate when it was done but would have done it.
Yes	Need to do it to operate but would have had to base it more on what the market could return in capital
Yes	No plan of installing the system if not for Union's incentive.
Yes	Possible still gone ahead. Maybe would have invested in something else.
Yes	Somewhere between later and never

Yes	The incentive played a big role in getting the project moving, if not the decision would have had to wait at least another couple of years.
Yes	The incentive was a key driver in the decision making process
Yes	The incentive. When you know it's there, that's a good reason to move forward.
Yes	The project would not have been installed if not for the incentive from Union.
Yes	Timing-wise, having the electricians available. If it's one item on to-do list as opposed to something we prioritized (because of the incentive)
Yes	We might have revisited this project to save energy
Yes	We needed to make sure in the early stages that this project was viable. We worked with Union from the beginning to make sure the <measure> would meet our needs. Without Union's help, this whole project would have taken longer.
Yes	We would have had to wait for operating costs to pay for it.
Yes	We would need more time to work around the financial aspect of the project to pursue it
Yes	Without the prior good experience, this was a non-starter.
Yes	Working with Union for other projects and learning about the incentives from the Utility rep ****** helped them see how we could save money by undertaking energy efficiency projects like this one. As for incentives, some had a bonus if you did it in a certain time. So there was a rush to get it done quickly and push things through after the projects were identified.
Yes	Would have waited or not installed anything at all
Yes	cost, most of our decision revolves around the financial aspect of the project
Yes	incentives help justify the payback period, start getting the savings sooner
Yes	later to never, Union helped support case
Yes	the ROI was not there without the incentives
Yes	there were other projects with higher priority and which were more financially feasible than this project
No	"The evolution of what we were doing with this greenhouse (and our company) required it. Ten years ago, nobody had <this measure>. Now it is commonplace. So we had to do what we did, when we did, to provide the most stable growth environment for our crops in order to stay competitive."
No	"We were looking to grow the business, and the timing was good. We wanted to build before prices rose much further."
No	Aside from the incentive, which was nice but not essential, Union had no involvement in the greenhouse construction.
No	At end of life; we needed to replace them, and the incentives made that possible.
No	Because the timing was a business decision unaffected by Union.
No	Because we were going to do it or not do it. We were not going to hold it on the project off because of Union.
No	Facility was expanding and required <measure> regardless
No	Funding was coupled with <an external grant>
No	Generally based on available time, equipment lead times. We plan based on market.
No	I don't think Union Gas had any time constraint on us.
No	I need to be able to maintain a stable growth environment for my crops. I want to make sure heat is used only where it is needed.
No	I needed to address the <issue solved> before it became a problem.
No	I run my business based on what I need and what I have; if Union Gas has a program that I fit into, that is great, but it is not what drives my decisions. We're looking at <small> incentive on a <large> investment.
No	It was a new construction project. If they did not install it at that time, it would have been retrofitted later or might not have been feasible.
No	It's a new construction facility, and the measure would have to be installed at the same time as the rest of the project was getting completed.
No	Management already decided to go through with the project with incentive or not. Incentive was a very small portion of project cost.
No	Needed to complete renovations regardless of incentives
No	New facility was being built regardless
No	Project was bigger than just the incentives
No	Project was bigger than the incentives
No	Project was larger than the incentives offered
No	Same as other project. Production requirements demanded it.
No	The boiler needed to be installed anyway, since it was old
No	The company already identified that we wanted to install <the measures> regardless of incentives.
No	The money was good, but the Union Gas incentives did not influence the timing. The timing was driven by product demand. There had been some delays due to waiting longer than expected for a permit and some delays in construction.

No	The system needed to be installed at the time it was because the building was new construction. It would not have been possible to install at another time otherwise.
No	The timing was right, with the other construction work going on we were a little disrupted anyway.
No	This project was a test case to learn about Union's program processes for future projects.
No	Union gas had zero to do with it. We would have installed it anyway.
No	Union had nothing to do with this project.
No	We had to do this work in 2018 as a result of capital improvements funding cycle.
No	We have been installed <the measures> throughout <buildings> since 2012.
No	We needed a boiler in the new <building>.
No	We needed to install these <measures> for crop survival.
No	We wanted to get this project done while we were doing other upgrades as well. We had to push Union to move faster with everything to get it done when we wanted it.
No	We were already redoing the HVAC in this building, so with that installation taking place and having the contractors come in and do it anyway, it was a perfect opportunity to install a new <measure>.
No	We were building the new <building>; it was the obvious time to install the <measure>.
No	We were constrained by the seasons, availability of contractors, etc. We had to install them when those factors allowed.
No	With all the construction we were doing at the site, the timing was right.
No	With the data that come from having the new equipment at our other locations, we knew that there would be operational savings anyway.
No	Would have installed it either way
No	Yearly budget, we were thinking about it before and the incentive was a nice bonus.
No	project needed to be done no matter what, project was bigger than the incentives
No	saw the need of the system at that particular time
No	upgrades had to be done anyways

Table 6-15. Efficiency Verbatim Responses for Union Custom C&I programs

Efficiency	Why do you say that?
Yes	Cost
Yes	Enabled us to implement it and would not have done something else such as <alternative approach> or **********
Yes	Financial.
Yes	I would have needed Union Gas to tell me what was a more efficient system.
Yes	Incentive was important, but I think there's really only one type of product. You either do it, or you don't do it.
Yes	It is expensive to do this stuff and <utility rep> helps us get the calculations to understand how this will improve our business and also helps us get the incentives
Yes	It was economical to install <the measure>.
Yes	It would have been cheaper; without the incentive, management would likely decide to go with a less expensive option, or stick with the existing boilers until they died.
Yes	It would not have changed anything. The system was designed around our operating requirements.
Yes	Purchase cost. The burner alone can cost over $*****
Yes	The <measure> would not have been installed if not for Union, but the <measure> that have been installed now are top-of -the line and the best.
Yes	The cost. I could not afford the high-efficiency boiler on my own.
Yes	The incentive helped pay for a more efficient system.
Yes	The incentive let us buy <a better measure> for about the same cost to us; it was a no-brainer.
Yes	The incentives allowed us to use better ******* systems, which contribute to efficiency.
Yes	Union helped justify the case
Yes	Union's technical expertise helped select the best <measure 1>. Less advanced for <measure 2>
Yes	When we knew about the incentive, bang t
Yes	Without the incentive we would have installed a less advanced system.
Yes	Without the incentive, we might not have been able to afford the <measure> we put in.
Yes	Would have kept old system running. New system needed to be inline with <company> standard and regulatory compliant.
Yes	incentives help get the best of the best, without the incentives product would have been lesser quality
No	<We know what we> wanted to install. We used an exact same system that we used before.
No	<We> prioritizes projects that can get better ROI and rebates.
No	<measure> is standardized across the site

No	Chose the equipment and efficiency based on status quo among neighbors and contractors advice. We wanted to be sure that the equipment was commonly being used in the area to ensure the equipment would be easily serviceable and there would be spare parts.
No	Design requirements as approved by the engineer
No	Due to the fact that we have ********** experts at that building everyday, we knew exactly what we needed to <implement in> the building.
No	Engineering firm/Vendor advised the change and there was no viable alternative so we would have implemented it nonetheless
No	Equipment was predetermined regardless of incentives.
No	Had similar boilers in other parts of facility. Also selected boilers before learned Union Gas incentives would be available
No	I had to do the entire job to protect my crops.
No	No standard in facility, contractor just matched <size> that was already <there>. I wish we would have had better engineering estimates for this because we probably could have gone <more efficient>.
No	Plant requirements
No	Same because would have installed it regardless.
No	The <measure> is really an all-or-nothing job. There is no point to doing less than the complete area.
No	The equipment was already decided upon regardless of incentive.
No	The incentive came about after the purchase order was made.
No	The vendors designed the system to meet the needs of the building and to be efficient. We would have installed the right equipment regardless of Union
No	There is no alternative to what was installed.
No	Union did not help select equipment.
No	Union didn't have an effect on their decision-making because this project was a test case to learn about Union's program for future projects.
No	Union had no bearing on this decision.
No	Union had no impact on the selection of materials. That was all proposed by the contractor.
No	Union helped absorb the cost of what we wanted, which certainly helps. They were helpful in working with us to do calculations and stuff, but we looked at other projects and had an idea of what we wanted.
No	Wanted to be more efficiency and would have done regardless
No	We decided early on that we wanted the highest <measure> value we could find.
No	We did not have a lot of options for the controls.
No	We might have delayed the project later until funding was available to install the specific equipment the consulting firm recommended
No	We needed to install what we installed to keep the **** ***.
No	We would have installed the same type of ***** system. The project was mainly driven by the needs of the building occupants.
No	We would have selected the right equipment for the job but it may have taken longer to get approved.
No	Whatever <vendor> would have recommended. R Value was same as in the past. R Value.
No	Would opt for the best and higher efficient option
No	any opportunity to save energy, we will take
No	equipment needed to meet specifications given by the design firm
No	project needed to meet certain specifications and was getting done anyways
No	project was larger than the incentives offered
No	the <measure> simply needed to meet the required specification and efficiency is not considered

Table 6-16. Quantity Verbatim Responses for Union Custom C&I programs

Quantity	Dat3a_O. Why do you say that?
Yes	Again, it came down to costs. I'd have had to make do with a smaller, less efficient boiler without the incentives.
Yes	Eventually would have installed the same system. If we would have installed the <measure>, it would have saved less ****.
Yes	For the <measure> it was mainly the incentive. And I should mention that Union Gas brought the equipment to our attention, thinking that it might be of value to us, and they helped us run the ROI. For this measure, Union was pretty crucial to our decision to proceed.
Yes	That recommendation came from <vendor>, so I'm not sure.
Yes	The cost.
Yes	Union helped quantify savings
Yes	We have ** boilers providing heat to this <building>; we likely would only have done ** without the incentives from Union.
Yes	We may very well have stuck with the existing boilers, since they had enough capacity to maintain our

Quantity	Dat3a_O. Why do you say that?
	operations.
Yes	We might have chosen to add less <measure> to some of the internal spaces, but I don't really know.
Yes	We would have gone for all the necessary components of a <measure> but not with this system as It is costly plus a new venture and It was something which was not a dire need as It is something new
Yes	less <of the measure> would have been <implemented> since business case is harder to make
Yes	the ROI was not there for the project without the incentives
No	**********
No	**********
No	Already working on conversion and wanted to replaced entire building's set of <measures>.
No	Business need; our process requires a specific output. Anything less, we can't optimize our crops; anything more is wasted.
No	Capacity would have been the same; it's based on our business needs.
No	Design requirements
No	Equipment needed to meet minimum specifications
No	I didn't even consider <doing> only part of my ****** system; that just makes no sense to me.
No	Similar boilers to what we are using elsewhere in our facility, also made decision about boilers before the Union Gas rep got back to us about qualifying for the incentives
No	The installed boiler suits the requirements of the site
No	The size is dictated by what is available and how much heat there is **********. This also maximizes our rebates. Since we did the most efficient <measure>, the rebate is covering up to 3/4 of the cost.
No	The system was constrained by the size of the room, so it would've been the same either way.
No	They didn't have any impact on this design.
No	Union didn't affect the capacity; the boiler system was designed to meet our business requirements.
No	Union didn't have an effect on their decision-making because this project was a test case to learn about Union's program for future projects.
No	We are getting a great deal on the ****** gas, and we buy what we need.
No	We chose the specific equipment based on what our neighbors and others in the community had. We would have likely installed the same equipment without Union
No	We had to install the <measure> we installed; the project would have been same scope without the incentive, which was just a nice surprise.
No	We planned to cover the maximum possible area even before figuring out how much the incentive was.
No	We submit an application for however many we need to replace.
No	We wanted to make sure we saved as much gas as possible
No	We were targeting all of the <measures opportunities>.
No	We would have gone for the best efficient option even though it might get done later on due to lack of financial support
No	equipment needed to meet specifications given by the design firm
No	project was larger than the incentives offered
No	the <# measure> were in most need of replacement and would be replaced anyways

Table 6-17. Dat4 Verbatim Responses for Union Custom C&I programs

Attribution	Please summarize <the utility's> effect on the timing, efficiency and amount of that you installed
Full	"The incentives had a distinctly positive effect; w/out the incentives we probably couldn't have afforded many of the energy saving measures we installed."
Full	- Since Union is very active in their area, they always motivate them to such new technologies through their incentives and guidance
Full	Combined with <other projects> with incentive. Without the incentive, we would have kept the current boiler running for 4/5 years.
Full	For the <measure> it was mainly the incentive. And I should mention that Union Gas brought the equipment to our attention, thinking that it might be of value to us, and they helped us run the ROI. For this measure, Union was pretty crucial to our decision to proceed.
Full	Funding for the project was highly dependent on all sources of funding including Union's incentives. Without the incentives, we may have not installed the project at all. The project was dependent on approval in funding from all of our <#> or so sources.
Full	HVAC had been on our radar but the cost of implementation left a 5 yr payback period. Combined with incentives allowed to for 2 yr payback.
Full	Important. Union saying "it makes sense to us" validated the decision. But the incentive was just as important.

Full	Once we established a relationship with our rep, they were able to provide more information and see where incentives would apply, it helped us make better decision.
Full	Our prior experience with Union Gas sold us on this project. Without proven support and incentives, we would not have installed <the measure>.
Full	Since <Union representative> didn't come in and do the audit, he didn't have an effect on the design or ultimate installed <measure>. He drove the process though, and helped me see how easy it was to keep going with other <measure> projects after showing me how to do the incentives and paperwork. A good relationship with <utility Rep> helped me get the forms completed and look for other projects to be done. I became his contact within our organization to help drive other conservation projects at our facilities. I even tried to help with the other projects, but the people in charge of them aren't good at getting this type of stuff done.
Full	The Union Gas programs are fantastic. They allow growers like us to implement state-of-the-art technologies that are otherwise out of our reach. We compete internationally, including 3rd-world producers with much lower operating costs; with these incentives, we can afford technologies that let us compete with anybody.
Full	The incentive let us add the <measure>; without it, we'd have had to wait to be able to afford it, and we were concerned about our bio-security.
Full	The project was installed only because Union provided the incentive, otherwise it would have never happened.
Full	They had a big effect. The incentive covered the higher cost of higher R-value.
Full	Timing of it was perfect because they were considering doing something. Union came to the table and study done. We had to show savings. Efficient working with them.
Full	Union Gas had a tremendous impact on our decision making. They helped with numbers in advance, so we could see both short-term and long-term savings. The incentives and Union's follow-up support definitely helped us make the decisions. Some upgrades would not have been done at all and some others would have been done at lower efficiencies.
Full	Union role is integral in getting it done and getting it done properly. It's a leg on the stool.
Full	Union was a good resource for info, so it allowed us to make an efficient decision. The incentive allowed us to do the roof upgrade with less risk and more confidence, and it let us do it a little bit earlier than we might otherwise have done.
Full	Union was enthusiastic about energy reduction, which pushed the project to be done. The incentives made the ROI worth it as well.
Full	Union was instrumental in making sure the energy study for the <measure> was completed; w/out the study, we wouldn't have known about the actual energy savings. And without the incentives we couldn't have put in any of the higher-efficiency options.
Full	With Union's incentives we saved a considerable amount of money in fuel, and it's helped the crops quite a bit too (especially the curtains.)
None	"Not much effect; we did what we had to do when we had to do it."
None	"They validated the project, and right up front they made sure our gas supply would be adequate, but the design was set without their involvement."
None	Incentives from Union were a nice bonus but we had already decided to complete the project.
None	No effect, we're going to do what we want to install.
None	No impact from the rebates. It's always good to have rebates but in the discussions that he and his co-owners had about the scope and input for this project 99% of the time did not mention the rebates
None	The <business> needed to install the <measure> at the time of the construction of the building. We appreciated the incentive but we would have likely pursued to project regardless of Union because we had time constraints to meet.
None	The incentive was very helpful; we wouldn't have done anything differently, but it was very helpful. If Union Gas had educated us on best practices, that might have helped, but we got no such reliable information from them.
None	The incentives were certainly welcome but the project would have been pursued regardless of the incentives.
None	Their involvement did not impact our decisions at all in terms of timing, length, or thickness of insulation we installed.
None	They helped with other projects and their involvement was appreciated.
None	Union did a great job facilitating the process, however project was so large that the incentives made very little difference
None	Union didn't have an effect on their decision-making because this project was a test case to learn about Union's program for future projects.
None	Union encouraged us to consider the upgrades and told me about the incentives. Union definitely saved us money.
None	Union gas is what turned the company onto CHP technology in the first place. Project was significantly

	helped by incentives, incentives helped justify the project to upper management
None	Union had little effect on timing and equipment installed. Incentive was a nice bonus
None	Union had zero effect on our project. We're building a $<XX> million facility; the $<1XX,XXX> doesn't really change my decisions. Like I said, if they want to give me some money back, that's great, but it wasn't a factor in the project.
None	Union turned company onto CHP technology in the first place, project would not have been done without Union gas. Also incentives helped in selling the project to management and moving the project through the bureaucratic process.
None	Union was not involved with any aspect of this project - no rebates, they didn't help us with the design choices, they didn't help us with the size of the system. We can't access any rebates until we can show savings can be earned.
None	Union was somewhat helpful but the incentives did not impact the project in a meaningful way. Project was happening without Union.
None	Union was very helpful but we were considering the system before they got involved.
None	Union wasn't a consideration at all. They approached me after I'd begun installation, letting me know they had incentives available.
None	Union wasn't responding in a timely fashion. We provided Union <info> in March and we didn't hear back until late September. <Measure> was installed in early summer but not commissioned until early fall.
None	Union worked with us form an incentive viewpoint - we were able to push through the project from a cost stand point.
None	Union's effect was making the project more attractive and full scope at the same time due to coupling with provincial grant. Would have tried to install every thermostat without it but it helped.
None	Union's help didn't really affect the project timing; I was planning to do what I did, but the incentive "sealed the deal."
None	We would have been better prepared after conversation with ****. We needed to quantify our numbers before and after. Our Records aren't the best. We're going to think about it going forward but least of our thought in the past. **** was up to speed.
None	Working with Union gas was easy as an end user, very helpful. As far as this project goes, we would do this project regardless of the incentive but helped with project decision. Reduce energy use is a company policy every fiscal year and we set aside money to look at ways to save gas.
None	project would have been done anyways at the same efficiency and quantity.
Partial	Essentially, once we realized we could save energy and had incentives, we went this way. Without incentives, we wouldn't have put the <measures> on there.
Partial	I'm very glad and it was almost unexpected to get this much help from Union. <Utility Rep> is a very helpful contact at Union and helps us maximize the amount of projects we are able to do.
Partial	My area rep was awesome in promoting the incentives. ******* listens and takes advantage of what is recommended. The Union reps were excellent to deal with. Union accelerated the timing, but did not have an effect on the number <of measure>.
Partial	Overall impact on project was that we would've gone ahead regardless with size and efficiency, because we have the long term margins in mind so we reduce energy usage when feasible and also since we had to redo the HVAC anyway. Rebate has not so much on the immediate decision making for the project, but it did make the project appear much more feasible to the people who are actually signing off on the purchasing. The money we save is actually going into <measures> at the same store, <measures> that are much more efficient.
Partial	Same as the greenhouse roof. From Union we got advice, guidance, and of course the incentive; from the baseline study on to the end of the project, Union's support is very valuable.
Partial	The effect on the project was the amount of insulation on the pipes, and the amount of areas that we did insulation on. They also helped with the location of the equipment so energy wasn't wasted by traveling through more lengths of pipes. The incentives increased the ability to pass this project with upper management because the incentives helped to reduce the payback time.
Partial	The incentive allowed us to tap into top-level gear and build a super-efficient system (both in terms of gas savings and operational efficiencies.
Partial	The incentive let us get a more efficient boiler than we could otherwise afford, but otherwise Union didn't really have any effect on the boiler project.
Partial	Their incentives are factors in the business decisions we make; our ROI calculations include the incentives. It didn't make sense to build a new greenhouse now, and add in these energy-efficiency elements later, so Union didn't really have much effect on the timing of the project. And aside from the curtains, they didn't have much effect on the materials or design either.
Partial	Union Gas helped me out quite a bit determining the efficiency and understanding more about natural gas. But they did not have an impact on the timing of the project.
Partial	Union assisted on everything - they gave us estimated savings in our operations and with incentives. The time of year helped too, ********** when this was approved and getting colder. From a design

	point they didn't help, but from a consultation point, they helped. They helped us explore every type of project that would save us gas, and money. Their expertise really helped us with or without the incentives - the incentives was the icing on top, but also pushed this project forward. Working with Union greatly improved the chance of getting any gas saving project approved.
Partial	Union gas incentives are necessary to complete these projects, they likely wouldn't be done without the incentives. Process is quick and helpful as well. "If we didn't have union gas incentives, we would likely only do one out of <#> projects"
Partial	Union gave us another set of eyes that confirmed that the change would save natural gas. The financial incentive and "feel good effect" gave us the confidence to implement it sooner.
Partial	Union had an important impact on the <measure>. The incentive, their consulting along the way, just having them look at the plan and say it made sense to them. That validation was important to us.
Partial	Union incentives allow them to pursue more projects and get approvals more easily due to better ROI.
Partial	Union is quick to get back to us with incentive money, faster than we can send it application material and we appreciate working with them.
Partial	Union played an important role in the whole project by providing technical guidance and also providing funding & incentives.
Partial	Union's incentives allowed me to buy thicker insulation than I'd budgeted.
Partial	Union's incentives helped make the upgrades to the system a higher priority project to pursue. Typically, projects with higher than 15% ROI or less than 4 years of payback are preferred projects. The incentives offered increased the likeliness and timeliness of project completion. Although most technical assistance was from the vendor, Union was helpful in determining incentives and financials.
Partial	Union's involvement helped us move to the next level; the incentives and their advice early on helped us get to the next level, efficiency-wise.
Partial	Utility Rep was reaching out more frequently to the <facility>, handful of phone calls and emails. They helped us along. Could have invested in something else but savings calcs helped push it.
Partial	We would have installed the same equipment, although maybe less <measure>. We would have waited to install the full amount of <measure> if there was no incentive.
Partial	With the incentives, we were able to get started on the project and move ahead. We took full advantage of Union Gas help, including working with them in the beginning to make sure the <measure> would meet our supply needs.
Partial	the biggest effect was the timing, we were able to do the project sooner with their help (incentives).

Union Large Volume

Table 6-18. Timing Verbatim Responses for Union Large Volume

Timing	Dat1a_O. Why do you say that?
Yes	Normally the <number> of <measures> is constrained by how much <money> we have in our maintenance budget minus <money> held in reserve in case a failed <measures>. The incentive allows us to replace or clean more <measures> than we otherwise would.
Yes	They probably would have done the same <measure> due to "company standards" but it might be a tougher sale to the absence of the incentives. I
No	Do not believe the size could have been reduced due to technical reasons
No	Efficiency savings was a big driver of the cost savings since we use a lot of energy at the facility for ********
No	If the incentives had not been available and we had done the project, it would have been the same efficiency
No	Incentive and energy savings was "nice" but it didn't drop the project cost in half. We still had to pay ***** just for the install and incurred most of the project costs themselves. "It's still nice to show you're going down the path of "green" energy reduction but it's not like [the incentives] were ***% of the funding."
No	See previous response about incentives not impacting project. The incentives did not influence the size or scope of the project.
No	Since there was a limited window of opportunity to do the <measure> when the facility was shut down, we decided to <do all measures> when we had the opportunity.
No	The direct access fund is less than *** percent of total $****** project cost
No	The incentives did not impact the project decision-making. The decisions about the size of the project were made before the incentives came into play
No	The project selected the technology independent of the energy savings and the energy savings was a side benefit of the technology we had already selected.
No	We needed "something that works." The duty requirements for the <measure> were scoped into the

	spec. As noted this is a very specialized <measure> design, almost proprietary technology that only a very firm vendors can offer. **********
No	We probably would have done the *** upgrade anyway, but we use the <money> from the Direct Access Fund and put it into our O&M fund for fixing <maintenance issues> and other EE funding
No	We use a lot of energy in ****** and so the energy savings benefits are large enough so we would go forward with projects even if the incentives had not been available.
No	We would have installed the same <measures> based on our own internal research. Union did validate our project plan, including <measure> selection, though.

Table 6-19. Efficiency Verbatim Responses for Union Large Volume

Efficiency	Dat2a_O. Why do you say that?
Yes	Normally the <number> of <measures> is constrained by how much <money> we have in our maintenance budget minus <money> held in reserve in case a failed <measures>. The incentive allows us to replace or clean more <measures> than we otherwise would.
Yes	They probably would have done the same <measure> due to "company standards" but it might be a tougher sale to the absence of the incentives. I
No	Do not believe the size could have been reduced due to technical reasons
No	Efficiency savings was a big driver of the cost savings since we use a lot of energy at the facility for ********
No	If the incentives had not been available and we had done the project, it would have been the same efficiency
No	Incentive and energy savings was "nice" but it didn't drop the project cost in half. We still had to pay ***** just for the install and incurred most of the project costs themselves. "It's still nice to show you're going down the path of "green" energy reduction but it's not like [the incentives] were ***% of the funding."
No	See previous response about incentives not impacting project. The incentives did not influence the size or scope of the project.
No	Since there was a limited window of opportunity to do the <measure> when the facility was shut down, we decided to <do all measures> when we had the opportunity.
No	The direct access fund is less than *** percent of total $****** project cost
No	The incentives did not impact the project decision making. The decisions about the size of the project were made before the incentives came into play
No	The project selected the technology independent of the energy savings and the energy savings was a side benefit of the technology we had already selected.
No	We needed "something that works." The duty requirements for the <measure> were scoped into the spec. As noted this is a very specialized <measure> design, almost proprietary technology that only a very firm vendors can offer. **********
No	We probably would have done the *** upgrade anyway, but we use the <money> from the Direct Access Fund and put it into our O&M fund for fixing <maintenance issues> and other EE funding
No	We use a lot of energy in ****** and so the energy savings benefits are large enough so we would go forward with projects even if the incentives had not been available.
No	We would have installed the same <measures> based on our own internal research. Union did validate our project plan, including <measure> selection, though.

Table 6-20. Quantity Verbatim Responses for Union Large Volume

Quantity	Dat3a_O. Why do you say that?
Yes	We might be replacing fewer steam traps and spacing the replacements out more, without Union verifying that it really makes sense to do it the way we are now.
Yes	Without the funding they only would have replaced "bad actor" steam traps or steam traps otherwise noticed by operations staff as having issues.
No	It was the right amount ***** for those sections that needed it
No	The funding does make it easier. "The funding is there and so it provides an extra incentive for us to do this." <I do not know if these steam trap replacements were occurring before we became involved with the Direct Access Program because that was before my time (2014)>
No	We had already done some spot patching and kept finding new leaks and so figured might as well do the whole <measure>. <Our> VP of HR was a former maintenance guy and had told **** that it was unacceptable that ******. "You just have to get whatever <money> is required to fix it."
No	We had already submitted the <measure> project for corporate approval

No	We have to have the same level of unit in the area as was there before.
No	Without the incentives we still would eventually have replaced all the leaking steam traps due to concerns about inefficiency (lost steam) and icicle buildup. The incentives just accelerated the replacement

Table 6-21. Dat4 Verbatim Responses for Union Large Volume

Attribution	Dat4. Summarize the program's effect on the timing, efficiency, and amount that you installed.
Full	Without the incentives, the project wouldn't have been done.
None	$******** project and only $******** of it was incentives. It was going to get done anyway. For this project in particular, the timing to do it was independent and The timing is more dictated by the maintenance schedule. You do the maintenance when it's required. You take the opportunity when you have other maintenance that is due. So in this case we would have to disassemble the turbine anyway for maintenance reasons. So instead of doing this and then reassembling the turbines with the old parts, we decided to use this window of opportunity to disassemble it and then reassemble it with new parts. Since it coincided with our normal maintenance schedule, no additional time was lost with the upgrade. Also the project economics based on our investment valuation tool would have passed our priority test even without the additional incentives. For this project in particular, the timing and the decision to do it were independent of the incentive $. We were able to justify the project "on it's own." The timing was primarily based on where the units were in their maintenance cycle. We viewed the incentives "almost like a bonus" that reduced the overall cost and therefore increased their ROI for this project.
None	In general, the incentives wouldn't have affected this project. The decision for the projects going forward was made before the incentives dollars became available.
None	In this particular case there was very little impact on their decision-making from the incentives. However, there were other projects through the program (e.g., maintenance) where the incentives had more influence
None	It really didn't impact their project decision making at all. They typically apply for the incentive <payment> after the projects were already approved. Because for these large projects they have to plan well in advance. This was also a <large> project so incentives were not consequential.
None	Not to diminish the incentives, but very little effect due to size, scope, and nature .
None	Regardless whether we had the funding or not we would still do this based on the efficiency increases and due to the need to replace defective traps. "It would still happen … We would still see the impact of the efficiency increases. And the timing wouldn't change."
None	The Direct Access $, it's "nice to have" it's "a little perk at the end of the year." But our average gas consumption is about $****** a month so our savings from the project was small compared to the amount of gas we consume. It was a nice little cost savings, it was "a small celebration" but it didn't impact the cost of the project
None	The incentives didn't really have an impact on this project. The energy savings alone would have driven the project and the safety concern was another motivation.
None	The incentives had "no effect" on the likelihood, size, or timing of the *** project. The incentives had no influence on this project. They didn't even amount to ***% of the total project cost.
None	The incentives was helpful to get the project approved. It had been difficult to get it approved in the past and it was still difficult to get it approved even with the incentives. <regulations> would have driven the main project and then they leveraged the incentives to do the measures.
None	The incentives were a fairly small influence, "kind of an afterthought" since the project had been approved before the incentives were factored in.
None	Union was useful through each phase, particularly their support of our review of available technologies. We rely on Union to review all of our gas-related projects. Our Direct Access budget and the LVP's Aggregate Pool are both a big part of our energy efficiency planning.
Partial	By having the EnerSmart program and the incentives through Direct Access and the pool, they can make their energy calcs better, because they have better understanding of the energy savings potential and they can make some progress improvements in the purchase price which means that energy projects have a better chances of being accepted when competing with other projects. So the program does allow them to install energy projects a little bit faster than they otherwise would
Partial	He said that the influence of the program on the kiln project was similar to what it would be for the infrared heater - the program accelerates the projects but doesn't impact their likelihood or size.
Partial	It significantly moved the payback so that they did it this year much later.
Partial	On the timing it would be a year later because the incentives moved the project up the priority list for capital improvement approval and there would also be a seasonal delay (We would need to do the project before the next winter season). But in terms of size the project would not have been smaller .

Attribution	Dat4. Summarize the program's effect on the timing, efficiency, and amount that you installed.
	However, if more incentives had been available (without the ***** cap) we might have installed more <measures> than we actually did
Partial	The incentives allow us to clean more heat exchangers than we otherwise would. A side benefit of cleaning more heat exchangers also gives us more data on the typical run time/measure life of these heat exchangers so we can be more proactive about cleaning in the future or identifying poor performing heat exchangers earlier based on this performance data.
Partial	The incentives caused us to do more steam trap replacement sooner than we otherwise would have. We also mentioned that the steam trap project was much smaller ********** than the <measure> project ********** and so the incentives were a larger proportion of project costs than for the other project
Partial	The incentives help them push <measure>. If more incentive $ had been available they might have pushed a bigger project
Partial	The incentives helped with the prioritization of project within our <Capital expense> budget. It also helped us justify the project but it didn't change the size or scope of the project or whether it would go forward.
Partial	Through their support in helping us demonstrate potential savings realized in maintaining steam traps more proactively, Union has confirmed that what we're doing is the right thing.
Partial	With the funding it made more sense to have a vendor come in and do the full steam trap survey of the facility. As a result, more steam traps were replaced as well as any issues identified with existing traps. The funding had the impact of increasing our steam efficiency by increasing the # of working traps.

Appendix E 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 5 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 2018 program year.

Overall ratios in these tables are the sample weighted average and not used in calculating net savings for the programs.

Enbridge Custom C&I Programs

Table 6-22. Applied Domains with Additional Statistics for Enbridge Custom C&I programs

Domain	Free Ridership Based Attribution	+/- FPC On	+/- FPC Off	Sample Customers	Sample Measures	Population Measures	Percent Population CCM Savings
Commercial Boilers	42%	11%	18%	23	24	82	10%
Commercial Ventilation	14%	5%	7%	16	16	41	5%
Commercial Other	26%	7%	10%	21	22	94	6%
Industrial	51%	8%	18%	34	42	122	48%
Multi-Residential Heating	58%	11%	14%	29	29	167	20%
Multi-Residential Other	70%	9%	10%	21	21	190	11%
Enbridge C&I Custom - Overall	50%	5%	9%	141	154	696	100%

Table 6-23. Targeted Sample Domain for Enbridge Custom C&I programs

Domain	Free Ridership Based Attribution	+/- FPC On	+/- FPC Off	Sample Customers	Sample Measures	Population Measures	Percent Population CCM Savings
Industrial Process	46%	16%	30%	15	16	41	23%
Industrial System Maintenance	46%	17%	32%	10	12	29	8%
Industrial Other	58%	8%	30%	13	14	52	18%
Commercial Boilers	42%	11%	18%	23	24	82	10%
Commercial Ventilation	14%	5%	7%	16	16	41	5%
Commercial Other	26%	7%	10%	21	22	94	6%
Multi-Residential Boilers	59%	11%	13%	28	30	168	21%
Multi-Residential Ventilation	82%	6%	7%	10	10	52	6%
Multi-Residential Other	41%	9%	10%	10	10	137	3%
Enbridge C&I Custom - Overall	50%	5%	9%	141	154	696	100%

Union Custom C&I Programs

Table 6-24. Applied Domains with Additional Statistics for Union Custom C&I programs

Domain	Free Ridership Based Attribution	+/- FPC On	+/- FPC Off	Sample Customers	Sample Measures	Population Measures	Percent Population CCM Savings
Agricultural	50%	13%	18%	23	30	150	49%
Industrial Steam/Hot Water	29%	10%	17%	15	17	60	17%
Industrial HVAC	40%	12%	17%	12	14	68	15%
Industrial Other	4%	3%	6%	9	9	17	11%
Commercial & Multifamily	29%	13%	26%	15	17	63	8%
Union C&I Custom - Overall	38%	7%	10%	70	87	358	100%

Table 6-25. Targeted Sample Domain for Union Custom C&I programs

Domain	Free Ridership Based Attribution	+/- FPC On	+/- FPC Off	Sample Customers	Sample Measures	Population Measures	Percent Population CCM Savings
Agricultural New Build	40%	23%	32%	6	6	13	23%
Agricultural Heating/Water	59%	13%	20%	14	15	88	20%
Agricultural Other	63%	20%	22%	8	9	49	6%
Industrial Steam/Hot Water	29%	10%	17%	15	17	60	17%
Industrial HVAC	40%	12%	17%	12	14	68	15%
Industrial Other	4%	3%	6%	9	9	17	11%
Commercial & Multifamily	29%	13%	26%	15	17	63	8%
Union C&I Custom - Overall	38%	7%	10%	70	87	358	100%

Union Large Volume

Table 6-26. Applied Domains with Additional Statistics for Union Large Volume

Domain	Free Ridership Based Attribution	+/- FPC On	+/- FPC Off	Samp Cust	Samp Meas	Pop Meas	Percent Population CCM Savings
Union - Large Volume	14%	4%	15%	16	23	40	100%

Appendix F EGD Commercial and Multi-Residential Vendor Attribution

Evaluation interviews with the Union and Enbridge program teams indicated that the program design for the Enbridge Commercial and Multifamily (C&M) 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 the Enbridge C&M program.

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 for the Enbridge C&M segments.

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 the Enbridge C&M segment's program strategy.

Table 6-27 shows that nearly all participants in the Union C&I program indicated that a vendor was involved in their decision making on the project.

Table 6-27. Vendor Interview Trigger for Union Custom C&I programs

Vendor Involvement	Participant Attribution	Customers	Measures
Not Involved in Decision	100% Paticipant Attribution	Null	Null
	Less than 100% Participant Attribution	5	5
Involved in Decision	100% Paticipant Attribution	20	23
	Less than 100% Participant Attribution	48	58

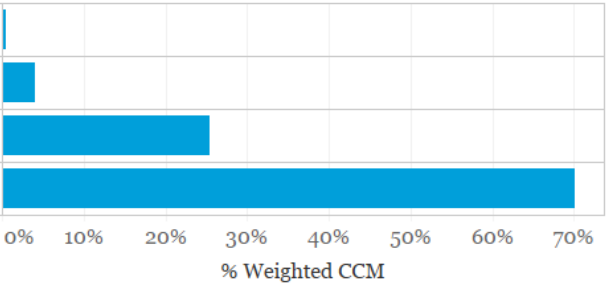


Table 6-28 shows that most projects in the Union Large Volume program indicated that a vendor was involved in their decision making on the project.

Table 6-28. Vendor Interview Trigger for Union Large Volume Program

Vendor Involvement	Participant Attribution	Customers	Measures
Not Involved in Decision	Less than 100% Participant Attribution	7	7
Involved in Decision	100% Paticipant Attribution	Null	Null
	Less than 100% Participant Attribution	11	15

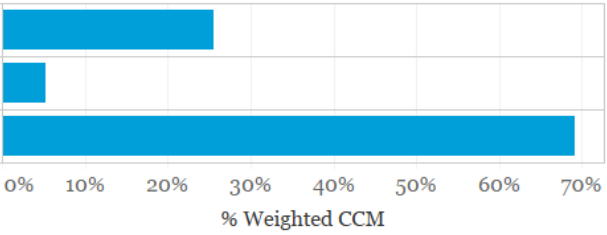


Table 6-29 shows that most projects in the Enbridge Industrial Segment indicated that a vendor was involved in their decision making on the project.

Table 6-29. Vendor Interviews for Enbridge Custom Industrial Segment

Vendor Involvement	Participant Attribution	Customers	Measures
Not Involved in Decision	100% Paticipant Attribution	5	5
	Less than 100% Participant Attribution	5	5
Involved in Decision	100% Paticipant Attribution	5	7
	Less than 100% Participant Attribution	20	25

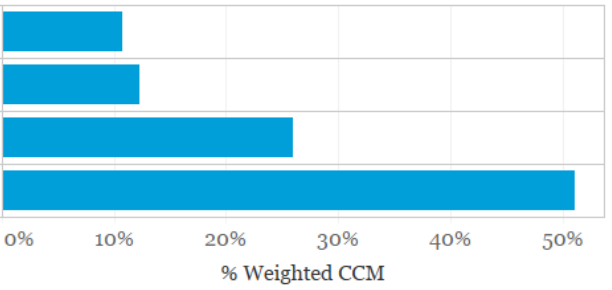


Table 6-30 shows that of nearly all measures in the Enbridge C&M segments had vendor involvement in project decision making.

Table 6-30. Vendor Interviews for Enbridge Custom C&I programs

Vendor Involvement	Participant Attribution	Vendor Interview	Vendor Complete	Customers	Measures
Not Involved in Decision	Less than 100% Participant Attribution	Did not attempt vendor interview	N/A	Null	Null
Involved in Decision	100% Paticipant Attribution	Did not attempt vendor interview	N/A	23	23
	Less than 100% Participant Attribution	Attempted vendor interview	N/A	49	52
			Completed Vendor Interview	34	34

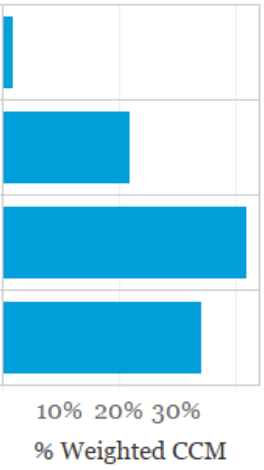


Table 6-31 shows that vendor attribution increased attribution by 7% for the Enbridge Commercial segment and by 22% for the Enbridge Multifamily segment. The results indicate that Enbridge is affecting vendor recommendations and that customers, particularly in the multifamily segment, rely on vendor involvement in making equipment and maintenance decisions.

Table 6-31. Free ridership based attribution with and without vendors for Enbridge C&M segments

Domain	Approach	Free Ridership Based Attribution	Lower Bound at 90% Confidence	Upper Bound at 90% Confidence	Population CCM Savings	Percent Population CCM Savings
Commercial	Vendor Included	31%	22%	41%	124,842,885	21%
	Without Vendor	24%	14%	34%	124,842,885	21%
Market-Rate Mulit-Family	Vendor Included	62%	53%	71%	177,956,273	30%
	Without Vendor	40%	27%	53%	177,956,273	30%

Appendix G Sensitivity Analysis

Four sensitivity analyses were performed to assess the influence of DNV GL assumptions in the participant FR scoring method. These scores are not intended for application in determining program net savings. The four sensitivity tests are:

1. Using an assumption of 2 years rather than 4 years for when the acceleration period is equivalent to a "never would have implemented" response (100% FR based attribution). Mathematically, this increases attribution for Industrial, Ag and Large Volume projects, and helps inform us how much the assumption matters.
2. 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. Mathematically, this decreases attribution for commercial and multifamily projects, and helps inform us how much the assumption matters.
3. 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.
4. Compare results using the life cycle net savings (LCNS) scoring method and the first year net savings (Y1NS) scoring method. This will test the sensitivity of results to the combined effect of measure life weighting of results (CCM rather than m^3) and the different treatment of acceleration period savings.

Across utilities and programs, the high-level findings from each test are:

1. Test 1 indicates that changing the "never would have implemented" assumption from 4 to 2 years would have a significant effect on both utilities' industrial segments, suggesting that we should include future research to verify the assumed planning horizon for these projects.
2. Test 2 indicates that changing the "never would have implemented" assumption from 2 to 4 years would have a significant effect on Enbridge commercial and multi-residential projects, suggesting that we should include future research to verify the assumed planning horizon for these projects.
3. Test 3 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.
4. Test 4 shows a large effect for most 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. As long as the program metrics are based on CCM savings, this finding indicates that the evaluation should continue to use the current Lifecycle Net Savings method as it should provide a more appropriate estimate of free ridership based attribution for cumulative savings.

In the following tables, 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 using the tables in this appendix, the reader should compare blue columns (standard approach, vendor and the four sensitivity tests) to the green 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 final four columns (Test #1, Test #2, Test #2, and Test #4) to show the effect of the sensitivity analysis.

Table 6-32 shows the results of the sensitivity analysis by sector for the Enbridge Custom C&I programs. None of the sensitivity tests produced a result that is statistically different from the "standard, no vendor" result (at 90% confidence).

All segments showed some sensitivity (8-9%) to the timing assumption for what constitutes an equivalent to "never" response (Tests #1 and #2). This is shown as an increase in the FR based attribution on test #1 vs standard for industrial and as a decrease on test #2 for commercial and multifamily segments. This indicates that across all segments a significant portion of participants indicated acceleration of between 2-4 years.

Test #3, 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 less than three percent. None of the segment scores was particularly sensitive to this assumption.

The biggest difference at the overall level (7%) among the scores is test #4, using the LCNS scoring vs. the Y1NS method. The Y1NS approach does not incorporate measure life and thus gives a higher score for acceleration if a program is made up of measures with EULs significantly longer than 4 years. The multi-family segment was the most affected by this comparison.

Table 6-32. Sensitivity Analysis for Enbridge Custom C&I programs

Segment	Standard Approach, Vendor	Standard Approach, No Vendor	Test #1: 2 year+ acceleration = Never	Test #2: 4 year+ acceleration = Never	Test #3: No Partial Efficiency Score	Test #4: Year1 Net Savings
Industrial	51%	51%	59%	51%	54%	57%
Commercial	31%	24%	24%	16%	26%	31%
Market-Rate Mulit-Family	62%	40%	40%	32%	42%	51%
Enbridge C&I Custom - Overall	50%	42%	46%	37%	44%	49%

Table 6-33 shows the results of the sensitivity analysis by sector for the Union Custom C&I programs. None of the sensitivity tests produced a result that is statistically different from the "standard, no vendor" result (at 90% confidence).

The results show that changing the "never" threshold in the timing scoring to two years from four years for the Industrial and Ag sectors (Test #1) produces a 5 percent change overall, driven primarily by industrial projects, which had an increase of 8%. Changing the "never" threshold to four years from two years for the Commercial and MF sectors (Test #2) had no effect

Test #3, 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 only three percent. The Agriculture segment is most significantly affected with an increase to FR based attribution of 5%, which may in part be due to the many Agriculture projects that represent a bundle of measures, each of which was asked about separately in the FR interview.

The biggest difference at the overall level (7%) among the scores is test #4, using the LCNS scoring vs. the Y1NS method. The Y1NS approach does not incorporate measure life and thus gives a higher score for acceleration if a program is made up of measures with EULs significantly longer than 4 years. The Industrial segment was most affected by this comparison.

Table 6-33. Sensitivity Analysis for Union Custom C&I programs

Segment	Standard Approach, Vendor	Standard Approach, No Vendor	Test #1: 2 year+ acceleration = Never	Test #2: 4 year+ acceleration = Never	Test #3: No Partial Efficiency Score	Test #4: Year1 Net Savings
Agricultural	50%	50%	54%	50%	55%	51%
Industrial	26%	26%	34%	26%	27%	39%
Commercial & Multifamily	29%	29%	29%	29%	29%	31%
Union C&I Custom - Overall	38%	38%	43%	38%	42%	45%

Table 6-34 shows the results of the sensitivity analysis for Union Large Volume. None of the sensitivity tests produced a result that is statistically different from the "standard, no vendor" result (at 90% confidence).

The results show that the Large Volume score is not particularly sensitive to changes of the assumptions in the FR scoring. The largest difference (11%) for Large Volume is using the LCNS scoring vs. the Y1NS method. The Y1NS approach does not incorporate measure life and thus gives a higher score for acceleration if a program is made up of measures with EULs significantly longer than 4 years.

Table 6-34. Sensitivity Analysis for Union Large Volume

Segment	Standard Approach, Vendor	Standard Approach, No Vendor	Test #1: 2 year+ acceleration = Never	Test #2: 4 year+ acceleration = Never	Test #3: No Partial Efficiency Score	Test #4: Year1 Net Savings
Union - Large Volume	14%	14%	17%	14%	15%	25%

Appendix H 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 6-35 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, 24 out of 274 FR based attribution scores were adjusted through this process, including 10 measures which were dropped. The percent of adjusted scores (9%) is consistent with the prior study.

Table 6-35. PM quality assurance adjustments

PM Quality Assurance Status			Union			Enbridge			Overall		
			Inc	Dec	Total	Inc	Dec	Total	Inc	Dec	Total
Total Measures Completed from FR IDIs					112			162			274
Not Adjusted					105			145			250
PM Adjustments from QA	Dropped				2			8			10
	Assign DNK Attribution, but unclear amount.	Timing	0	0	0	2	0	2	2	0	2
		Efficiency	3	0	3	1	0	1	4	0	4
		Quantity/Size	0	0	0	1	0	1	1	0	1
	Adjust Score Attribution Clear based on open, conflicted with scored response	Timing	0	0	0	1	0	1	1	0	1
		Efficiency	0	0	0	2	2	4	2	2	4
		Quantity/Size	2	0	2	0	0	0	2	0	2

Appendix I 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


FR Sample Design Memo.pdf


Participant IDI Guide


Vendor IDI Guide