



Interim Framework Retrofit PY2020 Evaluation Results

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Acronyms and Abbreviations

CDM-IS	Content data management information system
DCKV	Demand control kitchen ventilation
EM&V	Evaluation, measurement, and verification
EUL	Effective useful life
FR	Free-ridership
GTA	Greater Toronto Area
GW or GWh	Measurement of demand (GW) or energy (GWh) equivalent to 1,000,000,000 W or Whr
HVAC	Heating, ventilation, and air conditioning
IDI	In depth interview
IESO	Independent Electricity System Operator
IF	Interim Framework
kW or kWh	Measurement of demand (kW) or energy (kWh) equivalent to 1,000 W or Whr
LED	Light emitting diode
MW or MWh	Measurement of demand (MW) or energy (MWh) equivalent to 1,000,000 W or Whr
NTG	Net-to-gross
PY	Program year
P1	Evaluation Period 1 (January through June)
P2	Evaluation Period 2 (July through December)
SO	Spillover
VFD	Variable frequency drive

1 Executive Summary

The Independent Electricity System Operator (IESO) retained Nexant, Inc., and their sub-contractor, NMR Group, Inc., to conduct impact and process evaluations of the Interim Framework (IF) Retrofit Program. The IF operated during 2019 and 2020 to offer energy-efficiency incentives and rebates to Ontario electricity customers through a suite of Save on Energy programs. Commercial, industrial, and residential market segments, as well as indigenous and low-income communities, have all been served through the IF programs.

1.1 Impact Evaluation

An impact evaluation was performed to analyze the impact of the program and quantify the savings realized as an outcome of implementing energy efficiency projects in the province of Ontario during PY2020. A total of 3,157 Retrofit evaluation projects were completed in the province during Program Year (PY) 2020. The first-year net verified energy and summer peak demand savings are 172 GWh and 30 MW, respectively.

The impact results of the PY2020 Retrofit Program are presented in Table 1-1.

Table 1-1: Province-Wide Energy and Summer Peak Demand Impacts

Measurement	Gross Reported Savings	Realization Rate	Gross Verified Savings	Net-to-Gross Ratio	Net Verified Savings	Net Verified Savings at 2022
Energy (MWh)	210,152.0	107.9%	226,727.0	76%	171,680.1	171,680.1
Summer Peak Demand (kW)	35,574.6	111.0%	39,491.5	75%	29,791.4	29,791.4

As a result of impact evaluation below are a few key findings and recommendations, more details are presented in Section 3 of this report:

Finding 1: Assumed hours of use (HOU) and base case wattage for LED recessed downlights and omni-directional A-shape lamps in prescriptive worksheet may be inconsistent with actual HOU and base case wattage.

- *Recommendation 1: Review and adjust the HOU and base case wattage assumptions applied to these measures on prescriptive worksheet*

Finding 2: Assumed retrofit case wattage for LED troffers may be inconsistent with actual HOU and retrofit case wattage in prescriptive worksheet

- *Recommendation 2: Review and adjust retrofit case wattage assumptions applied to LED troffers on prescriptive worksheet*

Cost effectiveness (CE) for the Retrofit program achieved a TRC ratio of 1.02 in PY 2020 and PAC ratio of 2.20 (Table 1-2). Each of these tests exceeded the targets of 1.00 set to determine if a program is cost effective. Although these ratios were less than 1.00 in PY2019 due to low completed projects and higher new program's upfront costs, these values exceed the target of 1.00 when additional completed projects in 2019 were evaluated in 2020 as true-ups¹ projects and combined with previous evaluated PY2019 projects.

Table 1-2: Retrofit Cost Effectiveness Results

Program Year	TRC	PAC	LUEC (\$/kWh)	First Year GHG (Tonnes CO ₂ Equivalent)	Lifetime GHG (Tonnes CO ₂ Equivalent)
PY2019 Retrofit Program (with true-ups)	1.03	2.14	0.03	-107.1	40,082.1
PY2020 Retrofit Program	1.02	2.20	0.03	7,182.8	183,119.0
Cumulative PY2019-2020 Retrofit Program	1.02	2.19	0.03	7,075.7	223,201.1

1.2 Process Evaluation Findings and Recommendations

To better understand the design and delivery of the Retrofit program in PY2020, a process evaluation was completed. Primary data was collected through interviews with IESO staff and program delivery staff and surveys with applicant representatives, contractors, and participants. Key findings and recommendation from the process evaluation are summarized below and presented in greater detail in Section 4.5 of this report.

Finding 1: Program free-ridership (FR) was moderately high, compared to historical results, in 2020 at 23.6%.

- **Recommendation 1a:** *Maintain focus on minimizing FR. Key areas include:*
 - *identifying and targeting customers segments that would be unlikely to make upgrades without program support,*
 - *screening applications for customers who have not already begun implementing measures, and*
 - *encouraging all participants to complete the evaluation surveys to ensure that the FR results are as representative of the true population of program participants as possible.*
- **Recommendation 1b:** *Encourage participants to install additional energy-efficient equipment or services beyond what is covered through the program if it is feasible for them to do so (for example, identifying additional opportunities during initial site visits). Doing so may lead to increases in the program's spillover (SO), which may in turn help offset FR and lead to improved net-to-gross (NTG).*

¹ True-ups include project completed in 2019 and evaluated in 2020

Finding 2: Opportunities exist to improve the overall application process when working with multiple program delivery vendors.

- **Recommendation 2:** Identify ways to improve the application process for customers working with multiple *program delivery vendors* (for example, creating consistency in approaches through additional training for support staff and improving the quality of the information provided to participants).

Finding 3: The Application Portal presented challenges to some users.

- **Recommendation 3:** *Continue to enhance the Application Portal and its customer support to meet its various users' needs as the program evolves. Suggested enhancements include making the portal easier to navigate, minimizing issues when uploading documents, and making sure the content is as clear as possible.*

Finding 4: A desire for additional training exists among applicant representatives and contractors.

- **Recommendation 4:** Offer additional training opportunities on topics that will provide the applicant representatives and contractors with the knowledge they need to effectively support the program. *Training topics to consider include the program application process, changes in measure offerings or incentives, and marketing and outreach techniques.*

Finding 5: Satisfaction with program communications is moderate, suggesting some room for improvement exists.

- **Recommendation 5:** *Improve the IESO communication with program participants and program partners (such as the accuracy, consistency, and timeliness of responses to questions) to improve the quality and consistency of technical advice and customer support timeliness.*

Finding 6: Expanding measure offerings was the most common improvement suggestion mentioned by applicant representatives and contractors.

- **Recommendation 6:** *Consider gathering additional feedback on contractor measure offering suggestions through focus groups or outreach to key program partners to better understand market needs.*

Finding 7: Additional cross-program promotion opportunities exist.

- **Recommendation 7:** *Continue to identify cross-program promotion opportunities, which can be achieved through two means. Firstly, promoting other program opportunities to all participating Retrofit customers at both the start and end of the participation process. Secondly, ensuring that participating customers in particular segments, such as small businesses, are aware of the other program opportunities designed with their business segment in mind.*

Finding 8: The Retrofit Support Line and Save on Energy website are valuable resources for customers.

- **Recommendation 8:** *Continue to offer information about the program through the Retrofit Support Line and Save on Energy website in future program years.*

2 Introduction

This report summarizes the evaluation results of the Retrofit Program and includes projects that were completed and reported to the IESO during 2020. During the Interim Framework, the Retrofit Program was divided into four regions (Toronto, Greater Toronto Area (GTA), South-West, and North-East) served by three unique vendors. The program evaluation of PY 2020 was split into two evaluation cycles consisting of Period 1 (P1) from January through June and Period 2 (P2) from July through December. During each evaluation period, impact evaluations, net-to-gross analyses, and participant surveys were completed for all regions. This report provides an annual summary of the results from these seven¹ independent evaluations. Process evaluation tasks, such as in-depth interviews with the IESO program staff and implementation vendors, as well as surveys with applicant representatives and contractors, were conducted once across the two evaluation periods.

2.1 Program Description

The Retrofit program offers incentives to industrial, commercial, institutional, and multi-family residential facilities interested in upgrading existing equipment with energy-efficient alternatives. The Retrofit Program Requirements, found on the Save on Energy website, lays out criteria for eligible participants, facilities and projects. The program offers two application streams, as outlined below:

Prescriptive Track applications offer a program-defined list of approved equipment and fixed incentives available for installation. This track encourages lighting and non-lighting building improvements. Limited documentation is required for this track to ensure a simplified experience for program participants.

Custom Track applicants are provided with the flexibility to propose upgrades that best meet their facility's needs. Incentives are estimated from the project's energy or summer peak demand savings, with incentives of \$0.05/kWh or \$400/kW for lighting measures or \$0.10/kWh or \$800/kW for non-lighting measures and capped at 50% of project costs. This track provides an opportunity to install equipment that is unavailable in the prescriptive track and allows the implementation of measures outside the scope of the pre-approved equipment list.

2.2 Goal and Objectives

The goals and objectives of the 2020 Retrofit program evaluation are as follows:

- Conduct audits of completed projects to verify the installation of equipment and evaluate operating parameters through desk reviews

¹ Toronto and GTA were evaluated together in P1 due to limited completed projects but then separated in P2

- Verify energy and summer peak demand savings with a high degree of confidence and precision
- Assess free-ridership (FR) and participant spillover (SO) to determine an appropriate net-to-gross (NTG) ratio
- Provide recommendations for program improvements based on feedback obtained from the evaluations

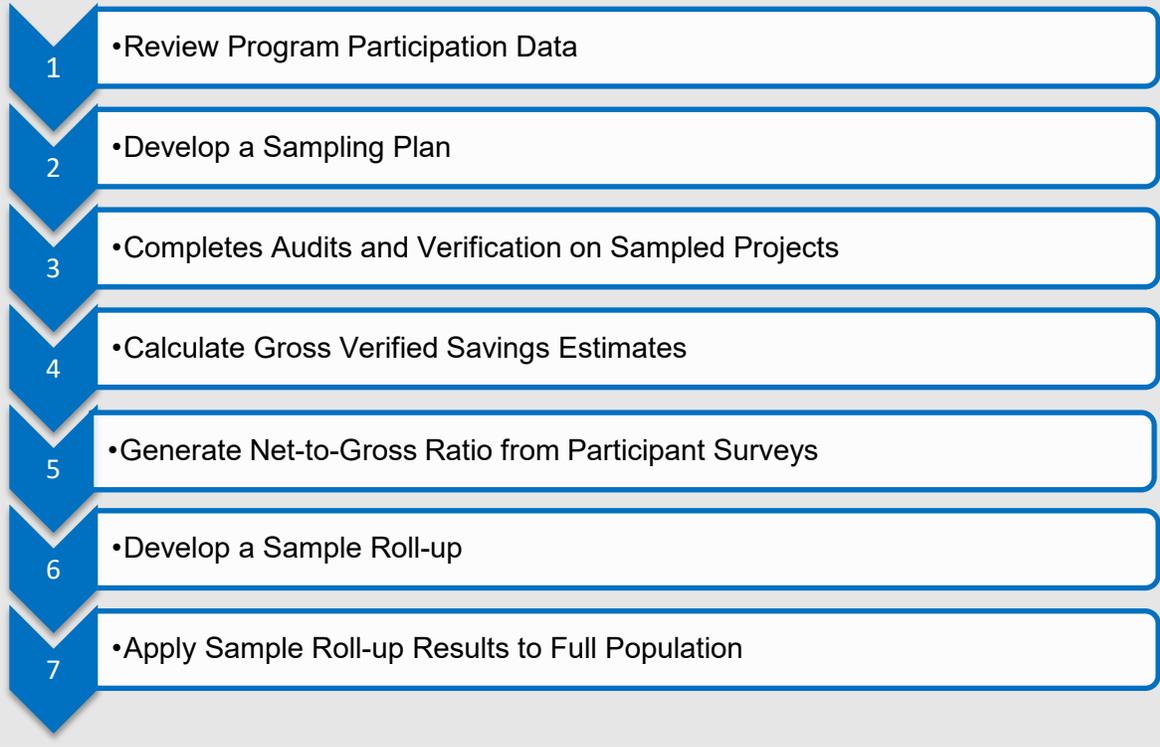
3 Impact Evaluation

An impact evaluation was performed to assess energy and summer peak demand savings attributable to the program and quantify savings generated as a result of implementing energy efficiency projects in the province of Ontario during PY2020. The evaluation of PY2020 was split into two separate evaluation cycles: projects post-approved and funded from January 1st to June 30th, 2020 (P1), and projects post-approved and funded from July 1st to December 31st, 2020 (P2). Projects completed in 2019 that did not receive post-approval and payment until 2020 were also included in P2. The impact evaluation section presents the combined results from both P1 and P2 evaluation cycles.

3.1 Impact Evaluation Methodology

The impact evaluation methodology, comprised of distinct components, is presented in Figure 3-1. Additional detail can be found in Appendix A and Appendix B.

Figure 3-1: Impact Evaluation Methodology



3.2 Impact Evaluation

As continuation of the COVID-19 global pandemic, the evaluation team completed a limited number of site visits (24 projects or 14% of the total sample projects) for the PY2020-P1 evaluation cycle yet were unable to conduct site visits or metering for the PY2020-P2 evaluation cycle due to government-imposed restrictions, including lockdowns, corresponding facility

closures, and physical distancing requirements. Verification tools were augmented to accommodate the challenges associated with participant outreach. The tools included phone calls and interviews with participants, a web-based lighting impact self-assessment survey, and virtual site visits. Across all outreach activities, participants were generally able to confirm the measures implemented, the equipment type, facility hours of use, and the quantity of measures installed. In instances where participants could not recall the quantity of measures or the base case wattage, project documentation was referenced, including invoices or application inputs.

3.2.1 Project Participation and Sampling

The evaluation sample for PY2020-P1 was drawn solely from the list of post-approved and paid projects between January 1st and June 30th, 2020. In contrast, The PY2020-P2 evaluation sample was generated from a list of post-approved and paid projects between July 1st and December 31st, 2020, and then merged with the PY2020-P1 sample to create a rolling sample. As a result, the evaluation increased the number of projects used in the roll-up, leading to higher precision and less uncertainty in the evaluated results. A rolling sample of 373 projects was achieved by adding the P2 impact evaluation sample of 202 projects with the P1 sample of 171 evaluated projects.

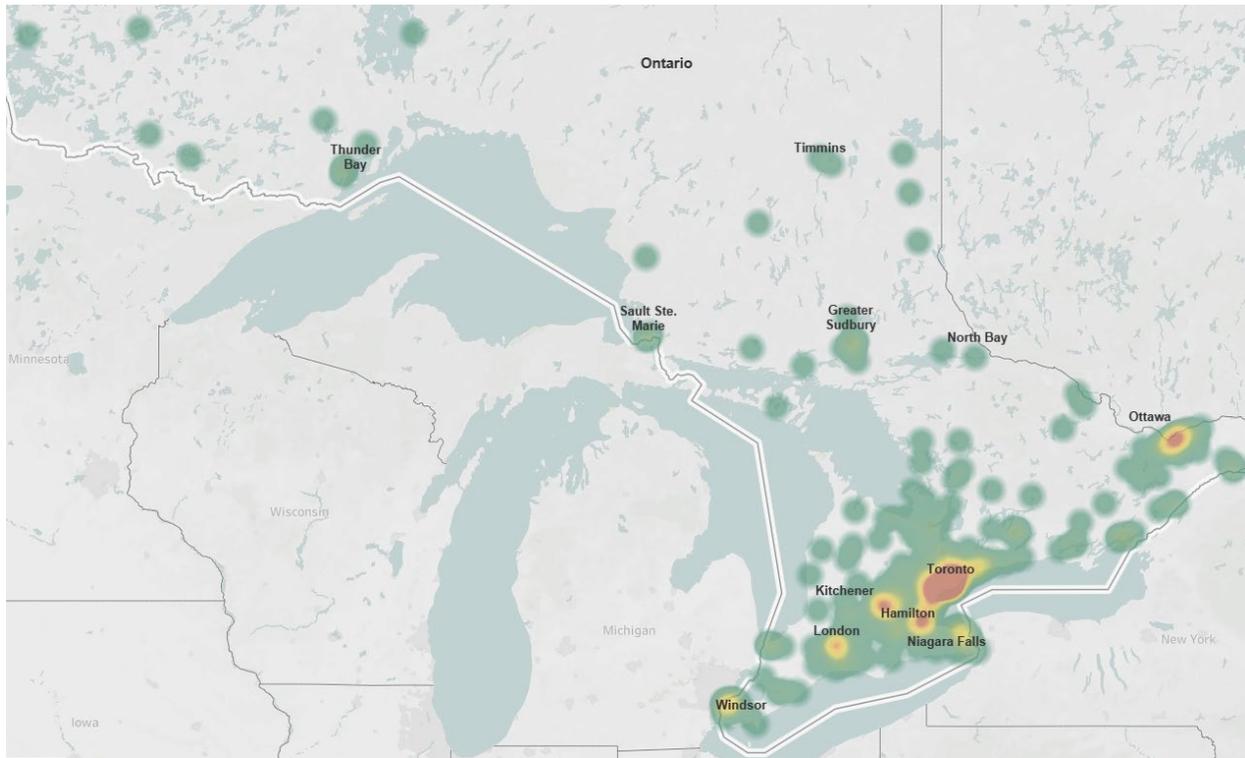
Confidence and precision levels of 90% and 10% were achieved for the PY2020 evaluation. Table 3-1 presents the sample and project counts for the evaluation of the PY2020-P1 and P2 cycles.

Table 3-1: PY2020 Project and Sample counts

Track/Type	P1 Sample	P2 Sample	Rolling Sample	P1 Project Count	P2 Project Count	Total Project Count
Prescriptive Lighting	90	139	229	365	1,273	1,629
Prescriptive Non-lighting	8	11	19	17	91	108
Custom Lighting	65	42	107	285	872	1,157
Custom Non-lighting	8	10	18	38	225	263
Total	171	202	373	696	2,461	3,157

A total of 3,157 evaluation projects with unique application IDs were completed under the IF Retrofit program in 2020. For additional details the heat map presented in Figure 3-2 illustrates the geographic distribution of 2020 Retrofit projects across Ontario based on the first three characters of the postal code (i.e. forward sortation area). Red, orange and yellow color scales show areas with a greater density of projects respectively, and the green overlay represents additional areas of program activity.

Figure 3-2: 2020 Retrofit projects distribution in Ontario



3.2.2 Sample Realization Rates

The P1 and P2 energy and summer peak demand sample realization rates are presented in Table 3-2. Interactive effect¹ and baseline shift adjustment² factors have been considered for applicable lighting measures.

Table 3-2: Sample Realization Rates

Measurement	Realization Rate
PY2020-P1	
Energy	106.9%
Summer Peak Demand	104.7%
PY2020-P2	
Energy	108.1%
Summer Peak Demand	112.8%
PY2020 Total	
Energy	107.9%
Summer Peak Demand	111.0%

¹ The effective realization rates for lighting projects include the influence of HVAC interactive effects as calculated in the evaluation sample

² Includes savings adjustments recommended by the Lighting Baseline Study. *IESO Business Programs: Lighting Baseline Shift Study*, April 30th, 2018

The energy realization rate exceeds 100% due to identified inconsistencies between the reported and verified following parameters:

- Equipment's operating hours
- Quantity of equipment installed
- Base case and/or retrofit equipment wattage

Lower verified wattage than reported values on retrofit equipment is the main driver of a higher than 100% PY2020 energy realization rate. This discrepancy was observed in 68% of the rolling sample projects (187 prescriptive projects and 66 custom projects). In addition, the summer peak demand realization rate exceeding 100% is attributed to the higher verified hours of operation compared to the reported values that coincide with the IESO's summer peak demand window³.

3.3 Impact Evaluation Findings

During PY2020, the Retrofit program generated 172 GWh first-year net verified energy savings and 30 MW net verified summer peak demand savings. All energy and demand savings discussions in this report are in reference to the first-year net verified energy savings or the first-year net verified peak demand savings unless otherwise noted.

Table 3-3 and Table 3-4 present the province-wide results of the PY2020 Retrofit program impact evaluation. Baseline shift adjustment factors have been considered for applicable lighting measures.

Table 3-3: Energy Impacts

Track	Measure Type	Reported Energy Savings (MWh)	Realization Rate	Gross Verified Energy Savings (MWh)	Net-to-Gross Ratio	Net Verified Energy Savings (MWh)	Net Verified Energy Savings at 2022 (MWh)
Prescriptive	Lighting	50,748	113.0% ^{4, 5}	57,332	76%	43,558	43,558
Prescriptive	Non-Lighting	6,669	106.8%	7,126	76%	6,204	6,204
Custom	Lighting	116,597	106.9% ⁴	124,630	76%	93,695	93,695
Custom	Non-Lighting	36,138	104.2%	37,640	76%	28,223	28,223
Total		210,152	107.9%	226,728	76%	171,680	171,680

³ June 1st to Aug 31st from 1:00 PM to 7:00 PM

⁴ The effective realization rates for lighting projects include the influence of HVAC interactive effects as calculated in the evaluation sample

⁵ Includes savings adjustments recommended by the Lighting Baseline Study. *IESO Business Programs: Lighting Baseline Shift Study*, April 30th, 2018

Table 3-4: Summer Peak Demand Impacts

Track	Measure Type	Reported Summer Peak Demand Savings (kW)	Realization Rate	Gross Verified Summer Peak Demand Savings (kW)	Net-to-Gross Ratio	Net Verified Summer Peak Demand Savings (kW)	Net Verified Summer Peak Demand Savings at 2022 (kW)
Prescriptive	Lighting	9,507	118.6% ^{2, 3}	11,276	75%	8,491	8,491
Prescriptive	Non-Lighting	1,130	92.3%	1,043	75%	891	891
Custom	Lighting	20,909	111.1% ⁴	23,227	75%	17,412	17,412
Custom	Non-Lighting	4,028	97.9%	3,944	75%	2,998	2,998
Total		35,574.6	111.0%	39,490	75%	29,792	29,792

The prescriptive track accounted for 55% of all projects in the PY2020 population and accounted for 29% of the first-year net verified energy savings. Alternatively, the custom track contained a lower portion of program projects (45%) yet represented 71% of the first-year net verified energy savings. The average net verified energy savings per project within the custom track (86 MWh) is approximately three times that of the prescriptive track (29 MWh). A similar trend is exhibited for the average net verified summer peak demand savings per project under the custom track (14.3 kW), which is larger than that of the prescriptive track (5.4 kW). Additional detail is provided in the following sections (3.3.1, 3.3.2, 3.3.3, 3.3.4).

Table 3-5 presents the impact results of 245 projects completed in PY2019 (April, 1 2019 to Dec 31, 2019) and true-up results for 692 projects that were completed in PY 2019 and evaluated in 2020. In order to compare the impact results for the first two years of the Interim Framework (IF) the PY2020 impact results are also presented in this table.

Table 3-5: PY2019 and PY2020 Impact Results

Measurement	Metric	2019	2020
Project Count		937	3,157
Energy	Gross Reported Savings (MWh)	45,431	210,152
	Realization Rate	118.5%	107.9%
	Gross Verified Savings (MWh)	53,858	226,727
	Net-to-gross Ratio	92%	76%
	Net Verified Savings (MWh)	49,334	171,680
Summer Peak Demand	Gross Reported Savings (kW)	7,384.95	35,574.60
	Realization Rate	133.9%	111.0%
	Gross Verified Savings (kW)	9,888.61	39,491.50
	Net-to-gross Ratio	99%	75%
	Net Verified Savings (kW)	9,799.61	29,791.40

As presented in Figure 3-3 and Figure 3-4, the annual net verified energy and summer peak demand savings are projected to persist until the end of the framework accounting period (2022), given that all measures have a minimum effective useful life (EUL) of four years.

Figure 3-3: 2020 and 2022 Net Verified Energy Savings by Track

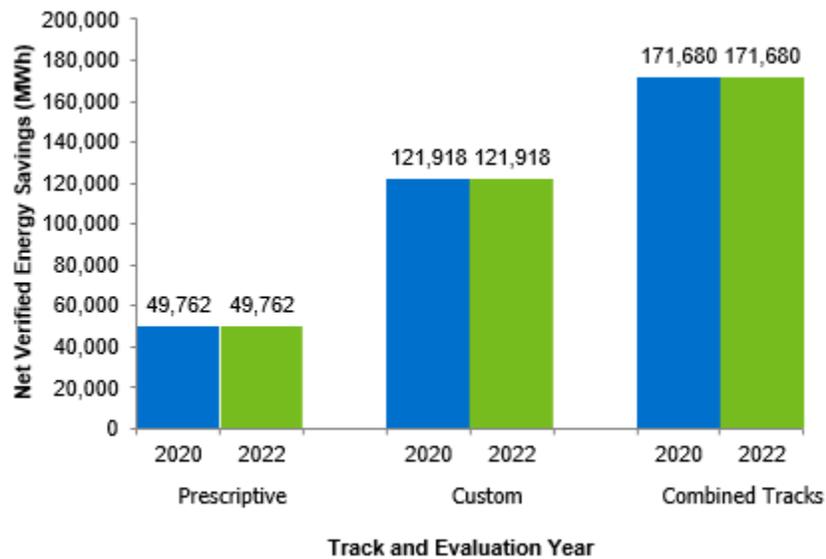
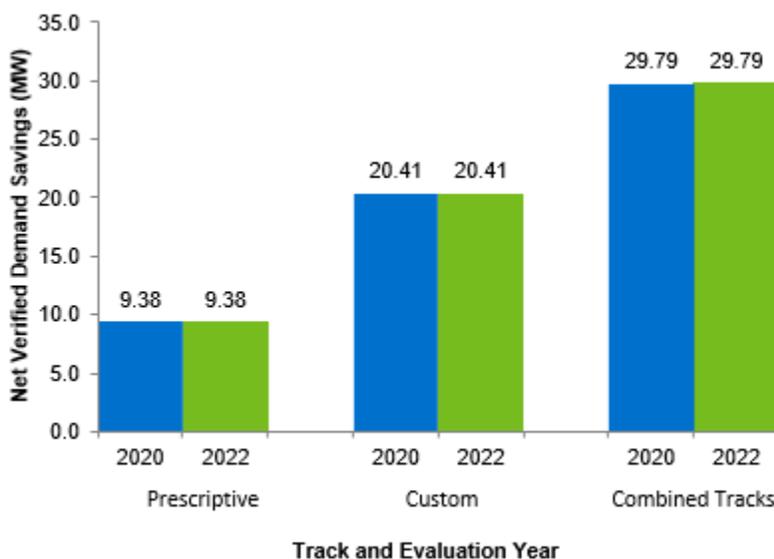
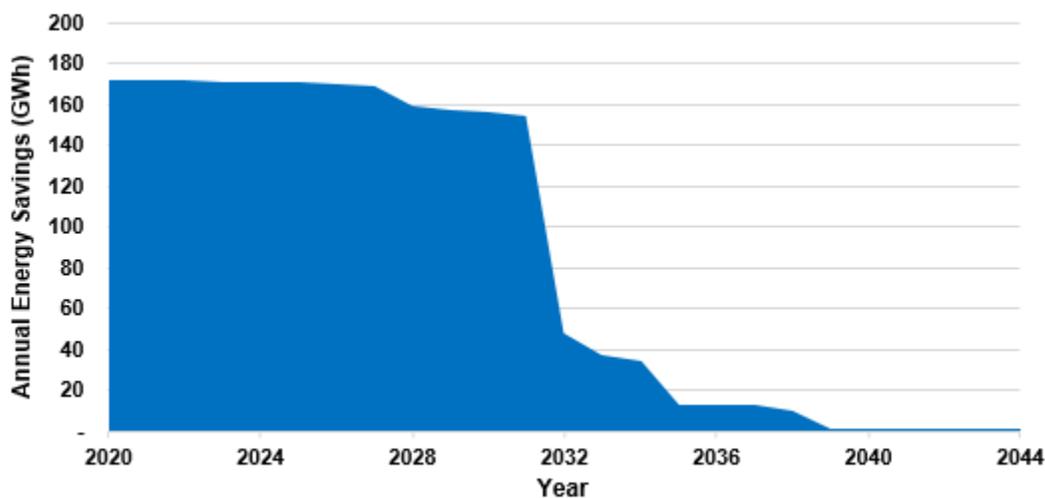


Figure 3-4: 2020 and 2022 Net Verified Summer Peak Demand Savings by Track



Equipment installed as part of the Retrofit program rules must be operated and maintained for a minimum continuous period of four years. Therefore, savings claimed in the first year of operation will persist annually and be attributable to the program until the equipment's EUL is depleted. As measures reach their EUL, program attributed savings will approach zero, and the annual incremental savings claimed by the Retrofit program in the province of Ontario will progressively decrease (Figure 3-5).

Figure 3-5: Annual Incremental Energy Savings over Time



When performing the impact evaluation, it is important to consider the total amount of savings over the lifetime of retrofitted equipment. This consideration is necessary given that energy savings, demand savings, avoided energy costs, and other benefits continue to accrue each year the equipment is in service. The method of calculating lifetime energy savings of a measure level is presented in Equation 3-1.

Equation 3-1: Lifetime Energy Savings

$$\text{Lifetime Energy Savings} = \text{EUL} \times \text{Annual Energy Savings}$$

Where:

EUL = Estimated useful life of the retrofitted equipment

The lifetime net verified energy savings for Retrofit program are estimated at 2,173 GWh, with the prescriptive track accounting for 31% and the custom track accounting for 69%. The savings are estimated using the installed measures and their corresponding EULs, as well as any lighting adjustments influenced by the lighting baseline study (Figure 3-6).

Figure 3-6: Lifetime Net Energy Savings by Track

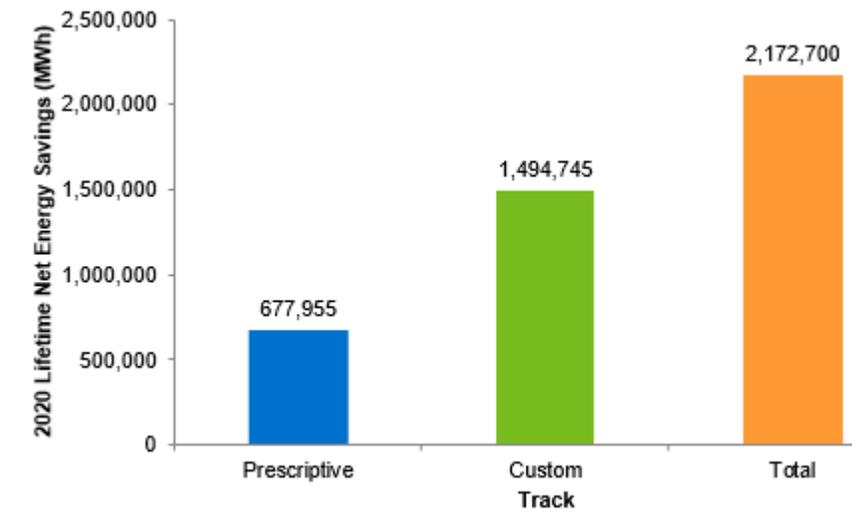


Figure 3-7 and Figure 3-8 present the distribution of the first-year net verified energy and summer peak demand savings by building type. The majority of the net verified energy (64%) and summer peak demand (65%) savings are derived collectively from commercial buildings, retail, and manufacturing facilities. The total program participation is comprised of a diverse variety of sub-sectors. The percentage of portfolio net verified energy and demand savings is similar by building type with slight difference attributable to the nature of measure end-use and operating hours that coincide with the IESO's summer peak demand window⁶.

⁶ June 1st to Aug 31st from 1:00 PM to 7:00 PM

Figure 3-7: 2020 First-year Net Energy Savings by Building Type

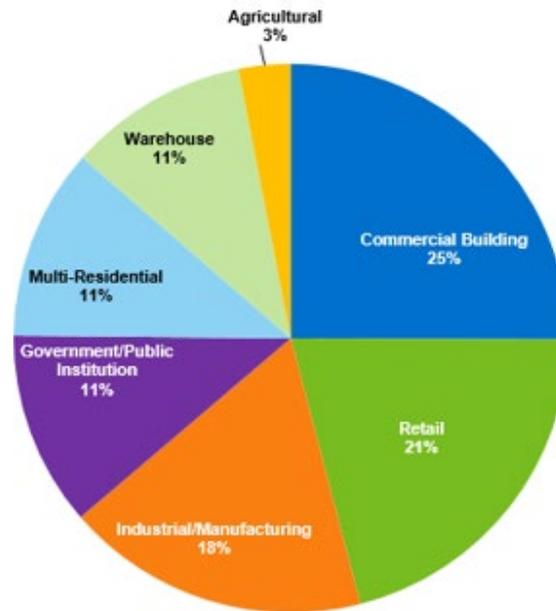


Figure 3-8: 2020 First-year Net Demand Savings by Building Type

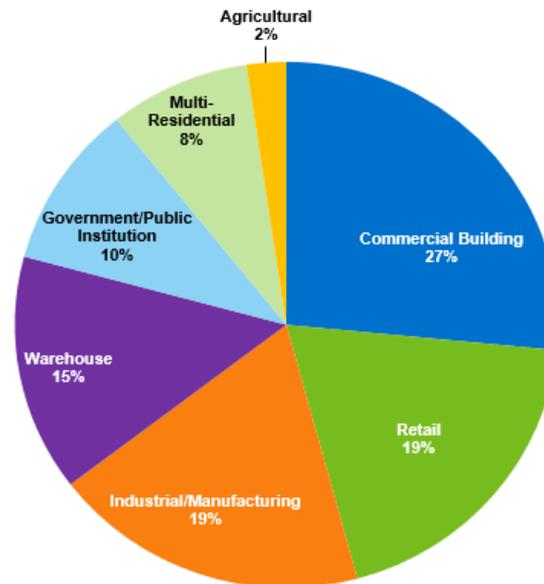


Figure 3-9 and Figure 3-10 depict the first-year net verified energy and summer peak demand savings distribution across program tracks and measure types (lighting/non-lighting). Lighting projects generated the majority of the program's net verified savings, accounting for 80% of the overall first-year net verified energy savings and 87% of the first-year net verified summer peak demand savings. The majority of non-lighting projects' savings are derived from the custom

track, accounting for 82% of the total non-lighting first-year net verified energy savings and 77% of the total non-lighting first-year net verified summer peak demand savings.

Figure 3-9: Net Verified Energy Savings by Track and Type

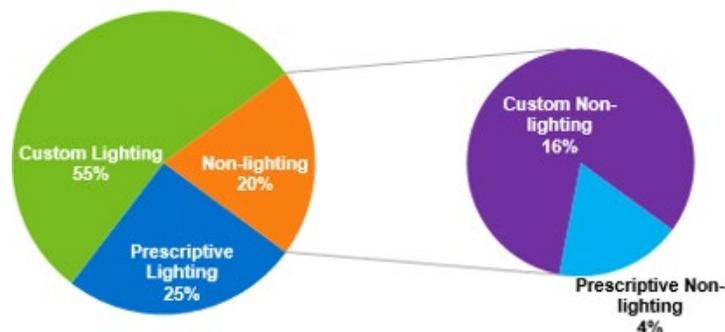
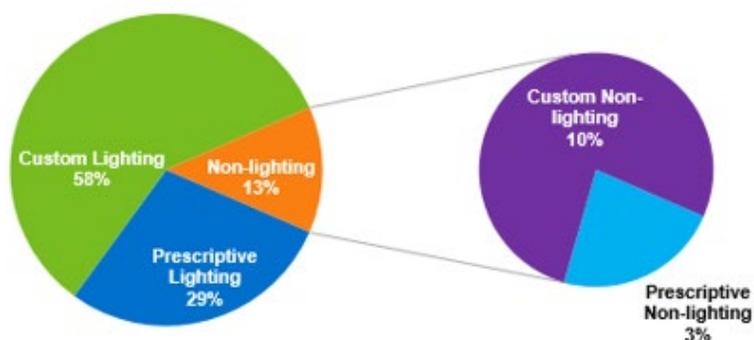


Figure 3-10: Net Verified Demand Savings by Track and Type

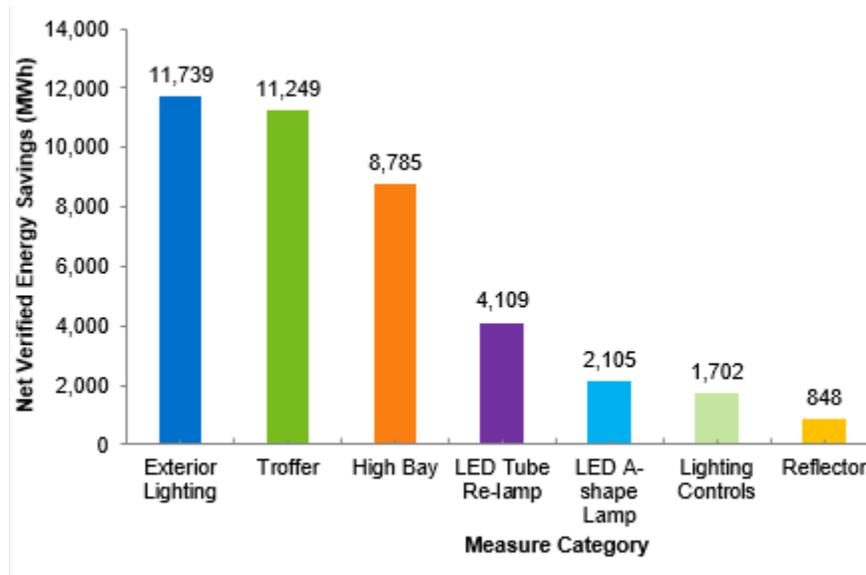


3.3.1 Prescriptive Lighting Measures

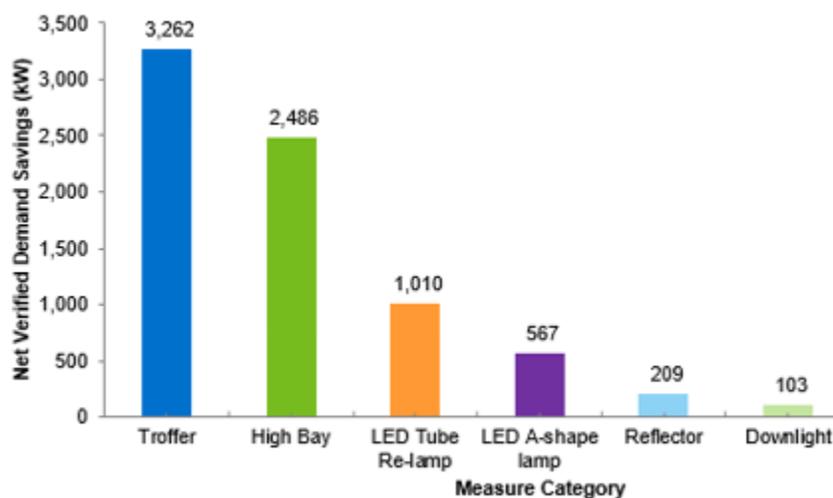
Prescriptive lighting projects accounted for 52% of all completed Retrofit projects during PY2020. They provided just over 43.5 GWh of the first-year net verified energy savings and 8.4 MW of the first-year net verified summer peak demand savings. The average first-year net verified energy and demand savings per project in this strata are 27 MWh and 5.2 kW, respectively.

The most common lighting measures installed within the prescriptive track are exterior lighting (27%), LED troffers (26%) and LED high bay fixtures (20%). Collectively, these measures account for 73% of the total first-year net verified energy savings in the prescriptive lighting strata. Additional savings are derived from LED tube re-lamps (9%), A-shape LED lamps (5%), lighting controls (4%), reflectors (2%) and a collection of smaller end-uses that have been excluded from Figure 3-11.

Figure 3-11 and Figure 3-12 present the measures that generated the highest savings in the prescriptive lighting strata.

Figure 3-11: Prescriptive Lighting Measures Net Verified Energy Savings

The main contributors to the net verified summer peak demand savings are LED troffers (38%) and LED high bay fixtures (29%). Additional net verified summer peak demand savings were generated by LED tube re-lamps (12%), A-shape lamps (7%), reflectors (2%) and downlight (1%). Exterior lighting does not contribute to the summer peak demand savings, notably for its night-time operation, which occurs outside peak demand hours. Similarly, lighting controls do not contribute to the demand savings as their operating schedule falls outside of the summer peak demand window.

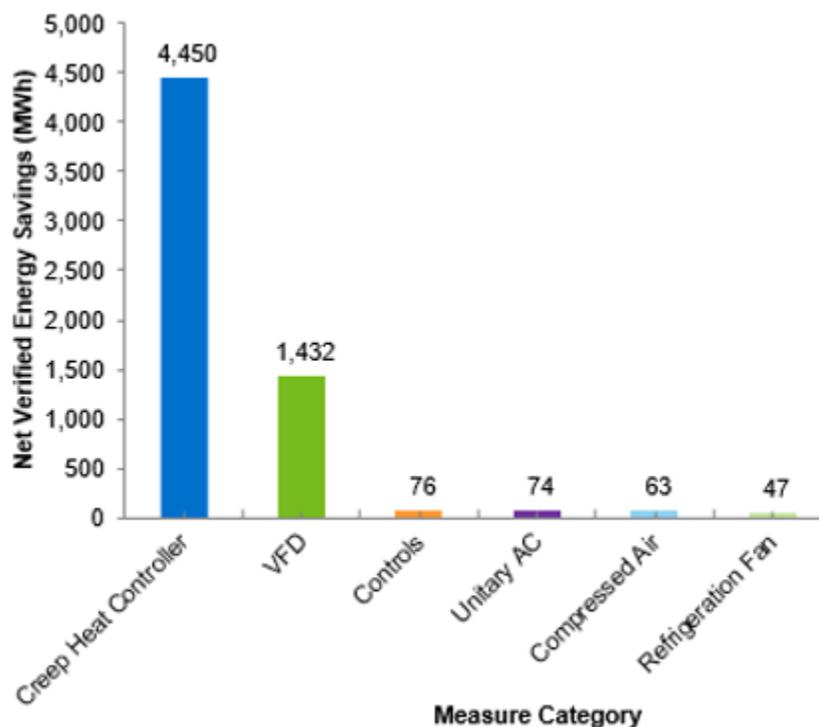
Figure 3-12: Prescriptive Lighting Measures Net Verified Demand Savings

3.3.2 Prescriptive Non-Lighting Measures

The prescriptive non-lighting stratum has the fewest completed projects (3%), accounting for merely 4% of the program's first-year net verified energy savings of 6.2 GWh in PY2020. The average first-year net verified energy savings in this strata are 56 MWh per project.

Creep heat controllers account for 72% of the prescriptive non-lighting measures' first-year net verified energy savings (4.4 GWh). These savings were generated by four large projects (an average of 1.1 GWh/per project). Variable Frequency Drives (VFDs) account for 23% of the prescriptive track's first-year net verified energy savings, as presented in Figure 3-13. Other measures include controls, Unitary AC, compressed air, and refrigeration fans, with each generating roughly 1% of the total net verified energy savings.

Figure 3-13: Prescriptive Non-lighting Measures Net Verified Energy Savings



3.3.3 Custom Lighting Measures

Custom lighting projects comprise 37% of the total completed project population in PY2020. The first-year net verified energy and summer peak demand savings for these projects are 93.6 GWh and 17.4 MW, respectively. Although the total number of projects in the custom lighting strata (1,157) is lower than the prescriptive lighting strata (1,629), the average net verified energy savings per project in this track is significantly greater (81 MWh versus 27 MWh).

LED high bay fixtures and LED tube re-lamps generated the majority of the first-year net verified energy savings (66%) and summer peak demand savings (72%) of the custom lighting track. Additional savings were achieved by signage (12% energy savings and 7% demand savings), exterior lighting measures (4%/0%), reflectors (3.3%/4%), ambient lighting (3%/4%), lighting controls (2.7%/0%) and LED troffers (2.5%/3%).

Figure 3-14 and Figure 3-15 present the lighting measures that generated the highest first-year net verified energy and demand savings in the custom track.

Figure 3-14: Custom Lighting Measures Net Verified Energy Savings

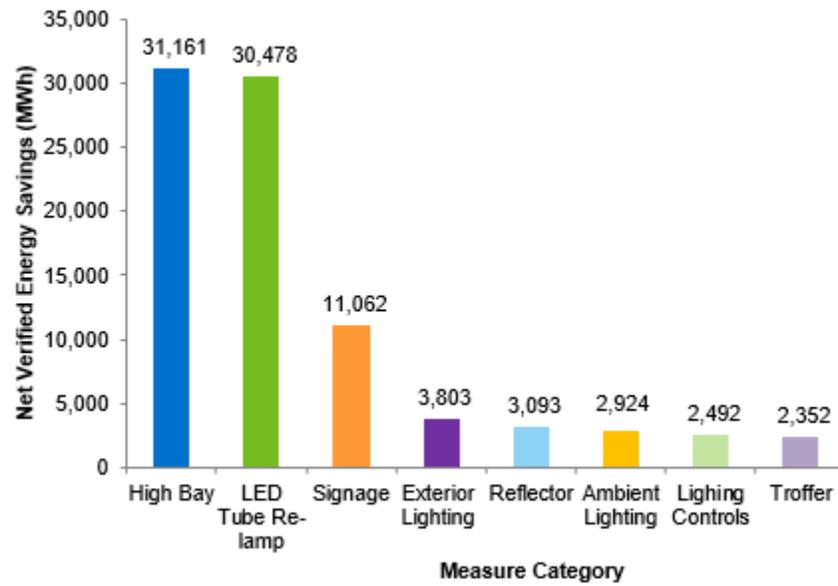
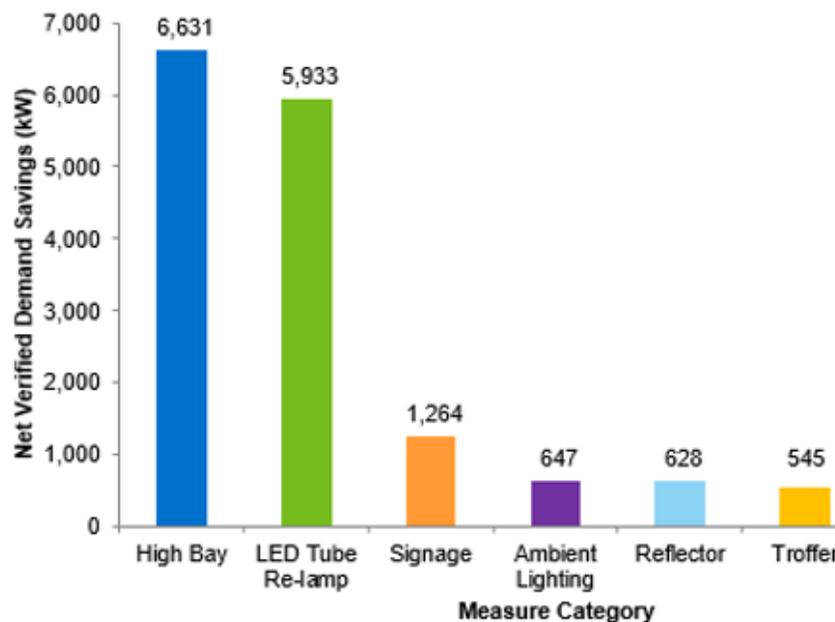


Figure 3-15: Custom Lighting Measures Net Verified Demand Savings



LED high bay fixtures, the most common lighting measure in custom track, generated 31,161 MWh of the first-year net verified energy savings. These savings are almost four times higher from the same measure via the prescriptive track (8,785 MWh). The first-year net verified summer peak demand savings for high bay fixtures account for nearly 40% (6,631 kW) of the total custom lighting's first-year net verified summer peak demand savings in PY2020. These savings are almost three times higher than net verified summer peak demand savings generated by this measure via the prescriptive track (2,486 kW).

The second popular lighting measure in the custom track, LED tube re-lamp, generated 30,478 MWh of the first-year net verified energy savings. These savings are over seven times greater than the net verified energy savings achieved by the same measure via the prescriptive track (4,109 MWh). Additionally, the net verified summer peak demand savings generated by LED tube re-lamps through the custom track (5,933 kW) is nearly six times greater than the net verified summer peak demand savings generated by this measure through the prescriptive track (1,010 kW).

The project count containing these two common measures in the custom track is higher than the prescriptive track. Specifically, the project count containing LED high bay fixtures in the custom track is 25% higher than that of the prescriptive track (360 versus 272). The project count containing LED tube re-lamps is over four times higher in the custom track (593) versus the prescriptive track (134). In conclusion, greater quantity and generated savings per project with common lighting measures installed under both custom and prescriptive track such as LED high bay and LED tube re-lamp measures account for the higher net verified savings under the custom track compared to prescriptive track. LED high bay and LED tube re-lamp fixtures under custom projects had almost 50% and 40%, respectively, higher verified hours of operation than prescriptive projects. The prevalence of these measures through the custom track can be attributed to the equipment's higher verified hours of operation rather than the prescriptive track assumptions.

The custom track offers flexibility to the participant to provide the actual operating hours of equipment within the custom worksheet. In contrast, the prescriptive track assumes operating hours for each measure based on facility type. For applications where the equipment's actual operating hours are greater than the prescriptive track assumptions, participants may be enticed to apply under the custom track where they may encounter greater savings and incentive values relative to the prescriptive track. Verification of equipment operating hours was validated by examining the custom track's sample projects, which confirmed that these hours are accurately reported.

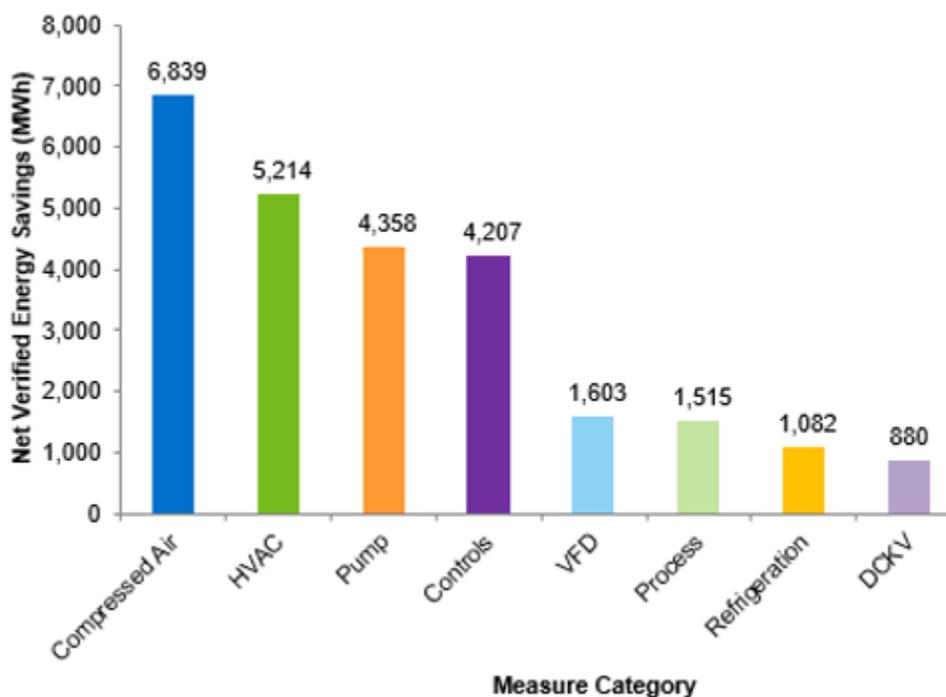
3.3.4 Custom Non-Lighting Measures

Custom non-lighting projects include the installation or replacement of a wide range of measures for non-lighting equipment. With 28.2 GWh of the first-year net verified energy savings, custom non-lighting measures accounted for 16% of the overall net verified energy savings. On average, these projects generated 107 MWh of the first-year net verified energy savings per project. These savings are nearly two times greater than the average net verified energy savings of the prescriptive non-lighting strata projects (56 MWh).

As presented in Figure 3-16, the compressed air measure is the highest contributor to the first-year net verified energy savings of the custom non-lighting track (24%). Other contributing measures include HVAC (18%), pumps (15.5%), controls (15%), variable frequency drive (VFD) (6%), process and system upgrade (5%), refrigeration (for example, ECM motor replacement) (4%) and demand control kitchen ventilation (DCKV) (3%).

Figure 3-16 presents the first-year net verified energy savings for non-lighting measures within the custom track.

Figure 3-16: Custom Non-Lighting Measures Net Verified Energy Savings



Common non-lighting measures were identified under both the prescriptive and custom tracks. However, they are present in greater quantities and achieve higher savings through the custom track. For example, the number of compressed air projects under the custom track (32) is nearly three times higher than the prescriptive track (11). Additionally, the net verified energy savings generated by this measure under the custom track (6,839 MWh) are significantly higher than the prescriptive track (63 MWh). On average, compressed air projects generated 215 MWh of the first-year net verified energy savings under the custom track and 9 MWh under the prescriptive track.

Similarly, despite being one of the most common measures in the prescriptive track, the VFD measure generated 12% higher savings in the custom track (1,603 MWh versus 1,432 MWh). Under the custom track, the average net verified energy savings per VFD project is 94 MWh, compared to 35 MWh under the prescriptive track.

The prevalence of these measures in the custom track is driven by the flexibility to utilize the actual operating conditions of the equipment within the custom track application. In instances when the equipment's actual operating hours exceed the prescriptive track assumptions, utilizing the custom track results in greater energy savings and incentives. As a result, the custom track contains non-lighting projects, which are larger in quantity and savings than the prescriptive track. For example, the average hours of operation for VFD measures submitted through the custom track in the evaluation sample was 7,690 hours. In contrast, the assumed hours of operation for this measure within the prescriptive worksheet was 3,963 hours.

3.4 Key Findings and Recommendations

The key impact findings are listed below and prioritized based on impact on realization rate (RR):

- Assumed hours of use (HOU) and base case wattage for LED recessed downlights may be inconsistent with actual HOU and base case wattage. Review of 25 evaluated prescriptive lighting projects containing LED recessed downlights provided weighted average of 5,898 hours per year of lighting operation and 0.057 kW base case, which is much higher than the program assumed HOU of 3,820 and base case of 0.024 kW
- Assumed HOU and base case wattage for omni-directional A-shape lamps may be inconsistent with actual HOU and base case wattage. Review of 14 evaluated prescriptive lighting projects containing omni-directional A-shape lamps provided weighted average of 3,787 hours per year of lighting operation and 0.044 kW base case, which is higher than the program assumed HOU of 3,215 and base case of 0.028 kW.
- Assumed HOU and retrofit case wattage for LED troffers may be inconsistent with actual HOU and retrofit case wattage. Review of 103 evaluated prescriptive lighting projects containing LED troffers provided weighted average of 4,635 hours per year of lighting operation and 0.033 kW retrofit case which is higher than the program assumed HOU of 3,838 and lower than the 0.042 kW retrofit case respectively. This inconsistency was observed in 2' x 4' LED troffer more than any other LED troffer type.
- Assumed HOU, base case and retrofit case wattage for Unitary AC may be inconsistent with the actual HOU, base case and retrofit case wattage. Review of 7 evaluated prescriptive non-lighting projects containing Unitary AC provided weighted average of 1,239 hours per year of effective full load hours (EFLH), 1.223 kW base case and 0.988 kW retrofit case which is higher than the program assumed HOU of 600, 1.129 kW base case and lower than the 1.024 kW retrofit case respectively.

It is recommended for the IESO to review these findings and consider making adjustments to the prescriptive measure assumptions for the HOU, retrofit and base case wattage.

3.5 Cost Effectiveness

Cost effectiveness (CE) for the Retrofit program achieved a TRC ratio of 1.02 in PY2020 and PAC ratio of 2.20 (Table 3-6). Each of these tests exceeded the targets of 1.00 set to determine if a program is cost effective.

Table 3-6: 2020 Retrofit Cost Effectiveness Results

Cost Effectiveness Test	Value
Total Resource Cost (TRC)	Value
TRC Costs (\$)	\$ 91,263,150
TRC Benefits (\$)	\$ 93,063,912

Cost Effectiveness Test	Value
TRC Net Benefits (\$)	\$ 1,800,762
TRC Net Benefit (Ratio)	1.02
PAC Costs (\$)	\$ 41,313,073
PAC Benefits (\$)	\$ 90,933,185
PAC Net Benefits (\$)	\$ 49,620,112
PAC Net Benefit (Ratio)	2.20
\$/kWh	\$ 0.03
\$/kW	\$ 151.50

3.6 Net-to-Gross Evaluation

Table 3-7 presents the results of the PY2020 Retrofit program Net-to-Gross (NTG) evaluation. The evaluation team targeted and achieved 90% confidence and 10% precision levels in the savings results. The analyses performed to assist in the interpretation of these values are summarized in the following subsections, with additional information available in Appendix D.

Table 3-7: Retrofit Program Net-to-gross Results

Unique Participants	NTG Responses	Savings Weighted Free-ridership	Spillover, energy	Spillover, summer peak demand	Net-to-Gross, energy	Net-to-gross, summer peak demand	Energy Precision
1,804	431	23.6%	0.8%	0.6%	77.2%	77.0%	± 4.1%

*Note: FR: Free-ridership, SO: Spillover; NTG: Net-to-gross

3.6.1 Key Findings

Key findings from the NTG analysis include the following:

- Participant feedback indicates moderately high levels of FR at 23.6%.
 - One-third (33%) of respondents stated they would have done the “exact same upgrade” in the program’s absence or were unsure of what they would have done, indicating full or partial FR among these respondents.
 - Two-thirds (67%) of respondents reported they would not have completed an upgrade, would have postponed it, or would have completed a scaled-back version of it in the program’s absence, indicating low FR among these respondents.

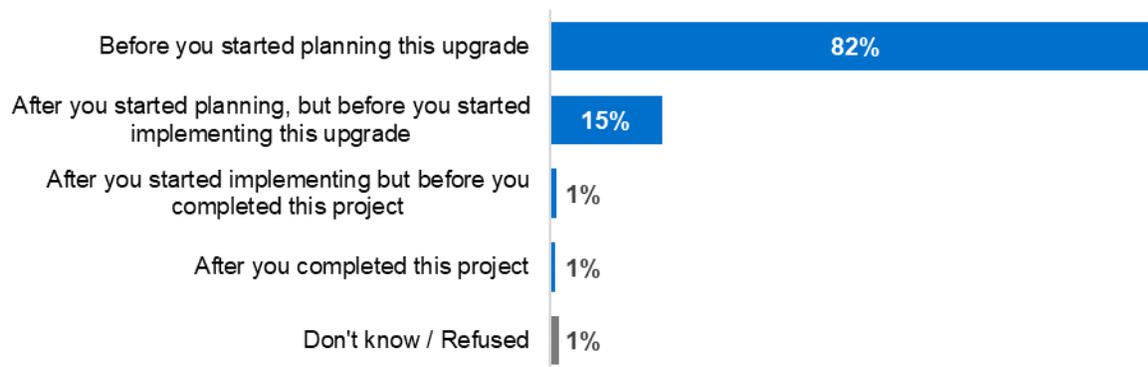
- Nearly three-fourths (72%) of respondents' decisions to participate in the program were influenced by the information or recommendations provided by contractors, vendors, or suppliers associated with the program. This matched the percentage that stated the availability of incentives was most influential.
 - About one-half (46%) of respondents selected energy-efficient equipment based on their contractor's suggestions, emphasizing their important role in helping drive customers to efficient equipment decisions. Another one in six (17%) selected from a shortlist suggested by their contractor.
 - Participation in the program resulted in a low SO at 0.8%. SO savings were primarily driven by the installation of new lighting measures.

3.6.2 Free-ridership (FR)

The extent of FR within the program was assessed by surveying Retrofit program participants to understand their experiences and plans before learning about the program, what they would have done in the program's absence, and how influential the program was on their decision to implement the energy-efficient upgrades.

Nearly eight out of every ten respondents (82%) stated they first learned they could receive energy-efficiency incentives through the Retrofit program before starting to plan their upgrades (Figure 3-17). This may suggest the program was influential in many of these respondents' decisions to begin the project. One in six respondents (15%) learned about the program after planning had started but before beginning the project. The remainder learned after beginning but before completing their projects (1%), after completing the project (1%), or did not know or refused to answer (1%). While responses to this question did not directly impact the FR score, they provided additional context for understanding the participants' decision-making processes.

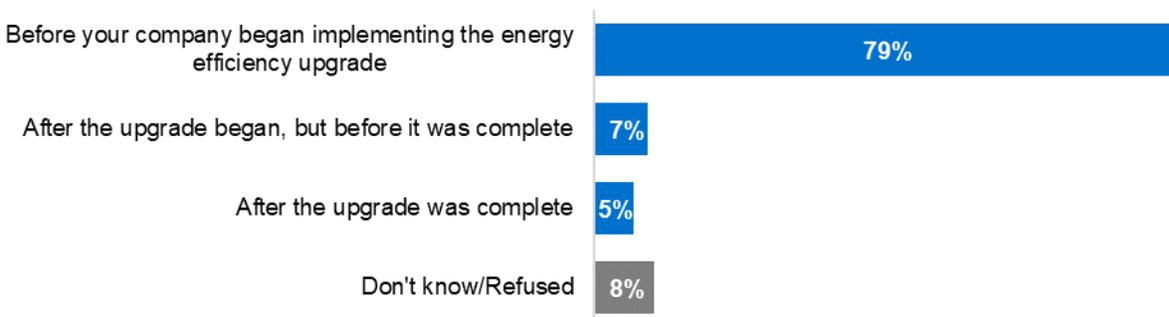
Figure 3-17: When Participants First Learned About the Program (n=431)



Participants were then asked about the timing of their application to the program in relation to the start of their energy-efficient upgrades (Figure 3-18). Four out of five respondents (79%) indicated they applied before their company began implementing the upgrade, suggesting that most participants apply to the program as intended. Less than one in ten (7%) did so after their energy-efficiency upgrades began but before its completion. The remainder either did so after the upgrade was complete (5%) or did not know or refused to answer (8%). Similar to the

previous question, this question was not used to calculate the FR score, yet it provided additional context regarding participant intentions.

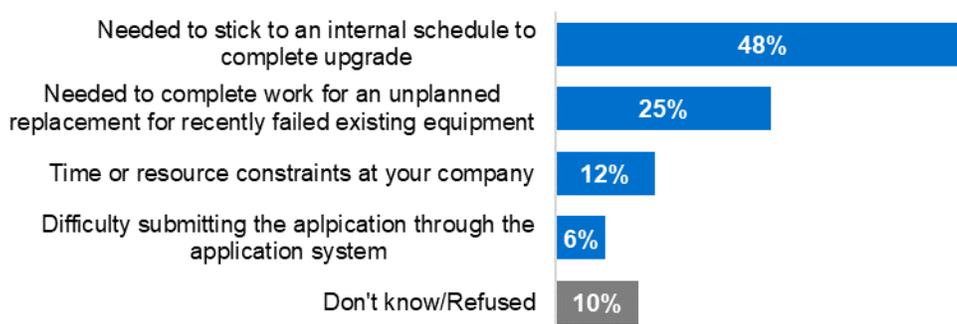
Figure 3-18: Timing of Program Application (n=431)*



*Does not add to 100% due to rounding.

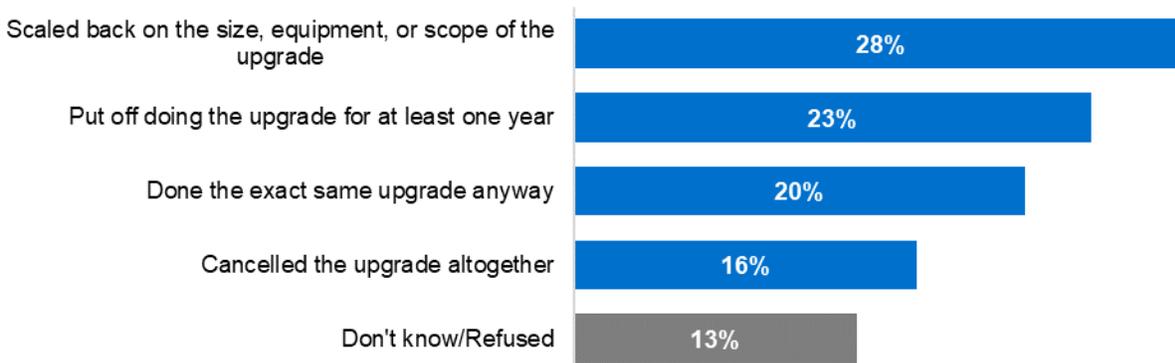
Respondents whose companies submitted a Retrofit program application after starting an energy-efficiency upgrade were asked their reasoning for doing so (Figure 3-19). One-half of respondents stated they were sticking to an internal schedule (48%). Another one-fourth was completing work for an unplanned replacement (25%). Additional responses included time or resource constraints at their company (12%), difficulty submitting their application (6%), or they did not know or refused to answer (10%). The responses suggest that many of these respondents would have applied earlier if it had been possible. While responses to this question did not directly impact the FR score, they provide additional context for understanding the participants' decision-making processes.

Figure 3-19: Reason for Submitting After Starting Upgrade (n=52)*



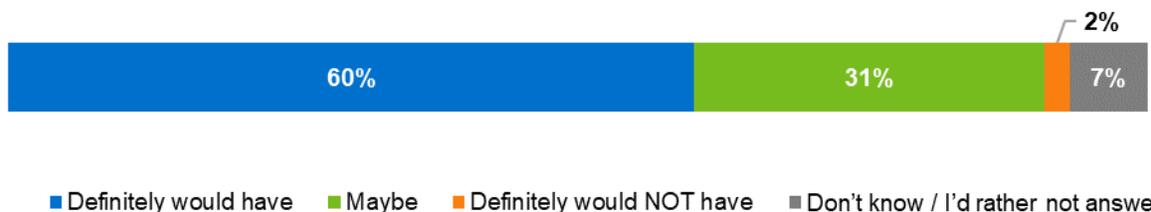
*Does not add to 100% due to rounding.

Respondents were then asked what they would have done in the program's absence (Figure 3-20). Overall, their responses suggest moderate FR as close to one-fifth would have done the "exact same upgrade" anyway (20%), which is indicative of partial or full FR for these respondents. However, over two-thirds of the remaining respondents (67%) would have put off, cancelled, or installed less expensive or less efficient equipment without the program's support. Responses from this participant intent question were factored into the FR analysis.

Figure 3-20: Actions in Absence of Program (n=431)

Respondents who indicated they would have installed less energy-efficient or less expensive equipment were then asked to describe how much they would have reduced the project's size, scope, or efficiency. Over one-half of these respondents (58%) would have scaled it back by a moderate amount. These results indicate the program allowed these participants to increase their project's size and/or extent beyond what they would have achieved on their own. The remaining participants were split between those who would have scaled back their projects by a large amount (19%), those who would have scaled it back by a small amount (15%), and those who did not know how their project scope would have changed (8%). This question was not used to calculate the FR score, though it provided additional context around participant intentions.

Respondents who stated they would have done the "exact same upgrade" in the program's absence were asked to confirm they would have had the funds to cover the project's entire cost without the program funding (Figure 3-21). Nearly two-thirds (60%) of respondents stated they definitely would have had the funds to cover all project costs, twice as many as the respondents who stated they might have had the funds (31%). Nearly one in ten (7%) respondents did not know or refused to answer. Only two respondents (2%) stated they definitely would not have had the necessary funds. This feedback indicates some degree of FR and suggests the program may have helped a portion of these participants complete projects they might not have been able to independently. This participant intent question was factored into the FR analysis.

Figure 3-21: Availability of Funds in Absence of Program Incentives (n=88)

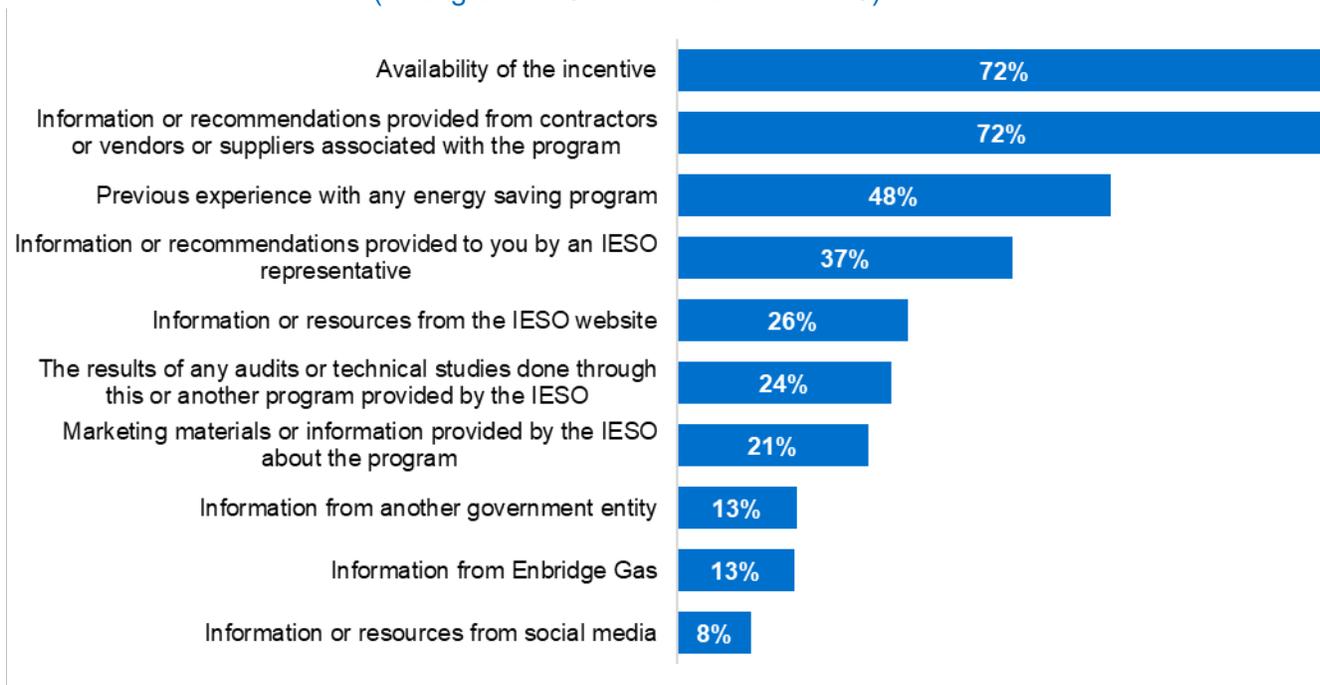
Respondents were asked how influential various program features were on their decision to install energy-efficient equipment (Figure 3-22). They rated each feature's influence on a scale from one (1) to five (5), where one indicates it had "no influence at all" and five indicates it was

“extremely influential.” The highest-rated responses were the availability of incentives and the recommendations from contractors, vendors, or suppliers (72% with a rating of 4 or 5 for each response). The next most influential program feature was a previous experience with energy-saving programs (48% with a rating of 4 or 5). This question, which focuses on the program’s influence, along with the prior questions about customer intentions, was used to estimate the FR score.

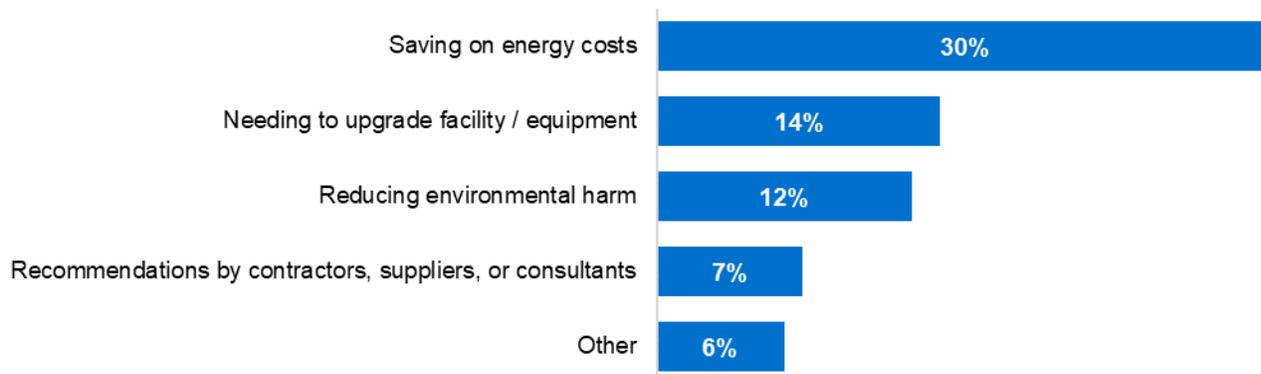
The findings from this question emphasize the contractor, vendor, and supplier networks’ strength in driving Retrofit program engagement. Their interactions with customers are valuable on their own but more generally help familiarize customers with energy-saving programs and influence future participation beyond the Retrofit program.

Figure 3-22: Influence of Program Features on Participation (n=431)

(Rating of 4 or 5 on a scale from 1 to 5)



When respondents were asked whether any other factors played “a great role” in influencing their organization to install the energy-efficient equipment, the respondents’ answers varied widely (Figure 3-23). The most common responses included saving on energy costs (30%), the need to upgrade their facility and/or equipment (14%), and environmental reasons (12%).

Figure 3-23: Other Influential Factors on Upgrade Decision (n=182)*

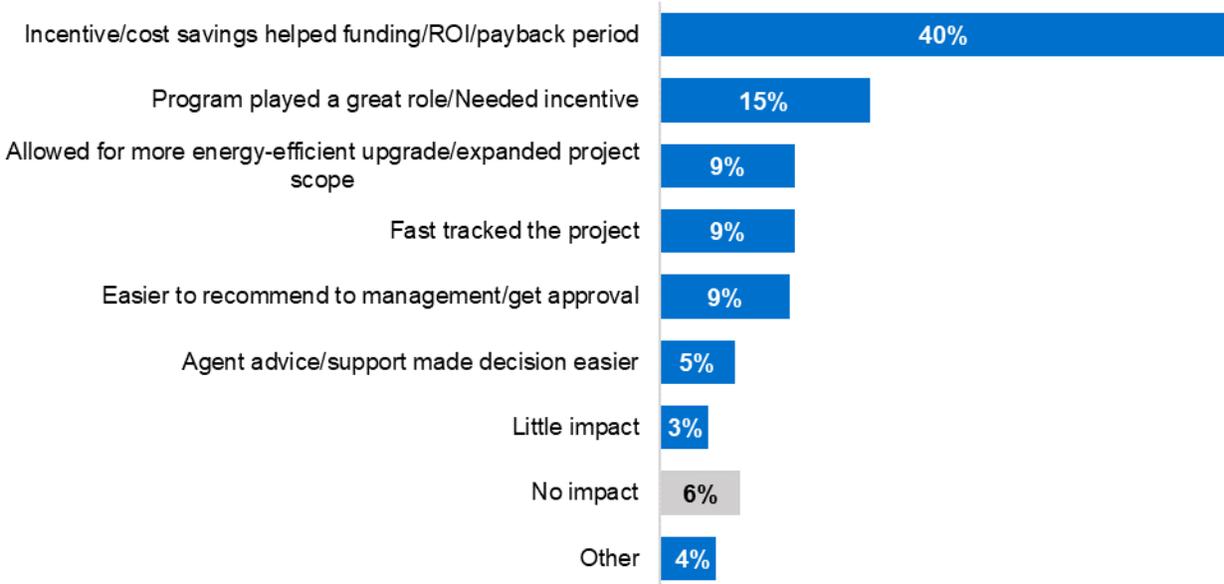
*Does not sum to 100% due to multiple response.

P2 participants were asked to explain in their own words what impact, if any, the financial support or technical assistance they received from the program had on their decision to install the program incentivized equipment at the time that they did. (Figure 3-24). Of the nine in ten (91%) P2 respondents who responded, the most common response related to being influenced to install the equipment because the financial incentive helped their funding, ROI, or payback period (40%). Other respondents said the program played a great role and they needed the

incentive (15%); the financial incentive allowed for a more energy-efficient upgrade or expanded project scope (9%), fast tracked the project (9%), or made it easier to recommend equipment to management and get approval (9%).

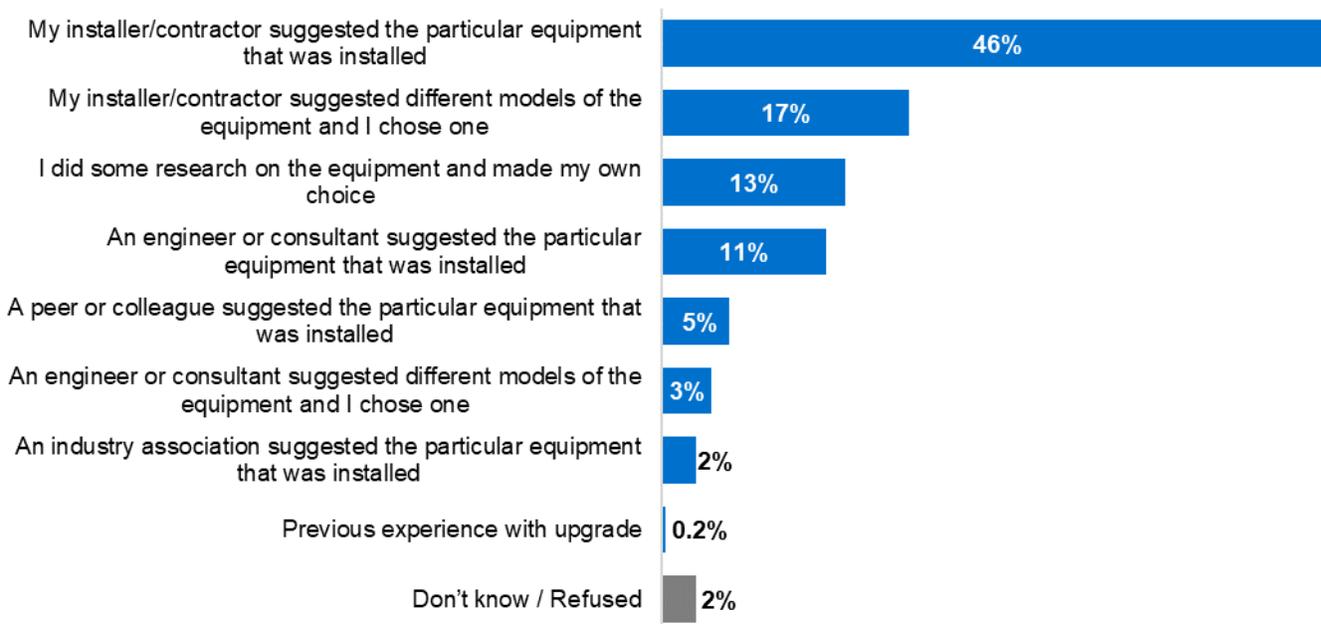
Figure 3-24: Program Impact on Decision to Install Equipment*

(Open end and multiple response allowed; n=210)



*Does not sum to 100% due to multiple response.

As shown in Figure 3-25, nearly one-half (46%) of surveyed participants selected equipment based on their installer's or contractor's suggestions, which is three to four times the number of participants who chose from a shortlist of equipment models provided by their installer or contractor (17%), did their own research (13%) or followed an engineer's or consultant's suggestions (11%). This reinforces the importance of contractors' role in helping drive customers to efficient equipment decisions.

Figure 3-25: Equipment Selection Process (n=431)*

*Does not sum to 100% due to rounding.

In summary, FR results among the Retrofit program participants indicate moderately high FR levels at 23.6%. Two-thirds (67%) of respondents reported they would not have completed an upgrade, would have postponed it, or would have completed a scaled-back version of it in the program's absence. One in five (20%) respondents would have done the "exact same upgrade" anyway. Close to one in six (13%) did not know or refused to answer the question. The latter two results suggest there is still some room for FR improvements in future program years.

3.6.3 Spillover (SO)

To estimate the SO rate, participants were asked if they installed any energy-efficient equipment for which they did not receive an incentive following their participation in the Retrofit program. Almost one-fifth (17%) reported installing new equipment.

Table 3-8 displays the types of non-incentivized equipment installed by companies after their Retrofit project was completed. Some survey respondents installed multiple equipment types. Non-incentivized lighting was the most common equipment installed. Two-thirds of respondents (65%) stated they installed lighting, more than three times the number that mentioned any other equipment type.

Table 3-8: Types of Upgrades Installed after Program Participation
(Multiple response allowed; n=430)*

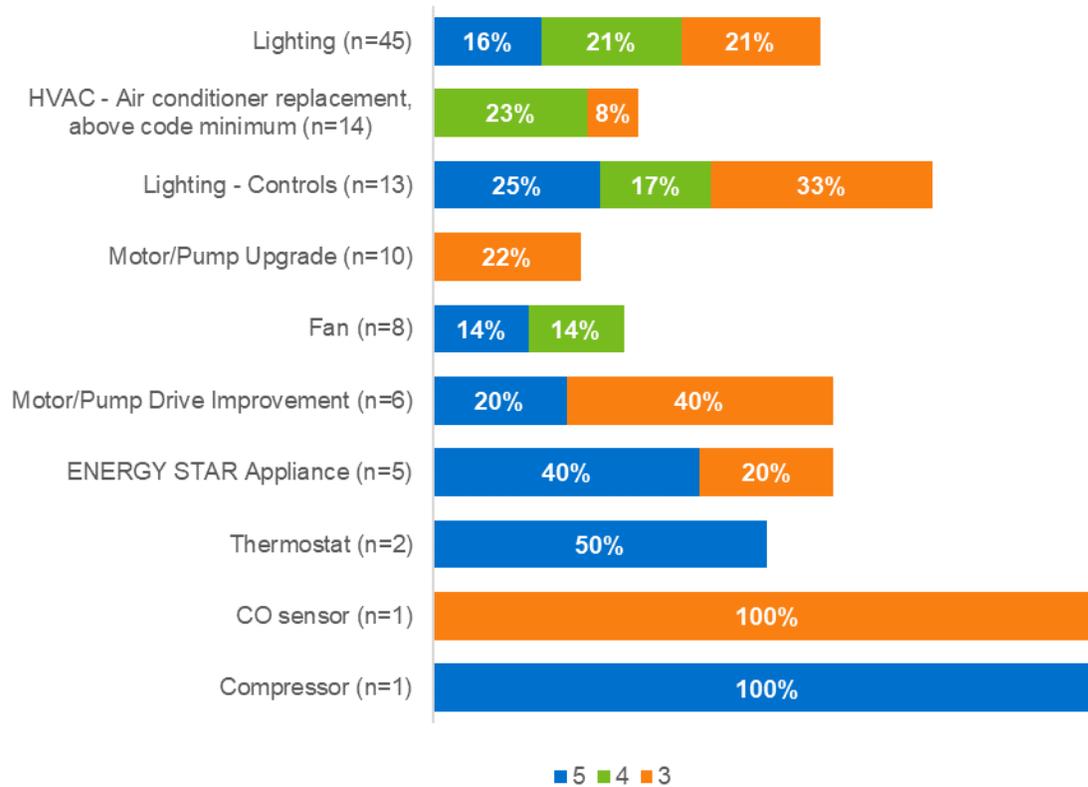
Upgrade	Respondents
Lighting	65%
HVAC - Air Conditioner Replacement, Above Code Minimum	19%
Lighting - Controls	19%
Motor/Pump Upgrade	14%
Fan	12%
Motor/Pump Drive Improvement	9%
ENERGY STAR® Appliance	7%
Thermostat	3%
Other	9%

*Does not sum to 100% due to multiple response. One response missing due to partial survey responses.

Respondents were then asked what level of influence their participation in the Retrofit program had on their decision to install this additional energy-efficient equipment. Participants rated the program's influence on a scale from one (1) to five (5), where one indicates the program had "no influence at all" and five indicates the program was "extremely influential."

The percent of survey respondents influenced by the program (a score of 3 or higher) is shown in Figure 3-26 for each equipment type. Among equipment types with more than two respondents, SO in lighting controls was most influenced by the Retrofit program. Three-fourths of lighting controls respondents (75%) rated the program's influence a 3, 4, or 5. Close to three-fifths of respondents (58%) with SO in lighting gave a rating of 3, 4, or 5. Respondents who provided neutral ratings (3) were treated as having partial SO, or one-half of the savings attributable as SO.

Figure 3-26: Program Influence⁷ on Equipment Installed Outside the Program
(Multiple response allowed; n=69)



Participants who had indicated they installed the program-influenced non-incentivized equipment were then asked a series of follow-up questions (for example, capacity, efficiency, annual hours of operation). These detailed questions are displayed in Appendix C. These questions were used within the NTG algorithm to attribute SO savings to each equipment installation. SO savings were primarily driven by the installation of 1,399 new LED linear bulbs and 200 new exterior LEDs.

⁷ Defined by a response of 3 or greater on a scale up to 5

4 Process Evaluation

A process evaluation was performed to better understand the design and delivery of the Retrofit program. Program staff interviews as well as applicant representative, contractor, and participant surveys were utilized to gather primary data to support this evaluation. In the sections below, if the number of respondents to a question is under 20, counts are shown rather than percentages. The results should be considered as directional given the small number of respondents.

4.1 Process Evaluation Methodology

4.1.1 Sampling, Interviews, and Surveys

The process evaluation focused on program design and delivery. Program processes were assessed through interviews and surveys with relevant program actors, including the IESO program staff, program delivery vendor staff, applicant representatives, contractors, and participants. For each respondent type, a customized interview guide or survey instrument was developed to ensure responses produced comparable data and allowed for the inference of meaningful conclusions. Table 4-1 presents the survey methodology, the total population invited to participate in the surveys or interviews, the total number of completed surveys, and the sampling error at the 90% confidence level for each respondent type. The following subsections provide context regarding each surveyed group.

Additional detail regarding the process evaluation methodology can be found in Appendix C.

Table 4-1: Process Evaluation Primary Data Sources

Respondent Type	Methodology	Population	Completed	90% CI Error Margin
IESO Program Staff	Phone In-depth Interviews (IDIs)	2	2	0%
Program Delivery Vendor Staff	Phone IDIs	3	3	0%
Applicant Representatives and Contractors	Web Survey	471	74	8.8%
Participants (P1 & P2) ¹	Web and Phone Survey	1,804	431	3.5%

4.1.1.1 IESO Program Staff and Program Delivery Vendor Staff Interviews

In-depth interviews (IDIs) were completed with two members of the IESO program staff and three members of the program delivery vendor staff. The appropriate staff to interview were identified in consultation with the IESO EM&V staff. Interview topics included:

- program roles and responsibilities

¹ The participant survey was completed twice with the first survey completed with participants who completed projects in Q1 or Q2 of PY2020 (referred to as Period 1, or P1) and the second survey completed with participants who completed projects in Q3 or Q4 of PY2020 (referred to as Period 2, or P2).

- program design and delivery
- marketing and outreach
- applicant representative and contractor engagement
- customer engagement
- program strengths and weaknesses
- suggestions for improvement

4.1.1.2 Applicant Representative and Contractor Survey

A total of 471 unique companies in the sample were emailed to request their participation in a web survey. A total of 74 applicant representatives and contractors responded to this request and completed the survey. The sample was developed from program records provided by the IESO EM&V staff. The survey topics included:

- firmographics
- program roles and responsibilities
- audits and/or projects completed
- impacts of the new incentive cap on project scope
- program-specific communications from the IESO
- how customers heard about the program
- training and education
- barriers to participation
- satisfaction with various aspects of the program
- program improvement suggestions
- FR and SO
- jobs impacts
- impacts of the COVID-19 pandemic

4.1.1.3 Participant Survey

A total of 1,804 unique companies in the sample were contacted by phone or email to request their participation in a web and phone-based survey. A total of 431 participants responded to this request and completed the survey.

The participant survey was completed twice with the first survey completed with participants who completed projects in Q1 or Q2 of PY2020 (referred to as Period 1, or P1) and the second survey completed with participants who completed projects in Q3 or Q4 of PY2020 (referred to as Period 2, or P2). In some instances, process questions that were asked in one survey were not asked in the other survey. This was done to cover a wide range of topics across both surveys while limiting survey length for respondents.

The sample was developed from program records provided by the IESO EM&V staff. The survey topics included:

- firmographics
 - energy management training path or certification
 - experiences with and suggestions for improvement of the Retrofit Application Portal (P1 only) and application process
 - impacts of the new incentive cap on project scope
 - satisfaction with program-specific communications from the IESO (P1 only)
 - experience with and suggestions for improvement of the program website and Retrofit Support Line (P2 only)
 - impact of program deadline on participation (P2 only)
 - participation in other programs
 - FR and SO
 - job impacts
- impacts of the COVID-19 pandemic

4.2 IESO Program Staff and Program Delivery Vendor Staff Perspectives

The following subsections highlight the feedback received from the IESO program staff and program delivery vendor staff.

4.2.1 Key Findings

Key findings from the IESO program staff and program delivery vendor staff IDIs include the following:

- The IESO staff indicated they worked closely with the delivery vendors to deliver the program as effectively and consistently as possible, despite the challenges associated with the vendor transition and the onset of the COVID-19 pandemic in 2020.
- The IESO developed a vendor guide to address common questions during the transition, a COVID-related guide to define protocols and procedures, and a Retrofit Hub to allow the vendors to review past decisions on relevant topics.
- Similar to 2019, the Retrofit program was minimally advertised by the IESO in 2020. Delivery vendors and contractors were tasked with outreach and lead generation specific to their geographic region.
- Delivery vendors reported some issues with the Retrofit program's Application portal, especially earlier in the year, though some issues persisted throughout the year. The IESO staff indicated their plans for updating the portal in 2021.

- The delivery vendor staff emphasized the importance of improving the clarity of the communications provided by the IESO to the market and service providers (such as what is posted on the Save on Energy website or distributed in newsletters).
- In the future, the IESO staff stated they would continue improving the customer experience, vendor efficiency, and the program's cost-effectiveness.

4.2.2 Design and Delivery

In PY2019, the first year of the Interim Framework, the Retrofit program was delivered by two transitional delivery vendors. In 2020, the Retrofit program's delivery transitioned to three delivery vendors who were each tasked with delivering the program to a specific region within the province.

The IESO staff indicated they worked closely with the delivery vendors to deliver the program as effectively and consistently as possible, despite the challenges associated with the vendor transition and the onset of the COVID-19 pandemic.

Delivery vendors indicated that collaboration with the IESO and the transitional delivery vendor generally worked well. They valued the consistent meetings, and opportunity for ad hoc calls with the IESO to keep everyone informed and in agreement, particularly during the transitional phase early in 2020.

No significant changes occurred in 2020 related to incentive levels or measures offered through the program apart from those in the South-West region, where higher incentives were offered for lighting projects implemented in the horticultural sector. IESO staff indicated that these horticultural lighting offerings were intended to help address demand constraints and congestion issues in the South-West region.

In response to the COVID-19 pandemic, changes relating to the program's design and delivery occurred. For example, aspects of the program routinely performed in-person, such as pre-approval or post-project inspections, were completed over the phone or virtually. Additionally, when necessary, the program allowed some exceptions related to equipment disposal, given that there could be long delays for equipment pick up, but with appropriate documentation. The IESO also developed a COVID-specific guide to help the vendors understand all relevant protocols to follow.

4.2.3 Outreach and Marketing

Similar to 2019, the Retrofit program was minimally advertised by the IESO in 2020. Delivery vendors and contractors were tasked with outreach and lead generation specific to their geographic region, while the IESO maintained its province-wide effort for the Save on Energy-branded marketing, communication, and support.

The IESO added additional new resources to the Save on Energy Retrofit program website, including videos and application checklists. Vendors were required to request approval when scheduling events or when using branded material. The IESO also tested a limited ad campaign through Facebook and LinkedIn in the fall of 2020. According to the IESO staff, this generated interest and increased participation, demonstrating the effectiveness of marketing campaigns.

The delivery vendors customized their outreach strategies based on the region in which they delivered the program, providing customers with relevant information and support on a local scale. Some of the delivery vendors stated the IESO approval process delays hampered their ability to conduct certain types of outreach and communications, such as webinars.

4.2.4 Application Portal

Following the Retrofit program's Application Portal launch in 2019, the IESO updated it in 2020. It had been enhanced, such as addressing bugs in the system and building out the capacity to handle multiple service vendors, in anticipation of the 2020 transition to a regional delivery model. Throughout 2020, the IESO staff managing the portal continued to make enhancements to it, with one major change being to minimize the number of communications required when communicating about a given project. This improvement process is still being tested, but to date IESO staff said that it has helped to reduce the back and forth needed between the program delivery vendor staff person who reviewed the applications and the applicant representative or the applicant who submitted the applications.

Delivery vendors reported some issues with the portal, especially earlier in the year, though some issues persisted throughout the year. One vendor reported two significant issues, the time-consuming password reset process and backlogged IT tickets. Another vendor stated the portal was not user-friendly for them and their customers, resulting in administrative hassles and impediments to participation.

Other tangible suggestions for improving the portal included adding additional interim statuses to better describe where a project is in the process and developing a two-way API² so vendors could rapidly send information to the portal from their internal applications. In addition, vendors emphasized the necessity of continuing to improve the portal to make it more user-friendly and offering a faster turnaround when responding to support requests in the future. In 2021, the IESO staff stated they intend to update the user interface further, such as improvements to the language used to make it clearer how to navigate the portal.

4.2.5 Trade Ally Engagement

The IESO staff indicated that the Save on Energy website offers resources to support the applicant representatives and contractors to assist in delivering the program. Additionally, the IESO distributes a newsletter targeted at trade allies which includes information on program changes and requirements. In 2020, the majority of trade ally engagement and training was managed by the delivery vendors, emphasizing the program application process and program requirements and guidelines. Delivery vendors indicated they were able to retain contractors by leveraging their existing networks, and they provided program support through direct communications or webinars focused on certain topics or market sectors.

4.2.6 Barriers and Opportunities

Besides the onset of the COVID-19 pandemic, the most difficult component of delivering the program in 2020, according to IESO staff, was transitioning from two vendors in 2019 to three vendors in 2020. However, IESO staff indicated the vendors were willing to collaborate to

² An API, or Application Programming Interface, is a software intermediary that allows two applications to communicate.

facilitate a smooth transition, passing on leads and documentation as quickly as possible and answering queries as needed, resulting in a better customer experience.

The new delivery vendors also needed to begin delivery of the program very quickly at the beginning of 2020. As a result, some participants encountered application delays, particularly customers whose applications were started by the transitional vendor in 2019 and subsequently transferred to the new delivery vendors in 2020. To address this, the IESO set up a system to make it easier for customers to continue their projects. The Retrofit support line was also improved to simplify the process of asking questions about application status for the customers.

Due to the pandemic, certain delivery vendors stated they were unable to engage customers and trade allies in the field, rendering some projects more difficult to finish, particularly for non-lighting projects or customers with more complex applications.

As the year progressed, the IESO staff indicated that their focus transitioned to ensuring the three program delivery vendors delivered the program in a consistent manner across the province. The IESO developed a vendor guide to address common questions and created a Retrofit Hub online to allow the vendors to review past decisions on relevant topics.

Another challenge mentioned by IESO staff and vendors was a surge of applications towards the end of 2020, which they attributed in part to the removal of the custom track at the start of 2021 as well as to uncertainties around what programs and offerings would be included under the new framework that would be introduced following the end of the Interim Framework. This created an application backlog that was challenging for the vendors to manage. Additionally, the IESO staff indicated that the horticultural lighting offering in the South-West region was very successful and impacted the program budget due to the large size of these.

The program budget was fully utilized, and the IESO staff stated they would likely have completed more projects if an additional budget had been available. Delivery vendors also indicated the program generally met their expectations, though some noted the short runway to deliver the program and budget limitations prevented them from accomplishing even more.

The delivery vendor staff emphasized the significance of increasing the clarity of the IESO's communications to the market and service providers, such as what is published on the Save on Energy website or distributed in newsletters. They stated that unclear or ambiguous communication from the IESO could cause undue concern, especially around deadlines.

In the future, IESO staff stated they would work to continue improving the customer experience, vendor efficiency, and the program's cost-effectiveness.

4.3 Applicant Representative and Contractor Perspectives

The following subsections highlight the feedback received from the applicant representative and contractor survey.

4.3.1 Key Findings

Key findings from the applicant representative and contractor survey include the following:

- Respondents were predominately applicant representatives (57%) or both applicant representatives and contractors (40%).
- Respondents' most-requested training and education topics were program and application rules (35%), program offerings (34%), marketing and outreach techniques (22%), and how to receive support when they or a customer are applying (18%).
- The aspects of the program with the highest satisfaction rating on a scale of one (1) to five (5) were the value that program equipment provides to clients (72% with a rating of 4 or 5) and interactions with representatives from the IESO (70% with a rating of 4 or 5). The lowest rated were program marketing and outreach (42% a rating of 4 or 5) and the program application process (47% a rating of 4 or 5).
- Respondents' suggestions for improving the Retrofit program focused on expanding measure offerings (50%), specifically bringing back custom projects (21%) and exterior lighting incentives (17%).
- Some respondents stated that changes to eligible measures and incentives were frustrating (31%), and the application review process took longer (24%) under the current Interim Framework than under the prior Conservation First Framework which was available from 2016 through early 2019.
- More than two-thirds of respondents (68%) reported no impact on customer participation due to the Retrofit program's new prescriptive track incentive cap.
- Two in three respondents (67%) rated their communication with the IESO staff positively, over one in four (27%) provided a neutral rating, and just four respondents (5%) provided a negative rating.
- More than one-half of respondents (54%) reported the COVID-19 pandemic had forced projects to be put on hold.

4.3.2 Firmographics

Nearly three out of five respondents (57%) were applicant representatives in the Retrofit program, as presented in Figure 4-1. Two out of five (40%) identified as both an applicant representative and a contractor. The remaining two respondents were a contractor only.

Figure 4-1: Respondents' Role in Retrofit Program (n=74)

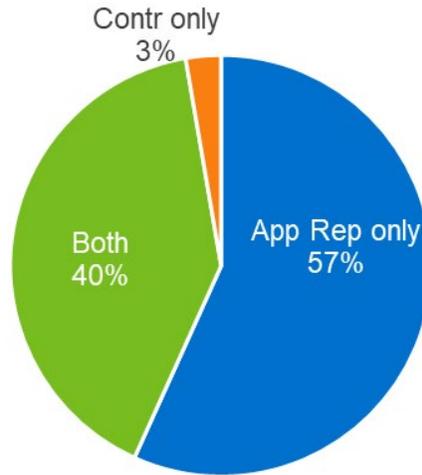


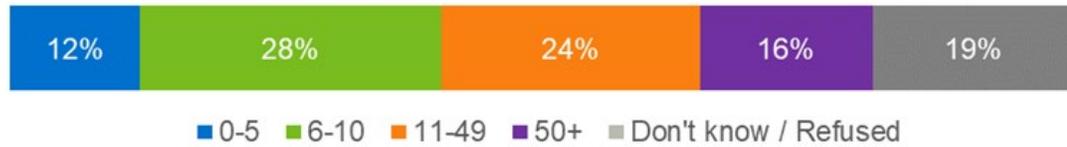
Table 4-2 displays the number of full and part-time employees at the respondents' companies. One in four (26%) were affiliated with companies that had over 20 full-time positions. Another one in five (20%) were affiliated with companies that had five or fewer full-time positions. Only one in five (22%) respondents reported having any part-time positions.

Table 4-2: Respondents' Full- and Part-time Employees (n=74)

Number of Employees	Full-time	Part-time
0-5	20%	15%
6-10	12%	3%
11-20	5%	3%
20+	26%	1%
Don't know/Refused	35%	45%
None	1%	34%

*Does not sum to 100% due to rounding.

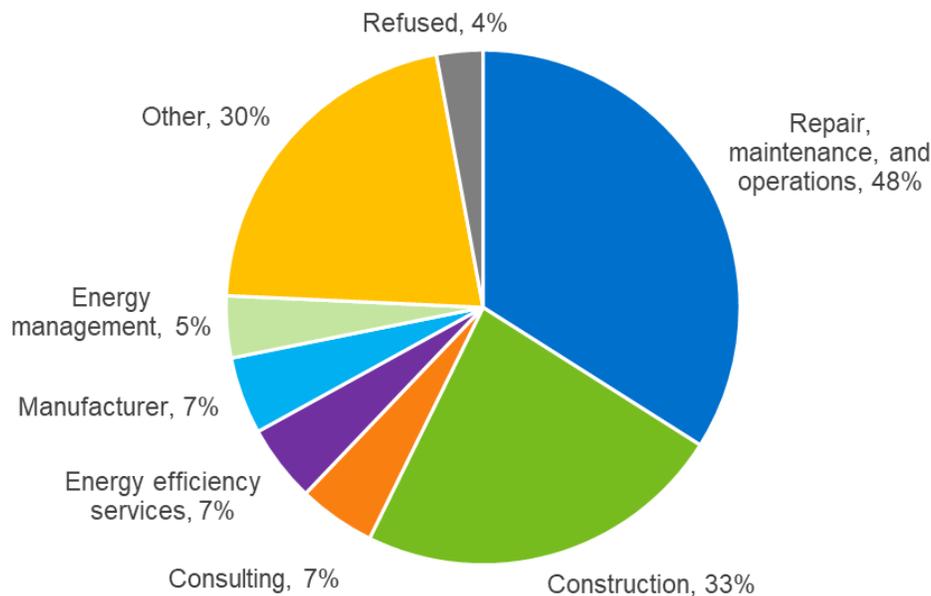
The breakdown of the respondents' company age is presented in Figure 4-2. One in ten respondents (12%) were affiliated with companies that had been in business for less than five years. Two in five respondents (40%) were affiliated with companies that had been in business for less than ten years. Nearly one in five (16%) were affiliated with older businesses that had been in operation for more than 50 years.

Figure 4-2: Respondents' Company Age (n=74)*

*Does not sum to 100% due to rounding.

Respondent business categories varied, as presented in Figure 4-3. Nearly one-half (48%) worked in repair, maintenance, and operations. One-third (33%) worked in construction.

Figure 4-3: Respondents' Business Category
(Open end and multiple responses allowed; n=73)*



*Does not sum to 100% due to multiple responses.

Respondents who reported being in the repair, maintenance, and operations business category were asked to specify a type. Nearly all (94%) of these respondents indicated they worked in repair and maintenance.

Respondents who reported being in the construction business category were also asked to specify a type. Two-thirds (67%) indicated they worked in non-residential building construction. Over one-half (54%) worked in repair construction.

4.3.3 Project Background

Both applicant representatives and contractors were asked to provide background information about the projects they supported.

Applicant Representatives

The 68 respondents who indicated they were applicant representatives reported representing an average of 19 customers. One respondent represented 110 customers.

Contractors

Of the 32 responding contractors, 23 provided detail on the total number of projects their company completed through the program in 2020. In aggregate, respondents reported a total of 1,693 projects, 668 (39%) of which were completed through the Retrofit program. The average estimate of the percentage of total sales that went through the Retrofit program was 40%. Nearly one-half (44%) of the projects were completed through the prescriptive track.

Respondents were asked to provide the total sales estimates by equipment type for program eligible measures, regardless of whether the equipment received an incentive through the program. They were then asked what percentage of those sales by equipment type went through the Retrofit program. Table 4-3 presents the average estimates of the percentage of sales by equipment type and the percentage of those sales that went through the Retrofit program. Lighting represents the largest percentage of sales (51%), and nearly two-thirds (65%) of reported lighting sales went through the Retrofit program. Pump replacements or VSD installs represent a small portion of sales (1%), and nearly all those sales (97%) went through the Retrofit program.

Table 4-3: Percent of Sales by Equipment Type (n=23)

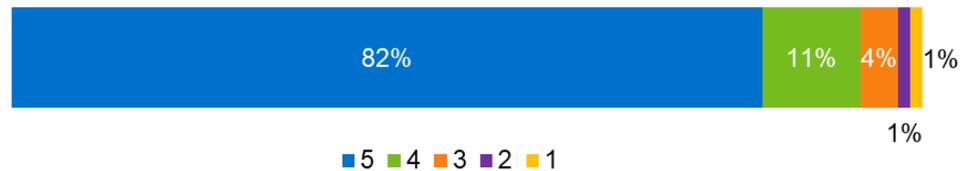
Equipment Type		
Lighting	51%	65%
HVAC	5%	45%
Lighting, controls	4%	17%
HVAC, controls	4%	36%
Refrigeration	4%	5%
Motor replacement or VSD	2%	95%
Energy management systems	2%	N/A
Pump replacement or VSD	1%	97%
Other program eligible measures	6%	1%
Don't know/ not applicable	21%	N/A

4.3.4 Outreach, Training, and Education

Respondents reported high communication levels with their business customers about the Retrofit program's availability, as presented in Figure 4-4. They rated how often they inform their

business customers about the program's availability using a scale from one (1) to five (5), where one indicates "never" and five indicates "always." Nearly all (93%) respondents either always or almost always communicate about the program with their business customers, suggesting strong program support.

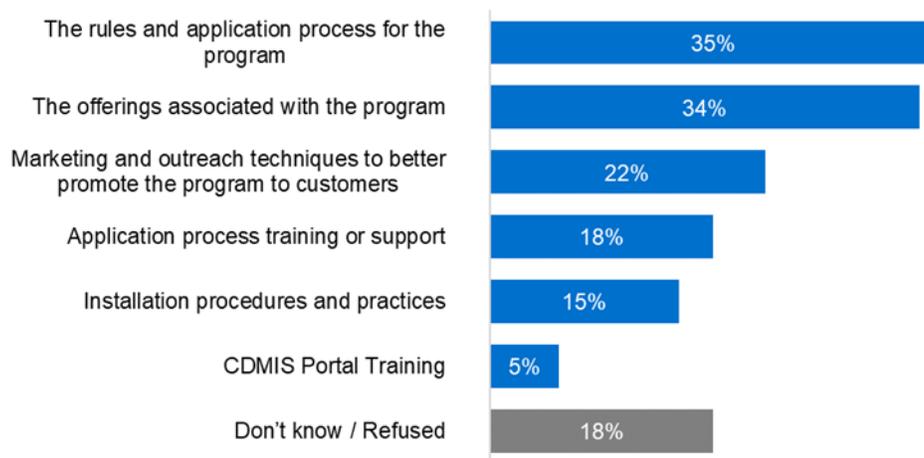
Figure 4-4: Respondents' Frequency of Communicating with Business Customers (n=74)*
(Rating on a scale from 1 to 5)



*Does not sum to 100% due to rounding.

Respondents provided input on what types of training and education would most support their work with the Retrofit program (Figure 4-5). The most requested training included those that covered program and application rules (35%), program offerings (34%), marketing and outreach techniques (22%), and how to receive training or support when they or a customer are applying (18%).

Figure 4-5: Recommended Training and Education Topics
(Multiple responses allowed; n=74)*



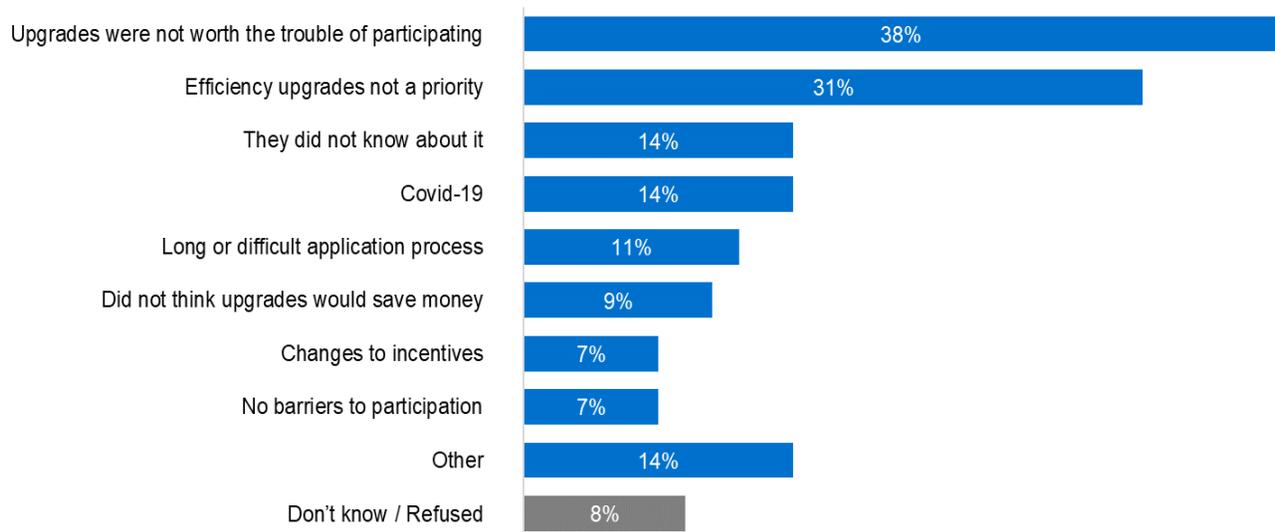
*Does not sum to 100% due to multiple responses.

4.3.5 Program Experience and Improvement Suggestions

Respondents were asked to identify barriers to customer participation in the Retrofit program, as presented in Figure 4-6. Nearly two in five (38%) stated that customers did not perceive the upgrades as being worth the trouble of participating in the program. Another one in three (31%) indicated the energy-efficiency upgrades were not a priority.

Figure 4-6: Barriers to Customer Participation

(Multiple responses allowed; n=74)*

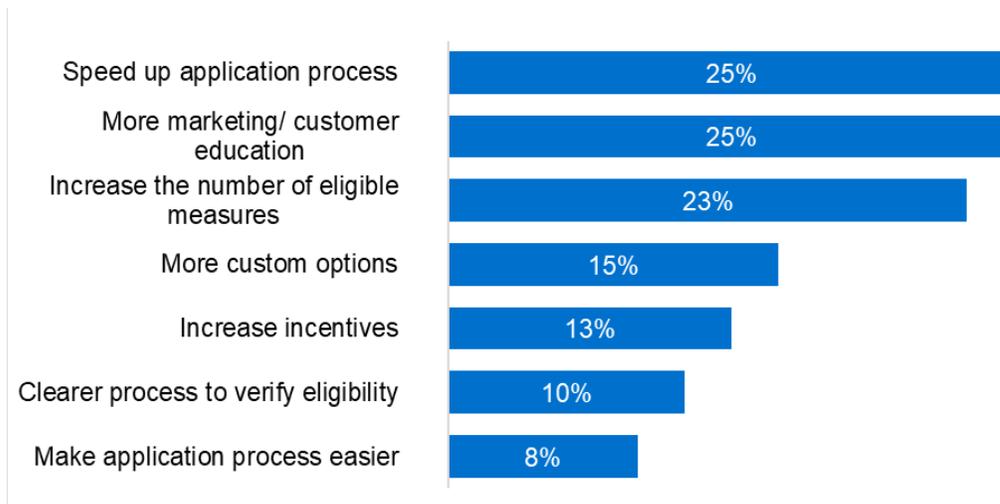


*Does not sum to 100% due to multiple responses.

The 48 respondents who identified specific barriers to participation in the program were also asked what they thought the Retrofit program could do to overcome these barriers (Figure 4-7). Speeding up the application process (25%) and increasing marketing/customer education (25%) were the most common responses. One respondent had this to say regarding the application process: *“Simplify the application process. It has become insanely cumbersome for clients and/or application reps to provide the detailed information required to move an application along compared to other programs.”*

Figure 4-7: Suggestions to Overcome Participation Barriers

(Multiple responses allowed; n=48)*

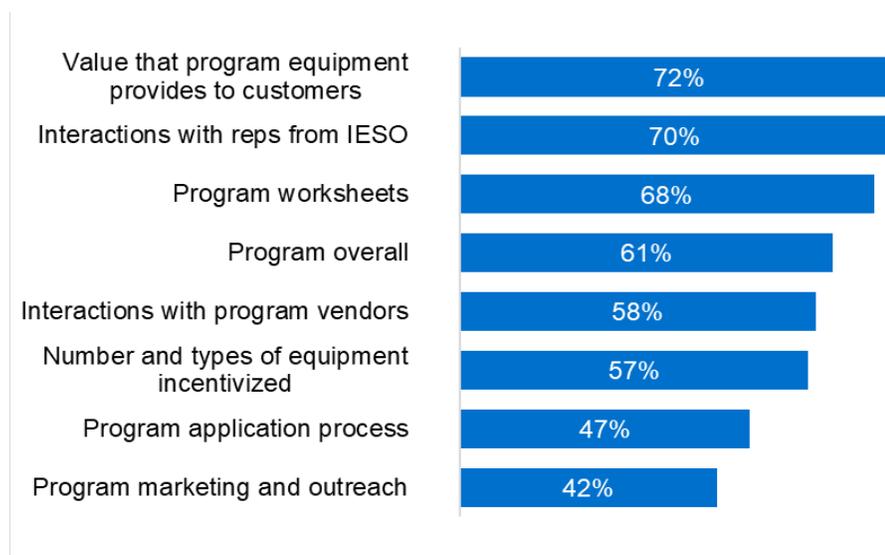


*Does not sum to 100% due to multiple responses.

Respondents were asked to provide a rating of their satisfaction with different aspects of the Retrofit program on a scale of one (1) to five (5), where one indicates “not satisfied at all” and five indicates “completely satisfied.” As shown in Figure 4-8, the highest-rated aspects of the program were the value that program equipment provides to customers (72% with a rating of 4 or 5) and interactions with representatives from the IESO (70% with a rating of 4 or 5). The lowest rated aspects were the program application process (47% with a rating of 4 or 5) and program marketing and outreach (42% with a rating of 4 or 5).

Figure 4-8: Satisfaction with Aspects of Retrofit Program(n=74)

(Ratings of 4 or 5 on a scale from 1 to 5)



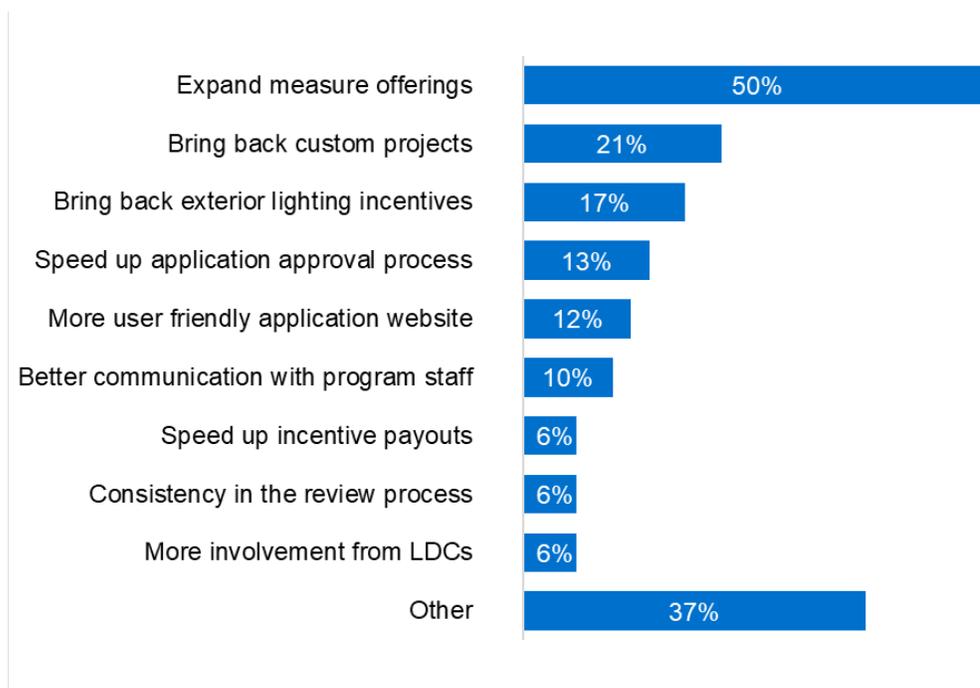
Respondents were asked for suggestions to improve the overall Retrofit program, as presented in Figure 4-9. The most common suggestion for improving the program was expanding measure offerings (50%) (refer to Appendix D.2 for a full list of suggested measures). The second and

third most common suggestions focused on bringing back specific measures such as custom projects (21%) and exterior lighting (17%). Over one-third (37%) of responses were grouped into an “Other” category, with some notable responses from this category listed below:

- Bring back engineered worksheets (2 respondents)
- Help with lead generation (2 respondents)
- Provide updated customer-facing measure/incentive lists (2 respondents)
- Add refrigeration incentives (1 respondent)
- Add controls incentives for compressed air (1 respondent)

Figure 4-9: Suggested Improvements for Retrofit Program

(Open end and multiple responses allowed; n=52)*



*Does not sum to 100% due to multiple responses.

One respondent provided the following feedback regarding custom projects: *“The removal of the custom program in the 2021 framework is a HUGE obstacle to new projects. It’s virtually eliminated the incentives for customers who want to improve energy performance but don’t fit into the prescriptive measures. The \$0.10/kWh or \$100/kW metrics were easy to explain and helped sway decision makers.”*

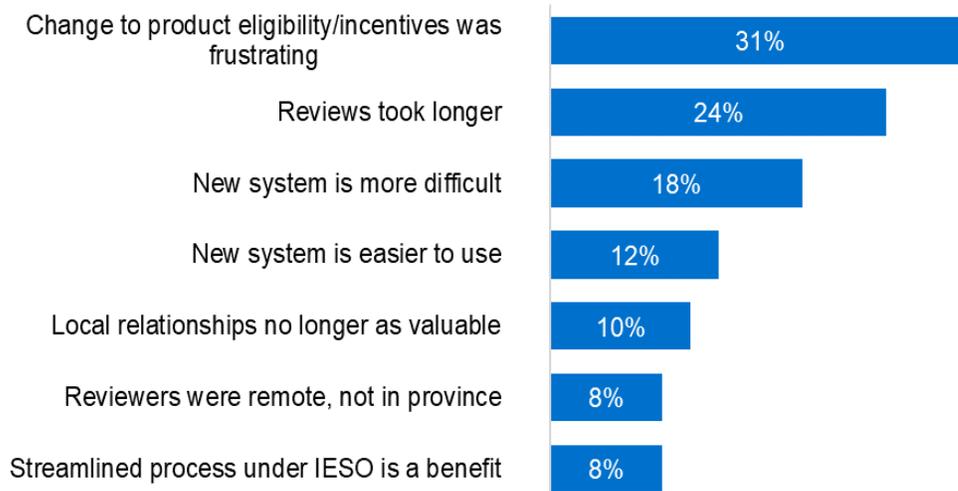
4.3.6 Changes to Program Delivery

If the respondent had experience with both the Conservation First Framework, which was the prior conservation framework available from 2016 through early 2019, and the current Interim Framework, they were asked to describe any differences they may have observed between

each program delivery (Figure 4-10). The most often-cited differences in delivery between the two frameworks were frustrating changes to eligible products and incentive levels (31%) and a longer application review process (24%) under the Interim Framework.

Figure 4-10: Changes in Program Delivery Under Interim Framework

(Open end and multiple responses allowed; n=49)*



*Does not sum to 100% due to multiple responses.

Respondents described the impacts, if any, of the Retrofit program's prescriptive track incentive cap of 50% of the total project cost, which went into effect in May of 2019 (Figure 4-11). Over two-thirds (68%) reported no impact on customer participation. One-fourth (25%) indicated the incentive cap reduced the scope of some of their projects. When asked to quantify the extent of the scope reduction, one-half of respondents (50%) indicated the scope was reduced in the range of 11% to 25% as presented in Table 4-4.

Figure 4-11: Assessment of Retrofit Program Prescriptive Incentive Cap (n=73)

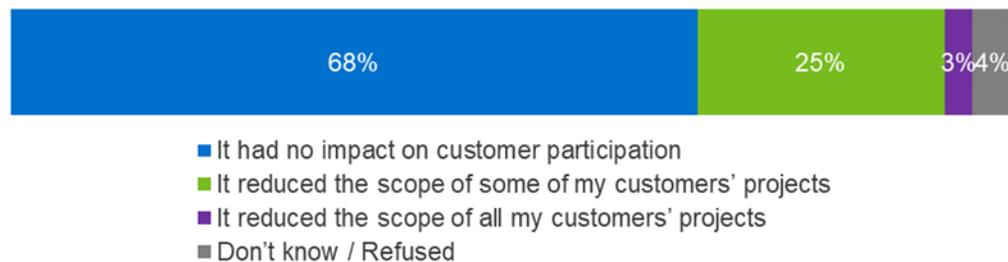


Table 4-4: Retrofit Program Prescriptive Incentive Cap Scope Reduction (n=20)

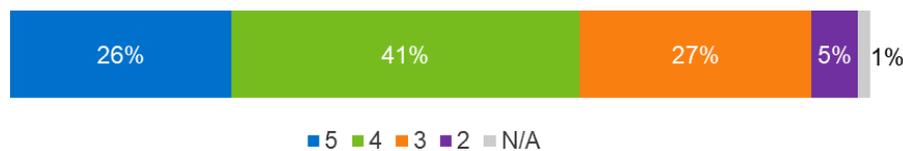
Scope Reduction	
Reduced scope by 1% to 10% on average	5%
11% to 25% on average	50%
26% to 50% on average	35%
76% or more on average	10%

4.3.7 IESO Communications

Respondents were asked to rate their satisfaction with the Retrofit-specific IESO communication on a scale from one (1) to five (5), where one indicates “not at all satisfied” and five indicates “extremely satisfied” (Figure 4-12). Two-thirds of respondents (67%) provided a positive rating, one-fourth (27%) provided a neutral rating, and only four respondents provided a negative rating (5%).

Figure 4-12: Assessment of Retrofit-specific Communications with IESO (n=74)

(Rating on a scale from 1 to 5)



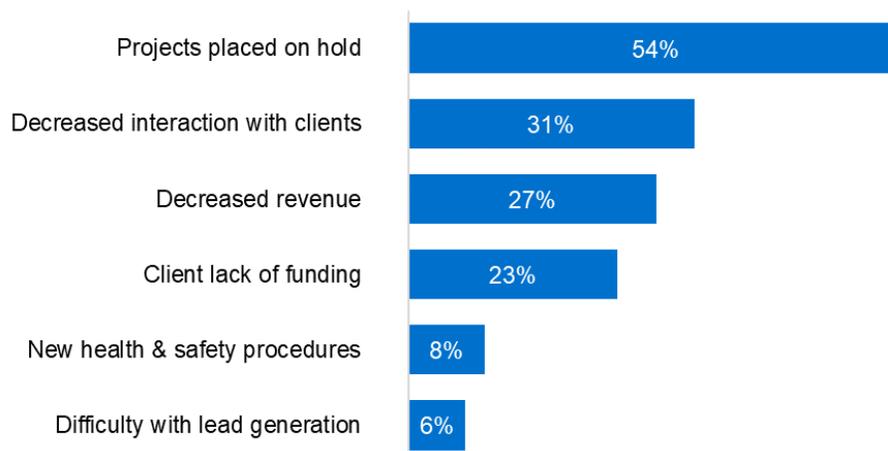
Those who provided negative responses and offered suggestions for improving the IESO’s communications mentioned a more efficient application review process (3 respondents) and additional training for application review staff (1 respondent).

4.3.8 Business Response to the COVID-19 Pandemic

Respondents were asked an open-ended question about how the COVID-19 pandemic had impacted their company and its operations. More than one-half (54%) reported that the COVID-19 pandemic had forced them to place projects on hold, as presented in Figure 4-13. Nearly one-third (31%) reported decreased interaction with clients, and limited site visits also affected their ability to provide services.

Figure 4-13: Changes to Business Operations due to COVID-19

(Open end and multiple responses allowed; n=48)*



*Does not add to 100% due to multiple responses.

4.4 Retrofit Participant Perspectives

The following subsections highlight the feedback received from the participant survey.

4.4.1 Key Findings

Key findings from participants' responses include the following:

- Similar proportions of respondents either had the primary responsibility for submitting their applications (36% of respondents) or a shared responsibility (38% of respondents).
- Nearly one-half (47%) of respondents had participated in other IESO energy-efficiency programs in 2020. Of those, nearly one-fourth (21%) had participated in the SBL program.
- A majority (57%) of P2 respondents reported visiting the Save on Energy program website to search for information about energy-efficiency program offerings. Three in five respondents (59% with a rating of 4 or 5) who did visit the website stated they found the information useful.
- Two-thirds of P2 respondents (67%) reported never using the Retrofit Support line. Of those who used it, three-fourths of respondents (76% with a rating of 4 or 5) stated it was very useful.
- One in five P2 respondents (20%) reported using more than one service provider to review their applications and provide application support.
- Nearly one-fourth (22%) of P1 respondents stated they had an issue with the Retrofit Application Portal with difficulty navigating the website (64%) and uploading documents (36%) being the issues most often mentioned.
- Two-thirds of respondents (67%) reported that the program's prescriptive track incentive cap of 50% had no impact on their participation.

- Over three-fourths of P1 respondents (78%) were completely or somewhat satisfied with the Retrofit program communication they received from the IESO.
- One in three (31%) responding participants stated the COVID-19 pandemic had halted their company's operations or reduced their business, though not necessarily permanently. One in four (27%) stated the pandemic had specifically lowered sales/revenue.

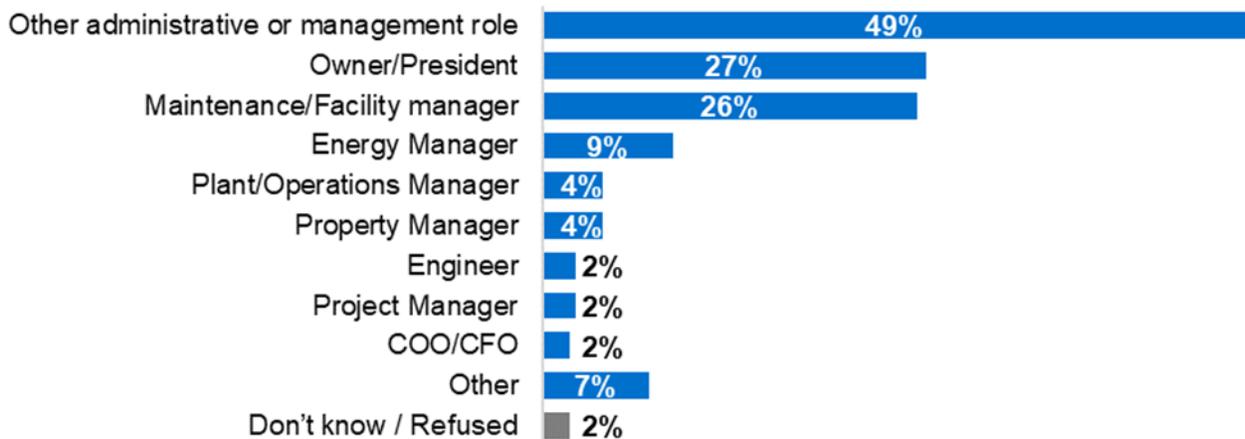
4.4.2 Firmographics

Participants were asked various questions to collect information on their job title, ownership status, responsibilities in relation to the program, and training received. Details on the participants' companies were also gathered during the survey.

As presented in Figure 4-14 nearly all titles that respondents shared indicated they held either an administrative or managerial role. Nearly one-half (49%) specified an administrative or management role other than those listed on the survey. More than one-fourth of respondents were the owner and/or president of the company (27%) or were the maintenance/facility managers (26%).

Figure 4-14: Titles of Respondent

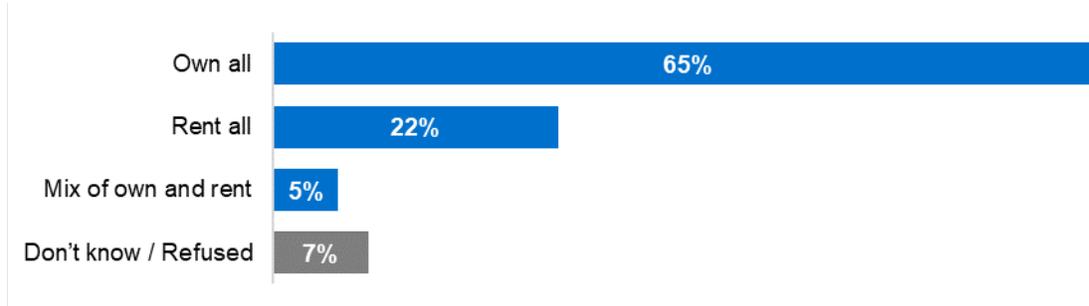
(Multiple response allowed; n=431)*



*Does not sum to 100% due to multiple responses.

Respondents predominately owned the facilities for which they applied for incentives, as presented in Figure 4-15. Nearly two in three (65%) owned all the affected facilities, while one in five (22%) were exclusively renting them.

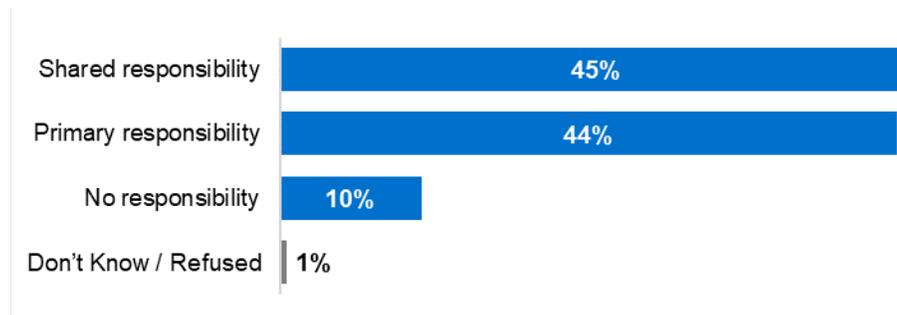
Figure 4-15: Ownership Status (n=429)



*Two responses missing due to partial survey responses.

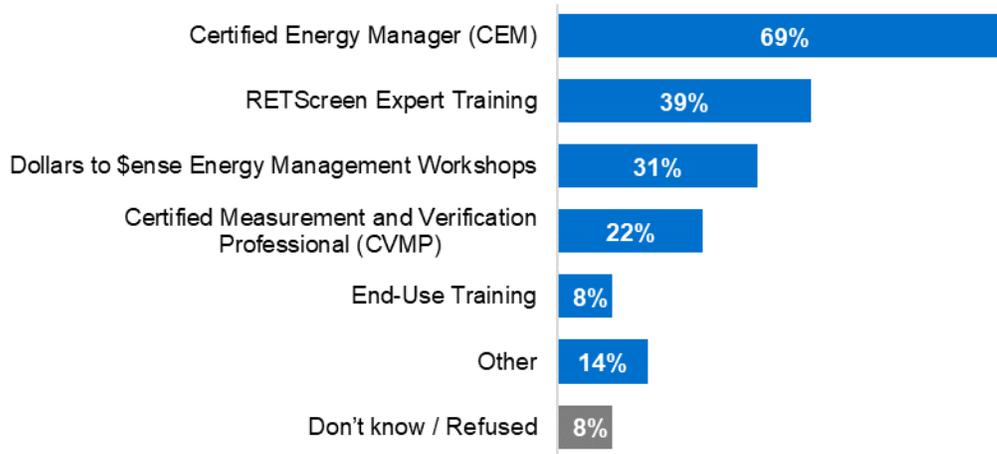
Respondents also specified whether they had the primary or shared responsibility for the budget and/or expenditures related to the Retrofit program project. Nearly one-half (45%) shared such responsibilities, similar to the number (44%) that had the primary responsibility (Figure 4-16). A relative few (10%) stated they had no responsibilities at all for the budget and/or expenditure decisions.

Figure 4-16: Responsibility for Budget and Expenditures (n=431)



Likewise, less than one in ten (8%) confirmed participation in the IESO's subsidized training programs. Of those that had training experience, two in three (69%) referenced the Certified Energy Manager (CEM) training (Figure 4-17). Another one in three referenced RETScreen Expert Training (39%) and Dollars to \$ense Energy Management Workshops (31%). One-fourth (22%) referenced the Certified Measurement and Verification Professional (CVMP) training.

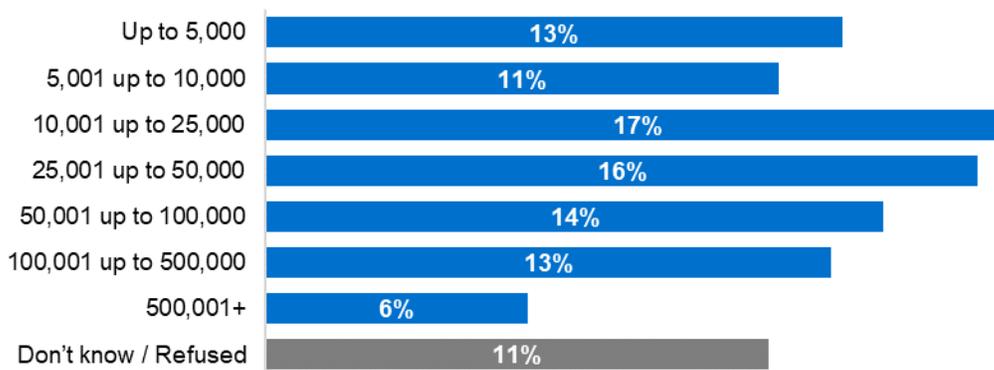
Figure 4-17: Participation in IESO-Subsidized Training
(Multiple response allowed; n=36)*



*Does not sum to 100% due to multiple responses.

Participants were asked to provide the total area of their facilities, along with information on the types of heating and/or cooling equipment they employ. The most-frequent facility sizes were between 10,001 to 25,000 sq. ft. (17%), 25,001 to 50,000 sq. ft. (16%), and 50,001 to 100,000 sq. ft. (14%) (Figure 4-18).

Figure 4-18: Total Square Footage for All Buildings (n=430)*

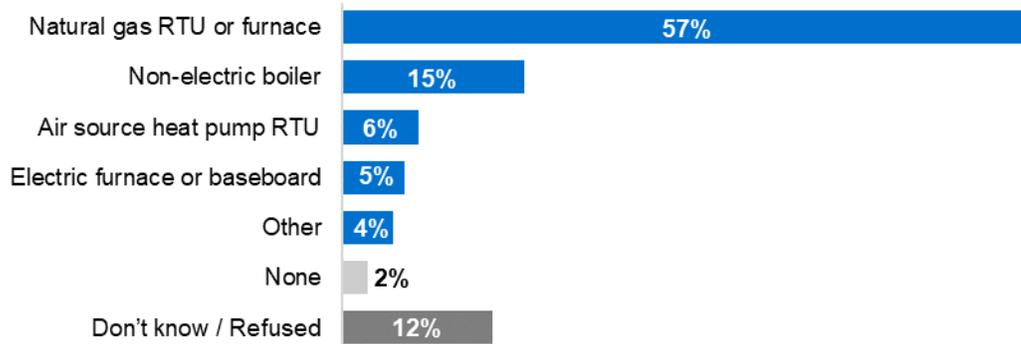


*One response missing due to partial survey responses.

Over one-half of responding participants (57%) reported a natural gas rooftop unit (RTU) or furnace heating at their facilities. Another one-sixth (15%) reported heating their facilities with a non-electric boiler (Figure 4-19). On the cooling side, nearly two-thirds (64%) reported an air conditioner or air source heat pump RTU (64%), followed by one-tenth (11%) with a chiller system (Figure 4-20).

Figure 4-19: Facility Primary Heating System

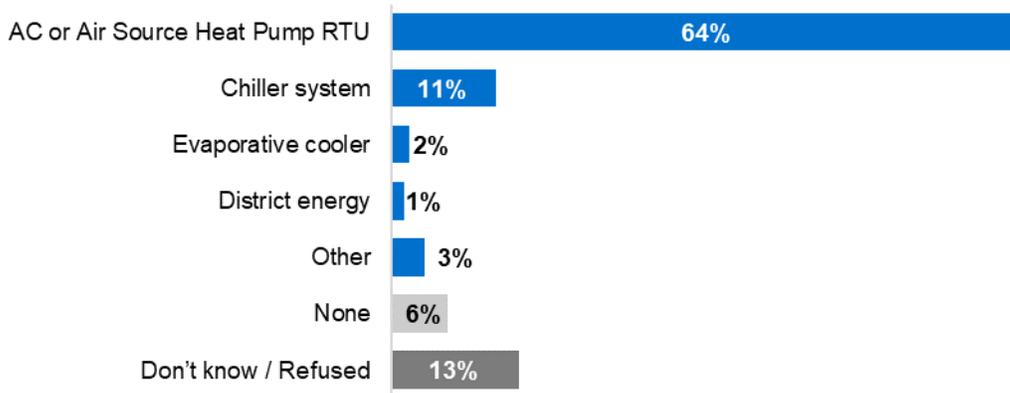
(Multiple response allowed; n=430)*



*Does not sum to 100% due to multiple responses. One response is missing due to partial survey responses.

Figure 4-20: Facility Primary Cooling System

(Multiple response allowed; n=430)*



*Does not sum to 100% due to multiple response. One response missing due to partial survey response.

Two-thirds (67%) of responding participants provided the average ceiling heights for the facilities where they made upgrades (Table 4-5). Only P1 respondents were asked this question, as it was removed from the survey instrument in P2. The average ceiling height for those that answered in feet was 15.7 ft (reported by 66% of respondents). One respondent (1%) answered in meters, with an average height of 4.0 m, or 13.1 ft. The remaining one-third of respondents (33%) did not know or refused to answer the question.

Table 4-5: Average Facility Height (n=131)*

Units		
Feet	15.7	66%
Meters	4.0	1%
Don't know/Refused	--	33%

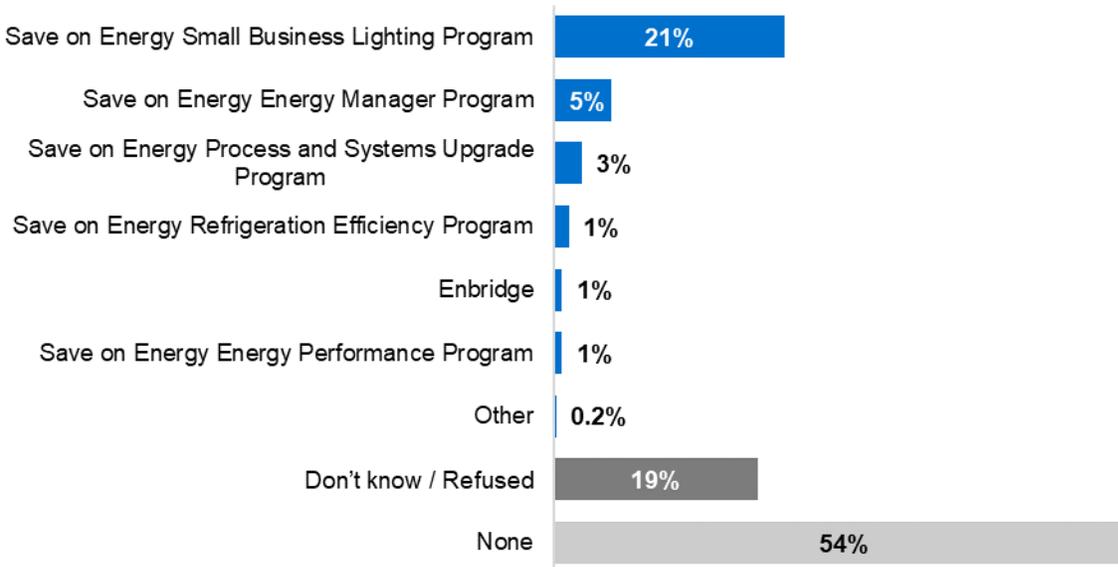
*Only asked of P1 respondents. Two responses missing due to partial survey responses.

Nearly all responding participants (89%) provided the number of floors at the facilities where they made upgrades. The mean number of floors was two, but the median number of floors was one.

When the respondents were asked whether they participated in other IESO energy-efficiency programs, nearly one-half (47%) of respondents reported they had (Figure 4-21). Roughly one in four (21%) had participated in the SBL program. Relatively few participated in any of the other programs, and one in four (19%) did not know or refused to answer.

Figure 4-21: Participation in Additional Energy Efficiency Programs

(Multiple response allowed; n=431)*



*Does not sum to 100% due to multiple response.

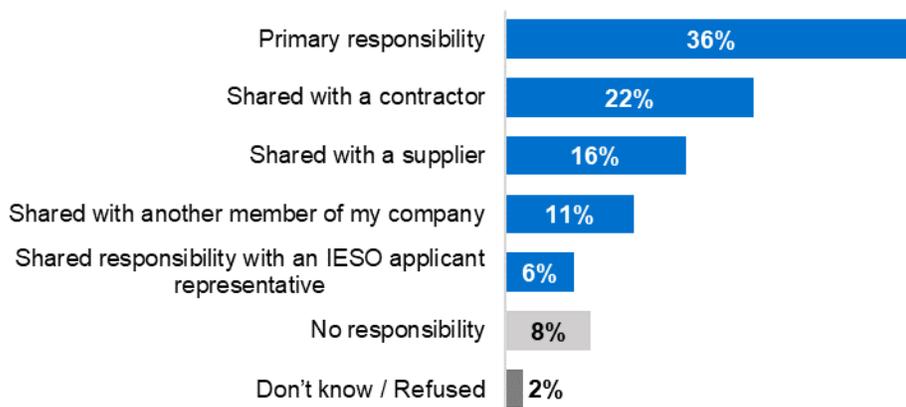
4.4.3 Application Process

The following subsections highlight the feedback received from the participant survey about specific components of the application process. Not all application process questions were asked of each participant due to differences in the P1 and P2 surveys.³

4.4.3.1 Responsibility for Submission

As presented in Figure 4-22 one-third of respondents (36%) had the primary responsibility for submitting their application to the program. Nearly one-fourth (22%) shared the responsibility with a contractor, while another one in six (16%) shared with a supplier. One in ten or less each shared responsibility with another member of their company (11%) or an IESO applicant representative (6%). Among those who stated they had no responsibility for submitting applications (8%), all ten respondents had another company member submit them.

Figure 4-22: Responsibility for Application Submission (n=133)

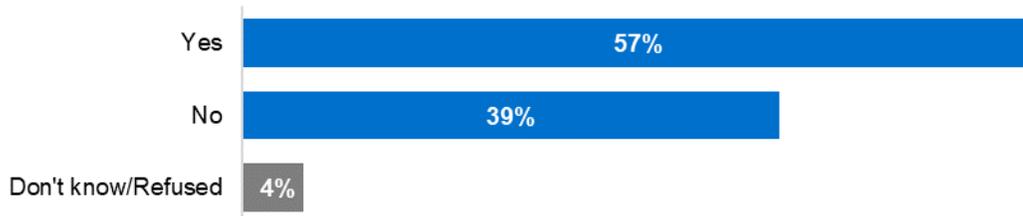


*Only asked of P1 respondents.

4.4.3.2 Website and Support Line

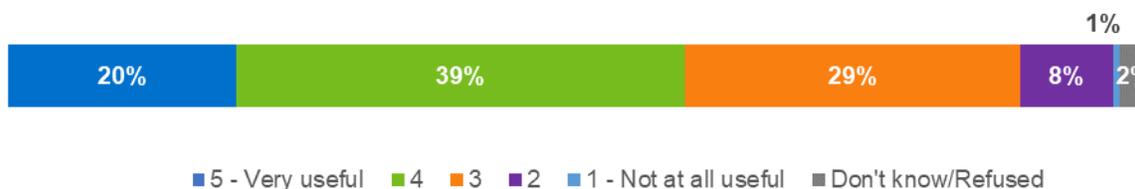
A majority (57%) of P2 respondents reported visiting the Save on Energy program website to search for information about energy-efficiency program offerings (Figure 4-23). In comparison, over one-third (39%) stated they had not visited the website, and relatively few did not know or refused the question (4%).

³ The participant survey was completed twice, with the first survey completed with participants who completed projects in Q1 or Q2 of PY2020 (referred to as Period 1, or P1) and the second survey completed with participants who completed projects in Q3 or Q4 of PY2020 (referred to as Period 2, or P2).

Figure 4-23: Use of Program Website (n=298)*

*Only asked of P2 respondents.

Of those respondents who visited the website, Figure 4-24 displays close to three-fifths (59%) gave it a rating of 4 or 5, on a scale of one (1) to five (5), where one (1) is “not at all useful” and five (5) is “very useful.” Over one-fourth (29%) gave it a neutral rating of 3, compared to one one-tenth (9%) who gave it a rating of a 2 or 1.

Figure 4-24: Program Website Usefulness (n=170)*

*Only asked of P2 respondents.

Of the 65 respondents who provided a neutral or negative rating of their program website experience, one-third (34%) provided suggestions for improving website information. Among these respondents, the most common suggestion was simplifying navigation and improving access to information (14 respondents), followed by simplifying the application process (4 respondents). Only P2 respondents were asked this question.

Two-thirds of respondents (67%) reported never using the Retrofit Support line. As presented in Figure 4-25, of those who used it, three-fourths (76%) gave it a rating of a 4 or 5, on a scale of one (1) to five (5), where one is “not at all useful” and five is “very useful.” Another one in eight (13%) gave the support line a neutral rating of 3, compared to one out of ten (10%) respondents who gave it a rating of 2. Nearly nine out of ten respondents (86%) who used the support line stated they received feedback in a timely manner.

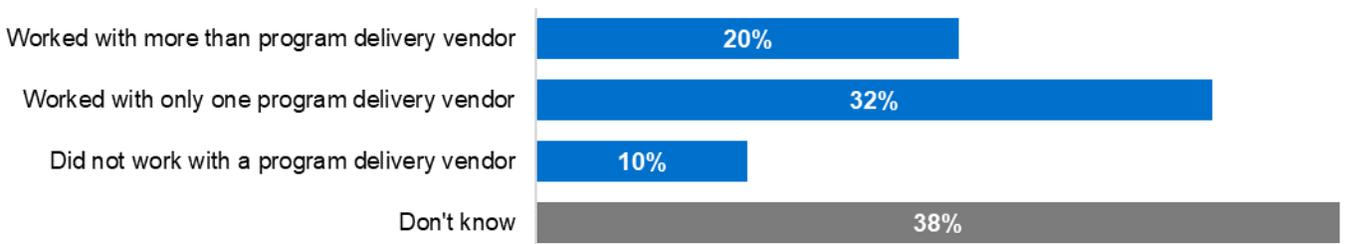
Figure 4-25: Program Support Line Usefulness (n=79)*

*Only asked of P2 respondents.

Eight of the ten respondents who provided a neutral or negative rating of their support line experience provided suggestions for improving the Retrofit Support line. The most common suggestion was improving staff's program knowledge (five respondents). Only P2 respondents were asked this question.

4.4.3.3 Program Delivery Vendor Support

As presented in Figure 4-26, one in five respondents (20%) reported working with more than one program delivery vendor to review their applications and provide application support. One-third of respondents (32%) used only one such program delivery vendor, and relatively few (10%) reported not working with a program delivery vendor at all. However, the largest group of respondents (38%) did not know whether they had used more than one service provider. This may suggest that the program is being delivered in a seamless way to these customers, especially if the customers may have been assisted by multiple program delivery vendors but were not aware of it.

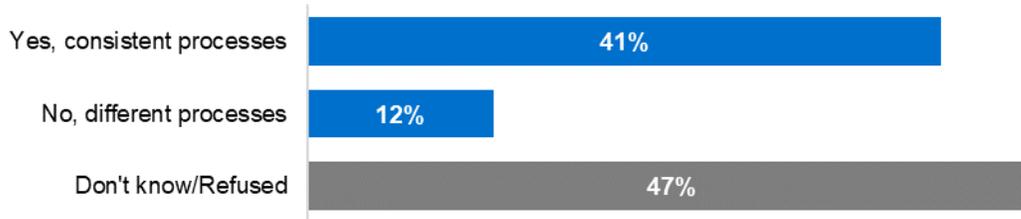
Figure 4-26: Working with Multiple Program Delivery Vendors (n=292)*

*Only asked of P2 respondents.

As presented in Figure 4-27, nearly one-half (47%) of the respondents who reported using multiple program delivery vendors did not know whether the application process was the same

across the different providers. Two in five respondents (41%) stated the process was the same, which is over twice the number of respondents who stated it was different (12%).

Figure 4-27: Consistency of Program Delivery Vendors (n=59)*



*Only asked of P2 respondents.

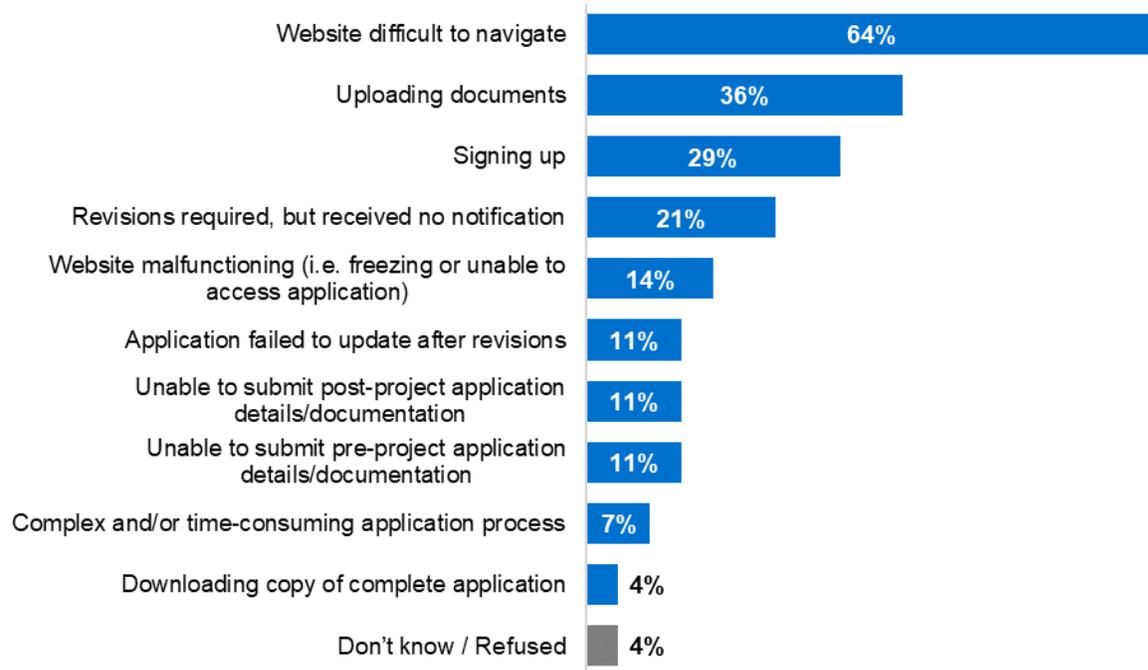
When asked what worked well about the application process across the multiple program delivery vendors, nearly one-half of respondents (42%) provided answers. The most often cited responses were helpful staff and resources (18 respondents) and a smooth overall process (5 respondents). When asked what could be improved about the application process when working with multiple program delivery vendors, over one-fourth of respondents (27%) provided answers. The most often mentioned responses were improving consistency across providers (5 respondents), better training for staff (4 respondents) and improving the information available (4 respondents). Only P2 respondents were asked this question.

4.4.3.4 Application Portal

Nearly one-fourth (22%) of P1 respondents stated they had an issue with the Retrofit Application Portal. Figure 4-28 summarizes the explanations that respondents with portal issues provided. The most common issue, cited by nearly two-thirds (64%) of respondents, was difficulty navigating the website, followed by uploading documents (36%).

Figure 4-28: Description of Application Portal Issues

(Open end and multiple response allowed; n=28)*

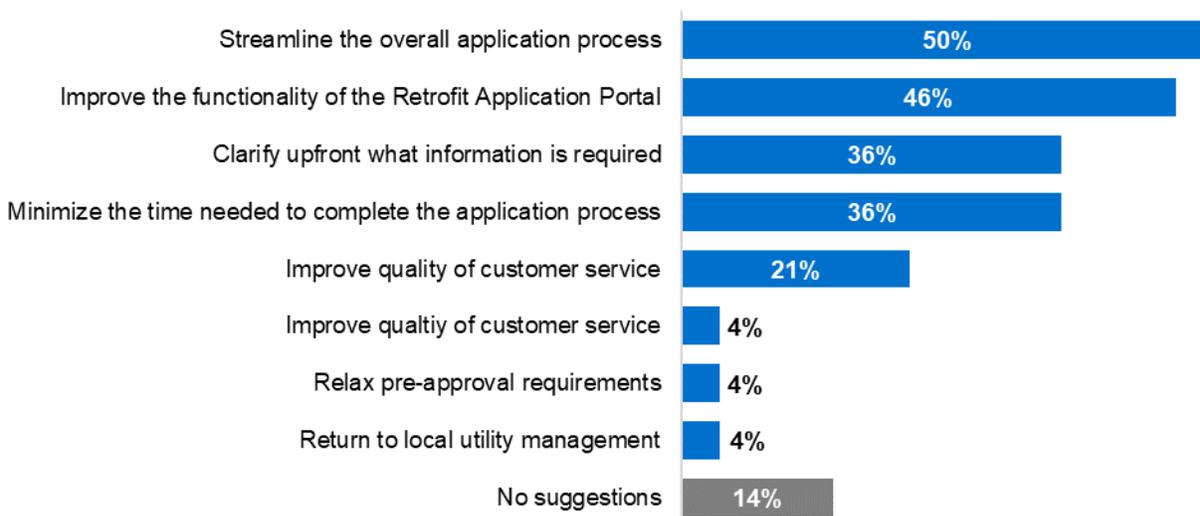


*Only asked of P1 respondents.

Respondents who reported issues were asked for suggestions on improving the Application Portal or the overall application process. The most common suggestions were streamlining the overall application process (for example, reducing the number of steps) (50%) and improving the functionality of the Retrofit Application Portal (46%) (Figure 4-29).

Figure 4-29: Suggestions for Improving Portal and Overall Application Process

(Open end and multiple response allowed; n=28)*

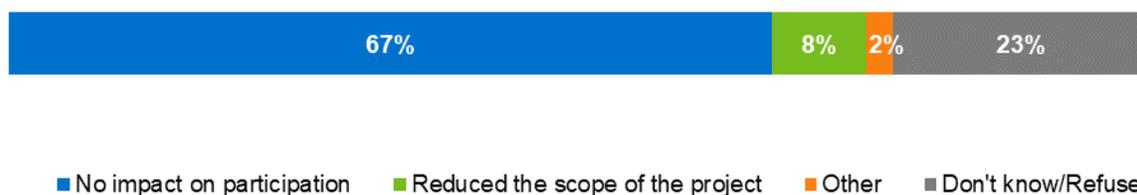


*Only asked of P1 respondents.

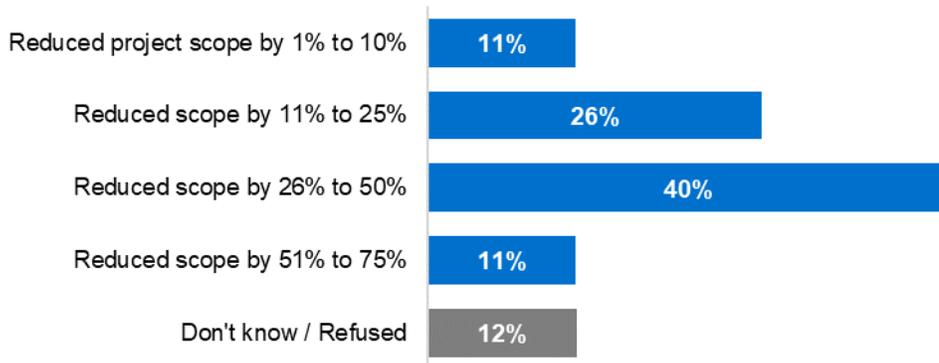
When respondents were asked to detail any issues with assigning responsibilities to applicant representatives in the portal, nearly three-fourths (72%) reported none. Another one in ten (13%) stated the question was not applicable, particularly because they had no applicant representative. The most reported issue was the delays in receiving responses to questions (2 respondents). Only P1 respondents were asked this question.

4.4.4 Incentive Cap

Two-thirds (67%) of respondents reported that the Retrofit Program's prescriptive track incentive cap of 50% of the total project cost, which was implemented in May of 2019, had no impact on their participation (Figure 4-30). Similarly, two-thirds (68%) of Retrofit applicant representatives and contractors (Section 4.3) stated the same response, albeit with a smaller sample size.

Figure 4-30: Impact of Retrofit Program Prescriptive Incentive Cap (n=431)

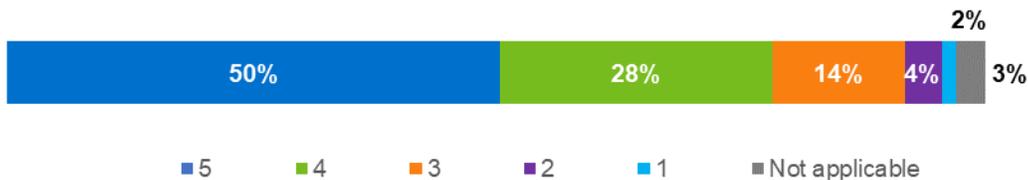
Among the 8% of responding participants who did report a scope reduction due to the incentive cap, two in five (37%) stated their projects were reduced in scope by 25% or less (Figure 4-31). Another two in five (40%) stated their projects were reduced in scope by between 25% and 50%. The remainder were split between those with projects reduced in scope by over 50% (11%) and those who did not know or refused to answer (12%).

Figure 4-31: Scope Reduction from Prescriptive Incentive Cap (n=35)

4.4.5 IESO Communications

Respondents were asked to rate their satisfaction with Retrofit-specific IESO communication on a scale from one (1) to five (5), where one indicates “not at all satisfied” and five indicates “extremely satisfied” (Figure 4-32). One-half (50%) were completely satisfied, and another one-fourth (28%) rated their satisfaction as a 4. Only one in six (14%) gave a neutral rating of three, and one in twenty (6%) gave a rating of 1 or 2. Only one respondent among those who provided lower ratings also provided a suggestion. They recommended being assigned a specific contact person for communication.

Figure 4-32: Assessment of IESO Communications (n=133)*
(Rating on a scale from 1 to 5)



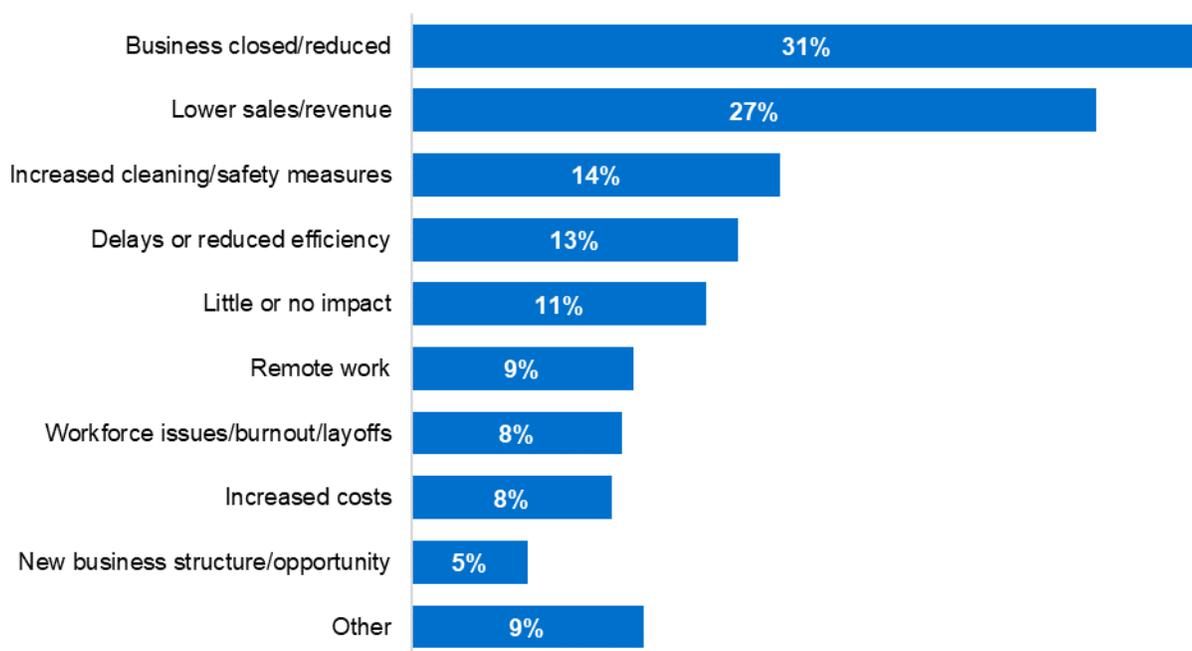
*Does not add to 100% due to rounding. Only asked of P1 respondents.

4.4.6 Business Response to the COVID-19 Pandemic

Respondents were asked an open-ended question about how the COVID-19 pandemic had impacted their company and its operations (Figure 4-33). Over one-half (56%) provided a response. Of these, close to one-third stated their business closed or was reduced (31%), and one-fourth reported lower sales/revenue (27%). About one in eight each stated that they adapted their safety and maintenance practices (14%), reported delays or reduced efficiency (13%) or indicated that there was little to no impact to their business (11%).

Figure 4-33: Impacts to Business Operations of COVID-19

(Open end and multiple response allowed; n=244)*



*Does not sum to 100% due to multiple response.

4.5 Process Findings and Recommendations

Finding 1: Program free-ridership (FR) was moderately high, compared to historical results, in 2020 at 23.6%.

The program's NTG was moderately low in 2020 at 77.2%. FR was found to be moderately high at 23.6% and SO was low at 0.8%. Two-thirds (67%) of participants stated they would not have completed an upgrade, would have postponed it, or would have completed a scaled-back version of it in the program's absence. However, the remaining one-third (33%) would have done the same upgrade anyway or were unsure of what they would have done, suggesting that there is still room for FR improvements in future program years.

- **Recommendation 1a:** *Maintain focus on minimizing FR. Key areas include:*
 - *identifying and targeting customer segments that would be unlikely to make upgrades without program support,*
 - *screening applications for customers who have not already begun implementing measures, and*
 - *encouraging all participants to complete the evaluation surveys to ensure that the FR results are as representative of the true population of program participants as possible.*
- **Recommendation 1b.** *Encourage participants to install additional energy-efficient equipment or services beyond what is covered through the program if it is feasible for them to do so (for example, identifying additional opportunities during initial site visits). Doing so may lead to increases in the program's SO, which may in turn help offset FR and lead to improved NTG.*

Please note that Recommendation 1a was included in the PY2019 evaluation as well. In response to the recommendation in PY2019, the IESO indicated that part of the technical review process that occurs when customers submit applications involves determining if the project was started prior to the application submission. As indicated in the PY2020 recommendation, it will continue to be important to carefully perform this application review in addition to identifying customer segments most in need of the program's support and encouraging responses to the evaluation surveys. Given the critical importance of minimizing FR, and given the moderately high FR achieved in PY2020, this recommendation is provided again to ensure that it continues to be carefully considered in future program years.

Finding 2: Opportunities exist to improve the overall application process when working with multiple program delivery vendors. One in five P2 participants (20%) reported working with more than one program delivery vendors to review their applications and provide application support. Two in five respondents (41%) stated the process was the same, which is over twice the number of respondents who stated it was different (12%). When asked what could be improved about the application process when working with multiple program delivery vendors, over one-fourth of respondents (27%) provided answers. They most often mentioned improving consistency across providers, better training for staff, and improving the information available.

- **Recommendation 2:** *Identify ways to improve the application process for customers working with multiple program delivery vendors (for example, creating consistency in approaches through additional training for support staff and improving the quality of the information provided to participants).*

Finding 3: The Application Portal presented challenges to some users. Close to one in four participants (22%) stated they experienced challenges with the Retrofit Application Portal. Of the participants who experienced these challenges, difficulty navigating the website (64% of respondents) and issues uploading documents (36% of respondents) were the issues most

often mentioned. Program delivery vendor staff also highlighted the importance of making the portal as user-friendly as possible.

- **Recommendation 3:** *Continue to enhance the Application Portal and its customer support to meet its various users' needs as the program evolves. Suggested enhancements include making the portal easier to navigate, minimizing issues when uploading documents, and making sure the content is as clear as possible.*

Please note that Recommendation 3 was included in the PY2019 evaluation as well. In response to the recommendation in PY2019, the IESO indicated that a ticket management system was implemented to improve the process of resolving issues with the Retrofit Portal. In PY2020, surveyed participants, applicant representatives, and contractors mentioned either continuing challenges (such as with document uploads) or additional challenges (such as difficulty navigating the website) with the portal which suggests this recommendation continues to be relevant. Given this, this recommendation is provided again in PY2020 to ensure that it continues to be considered in future program years.

Finding 4: A desire for additional training exists among applicant representatives and contractors. The most-requested training and education topics mentioned by applicant representatives and contractors were program and application rules (35%), program offerings (34%), marketing and outreach techniques (22%), and how to receive support when they or a customer are applying (18%).

- **Recommendation 4:** *Offer additional training opportunities on topics that will provide the applicant representatives and contractors with the knowledge they need to effectively support the program. Training topics to consider include the program application process, changes in measure offerings or incentives, and marketing and outreach techniques.*

Please note that Recommendation 4 was included in the PY2019 evaluation as well. In response to the recommendation in PY2019, the IESO indicated that training webinars had been offered to applicant representatives and contractors on the Retrofit Portal, the application submission process, the development of measurement and verification plans and that frequently asked questions (FAQs) and other guides to support the market with participation in the program had also been published. Given this additional feedback received in PY2020 regarding additional training needs, this recommendation is provided again to ensure that the program consider offering additional training opportunities that reach more applicant representatives and contractors.

Finding 5: Satisfaction with program communications is moderate, suggesting some room for improvement exists. Over three-fourths of P1 surveyed participants (78%) were completely or somewhat satisfied with the Retrofit program communications they received from the IESO. Two-thirds of surveyed applicant representatives and contractors (67%) rated their communication with the IESO staff positively. Those who provided negative responses and offered suggestions for improving the IESO's communication mentioned a more efficient

application review process, additional training for application review staff, and assigning a specific contact person for communication.

- **Recommendation 5:** *Improve the IESO communication with program participants and program partners (such as the accuracy, consistency, and timeliness of responses to questions) to improve the quality and consistency of technical advice and customer support timeliness.*

Please note that Recommendation 5 was included in the PY2019 evaluation as well. In response to the recommendation in PY2019, the IESO indicated that customers are communicated with about the program in a variety of ways, including through newsletters, social media, and the Save on Energy website. Additionally, IESO indicated that they had implemented a centralized support function to answer application questions, and that program delivery vendors are available to provide direct support to customers as needed. Given that participant satisfaction with IESO communications was still moderate in PY2020, the related recommendation about improving IESO's communications, especially in terms of the accuracy, consistency, and timeliness of feedback is provided again in PY2020 as it continues to be relevant.

Finding 6: Expanding measure offerings was the most common improvement suggestion mentioned by applicant representatives and contractors.

One-half of applicant representatives and contractors mentioned expanding measure offerings (50%), specifically bringing back custom projects (21%) and exterior lighting incentives (17%).

- **Recommendation 6:** *Consider gathering additional feedback on contractor measure offering suggestions through focus groups or outreach to key program partners to better understand market needs.*

Finding 7: Additional cross-program promotion opportunities exist. Given that over one-half (55%) of respondents had not applied to any other energy-efficiency programs in 2020 besides the Retrofit program, opportunities exist to further promote other Save on Energy programs to Retrofit customers.

- **Recommendation 7:** *Continue to identify cross-program promotion opportunities, which can be achieved through two means. Firstly, promoting other program opportunities to all participating Retrofit customers at both the start and end of the participation process. Secondly, ensuring that participating customers in particular segments, such as small businesses, are aware of the other program opportunities designed with their business segment in mind.*

Please note that Recommendation 7 was included in the PY2019 evaluation as well. In response to the recommendation in PY2019, the IESO indicated that a Retrofit and Process and Systems Upgrade (PSU) comparison chart had been posted to communicate the benefits of those two programs so participants could determine which program was most relevant to them. Given that cross-program participation in PY2020 was still low between the various business program offerings, the related recommendation about continuing to identify cross-program promotions opportunities is provided again in PY2020 as it continues to be relevant.

Finding 8: The Retrofit Support Line and Save on Energy website are valuable resources for customers. A majority (57%) of P2 respondents reported visiting the Save on Energy

program website to search for information about energy-efficiency program offerings. Three in five respondents (59% with a rating of 4 or 5) who did visit the website stated they found the information useful. Fewer participants reported using the Retrofit Support Line (67% reported never using it), but of those who used it, three-fourths (76% with a rating of 4 or 5) stated it was very useful.

- **Recommendation 8:** *Continue to offer information about the program through the Retrofit Support Line and Save on Energy website in future program years.*

5 Job Impacts

This section presents the results of the job impact analysis, as summarized in Table 5-1. As the two right columns indicate, the analysis estimated that the PY2020 Retrofit program would create 2,198 total jobs in Canada, with 1,987 jobs being created in Ontario. Of the 2,198 estimated total jobs, 1,141 are direct jobs, 516 are indirect jobs, and 541 are induced. In terms of FTEs, the numbers are slightly lower, with 1,655 FTEs created in Ontario and 1,828 FTEs created nationwide. Of these 1,828 FTEs, 998 fall under the direct category, while the indirect and induced categories account for 430 and 400 FTEs, respectively. In total, the Retrofit Program created 48.8 jobs per million dollars of investment (i.e. program budget).

Table 5-1: Summary of Total Job Impacts

Job Impact Type					
Direct	975	998	1,119	1,141	25.3
Indirect	354	430	425	516	11.5
Induced	326	400	443	541	12.0
Total¹	1,655	1,828	1,987	2,198	48.8

¹ Columns may not add to totals due to rounding. Real values are rounded to the nearest whole number and the whole numbers do not sum exactly to the whole number total in every column

Section 5.1 details the values of the inputs used in the model runs. Section 5.2 presents the analysis results (including the details of job impacts and assumptions) as well as responses to the Contractor survey related to job impacts.

5.1 Inputs

The model was used to estimate the impacts of three economic shocks

1. Demand for energy-efficient products and services from the Retrofit program,
2. Increased business reinvestment due to bill savings (and net of project funding)
3. Reduced residential spending due to program funding.

Table 5-2 below displays the input values for the demand shock representing the products and services related to the Retrofit program. Each measure installed as part of the program was categorized according to the StatCan IO Supply and Use Product Classifications (SUPCs).

The first seventeen rows of Table 5-2 contain the categories corresponding to products, which were the measures installed in businesses. The last row contains the services. Of the seventeen product categories, Lighting fixtures had the highest total cost at \$48.4 million, and Electric lightbulbs and tubes were the second-highest at \$34.4 million. Each measure’s cost was

divided into labour and non-labour, as the IO Model required this distinction to determine direct versus indirect impacts. The labour costs were determined by examining a random sample of invoices from the program. Utilizing the 90/10 methodology for the full set of 3,367 projects would have required examining 68 invoices. The analysis used a sample size of 122 invoices that specified the portion of the project cost for labour versus materials to be conservative. Labour percentages were calculated and applied by measure type and based on when the project was completed in the year. Of the 122 invoices examined, the weighted average labour percentage for these projects was 34%. Thus, the demand shock for each SUPC was assumed to be 34% labour and 66% non-labour.

The single service category in Table 5-2, Office administrative services, included general overhead and administrative services associated with program delivery. The labour and non-labour amounts are not specified for this category, as the IO Model has built-in assumptions for this category.

Table 5-2: Summary of Input Values for Demand Shock

Category Description			
Lighting fixtures	31,138	17,282	48,421
Electric light bulbs and tubes	22,431	11,939	34,371
Switchgear, switchboards, relays and industrial control apparatus	6,490	3,159	9,648
Heating and cooling equipment (except household refrigerators and freezers)	5,002	2,285	7,287
Pumps and compressors (except fluid power)	4,888	2,194	7,082
Industrial and commercial fans, blowers and air purification equipment	4,267	1,744	6,012
Measuring, control, and scientific instruments	482	249	732
Other industry-specific machinery	513	207	720
Major appliances	436	176	613
Other professional, scientific and technical services	410	166	576
Electric motors and generators	189	78	267
Glass (including automotive), glass products and glass containers	48	19	67
Textile products, n.e.c.	28	14	43
Plastic films and non-rigid sheets	21	9	30
Agricultural, lawn and garden machinery and equipment	19	10	28
Fabricated metal products, n.e.c.	18	7	25
Non-metallic mineral products, n.e.c.	5	3	8
Subtotal – Products	76,386	39,542	115,928
Office administrative services	-	-	22,115
Total			138,043

The second shock modelled by the IO Model was the business reinvestment shock. This shock represented the amount that businesses would reinvest and thus inject back into the economy. The net amount that businesses have available to either reinvest, pay off debt, or distribute to owners/shareholders (\$184.2 million) was the net of electricity bill savings (NPV = \$277.2 million), and the portion of Retrofit project costs not covered by incentives (\$93.0 million). The portion of this \$184.2 million that was to be reinvested was estimated using the surveys administered to participants as part of the Retrofit Process Evaluation. The surveys included several questions about what businesses would do with the money they saved on their electricity bills and the type of business. Overall, respondents indicated that 73% of bill savings would be reinvested. The remaining savings would either be used to pay off debt or disbursed to owners/shareholders.

To properly model the effects of the business reinvestment shock, the IO Model required the reinvestment estimates by industry. Each industrial category has a production function in the model, and these functions were adjusted to account for the reinvestment shock. Table 5-3 presents the input values for the business reinvestment shock by industry. The total business expenditure shock was \$132.5 million over 35 industries, as shown in the table.

Table 5-3: Summary of Input Values for Business Reinvestment Shock

Category Description	Business Reinvestment Shock
Other Miscellaneous Manufacturing	21,518
Retail trade	13,906
Educational services	8,881
Transportation and warehousing	7,765
Non-profit institutions serving households	6,901
Accommodation and food services	5,836
Other municipal government services	5,785
Wholesale trade	4,567
Automotive and transportation	4,466
Finance, insurance, real estate, rental and leasing and holding companies	4,314
Primary and fabricated metal	4,314
Crop and animal production	4,035
Owner occupied dwellings	4,009
Health care and social assistance	3,908
Repair, maintenance and operating and office supplies	3,908
Machinery	3,629
Crop, animal, food, and beverage	3,197
Furniture, cabinet, and fixtures	3,197
Other services (except public administration)	3,197
Arts, entertainment and recreation	2,639
Other activities of the construction industry	1,954
Government health services	1,117
Mining, quarrying, and oil and gas extraction	1,117

Category Description	Business Reinvestment Shock
	(\$ Thousands)
Professional, scientific and technical services	1,117
Support activities for agriculture and forestry	1,117
Utilities	1,117
Chemical, soap, plastic, rubber, and non-metallic minerals	558
Computer and electrical	558
Forestry, logging, paper, and printing	558
Government education services	558
Non-residential building construction	558
Other provincial and territorial government services	558
Repair construction	558
Residential building construction	558
Textile and clothing	558
Total	132,536

The third model input is the household expenditure shock.¹ This shock represents the incremental increase in electricity bills to the residential sector from funding the program. The assumption is that the IESO programs are funded by all customers in proportion to the overall consumption of electricity. Thus, the residential funding portion was 35% of the \$45.0M program budget or \$15.8M.

5.2 Results

The StatCan IO Model generated results based on the input values detailed in Section 5.1. Table 5-4 presents the results of the model run for the demand shock for products and services. This shock accounts for about two-thirds of job impacts. As the two right columns display, the model estimated that the demand shock would result in the creation of 1,444 total jobs (measured in person-years) in Canada, of which 1,338 will be in Ontario. Of the 1,444 jobs, 794 were direct, 298 indirect and 352 were induced. In terms of FTEs, the numbers are slightly lower, with 1,113 FTEs were estimated to be created in Ontario and 1,199 in total across Canada. Of those 1,199 FTEs, 687 were direct, 252 indirect and 260 induced. Direct jobs impacts were realized exclusively in Ontario, as shown in the table. As we move to indirect and induced jobs, impacts are dispersed outside of the province.

¹ The model is actually run with a normalized value of \$1 million in extra household expenditures, and the job results can be scaled by the actual demand shock.

Table 5-4: Job Impacts from Demand Shock

Job Impact Type	FTE <i>(in person-years)</i>		Total Jobs <i>(in person-years)</i>	
	Ontario	Total	Ontario	Total
Direct	687	687	794	794
Indirect	209	252	249	298
Induced	217	260	295	352
Total	1,113	1,199	1,338	1,444

Table 5-5 presents the results of the model run for the business reinvestment shock. Job impacts generated by business investment were equal to 362 total direct FTEs and 418 total direct jobs. Overall, business investments were responsible for 722 FTEs and 880 total jobs across Canada.

Table 5-5: Job Impacts from Business Reinvestment Shock

Job Impact Type	FTE <i>(in person-years)</i>		Total Jobs <i>(in person-years)</i>	
	Ontario	Total	Ontario	Total
Direct	336	362	391	418
Indirect	164	204	202	251
Induced	122	156	165	211
Total	622	722	758	880

The third shock was the reduction in residential spending from the increase in electricity bills to fund the program. Table 5-6 presents the job impacts from the model run. It represents the number of jobs attributed to reduced residential spending. This amount could have been spent in other sectors of the economy but was instead spent on funding the Retrofit program. The model estimated a reduction of 93 FTEs and 126 total jobs across Canada due to the decreased residential spending.

Table 5-6: Job Impacts from Residential Funding Shock

Job Impact Type	FTE <i>(in person-years)</i>		Total Jobs <i>(in person-years)</i>	
	Ontario	Total	Ontario	Total
Direct	-48	-51	-66	-71
Indirect	-19	-26	-26	-33
Induced	-13	-16	-17	-22
Total	-80	-93	-109	-126

The non-residential sector also contributes to program funding. The StatCan IO Model does not adjust production functions for all industries experiencing marginally higher electricity price changes. This portion of the shock would be modelled by assuming that surplus would be reduced by the extra amount spent on electricity. The model captures energy bill increases from

program funding as an impact on direct GDP (value-added) and not as a reduction in employment. The GDP impact is equivalent to the profit loss resulting from the increase in electricity bills from program funding.

The economic impact of the reduction of electricity production as a result of the increase in energy efficiency was another potential economic shock. Technically speaking, it can be estimated using StatCan Input-Output multipliers without running the model. However, the IO model is linear and not well suited to model small decreases in electricity production. Total electricity demand has been increasing over time and is projected to continue increasing². The relatively small decrease in overall consumption attributed to Retrofit program savings may slow the rate of consumption growth over time but would likely not result in actual job losses in the utility industry or upstream suppliers. The linearity of the IO model means that it will provide estimates regardless of the size of the impact. Given the nature of electricity production, it is reasonable to conclude that the linear IO multiplier is not appropriate for estimating job impacts. This analysis assumes that job losses from decreased electricity production are negligible.

Table 5-7 presents the total estimated job impacts by type, calculated by combining the jobs estimated in Table 5-4, Table 5-5 and Table 5-6.

Of the 1,141 estimated total direct jobs, 1,119 were in Ontario. A slightly smaller proportion of the indirect and induced jobs were in Ontario; 425 out of 516 indirect jobs and 443 out of 541 induced jobs were estimated to be created within the province. The FTE estimates were slightly lower overall than the total jobs, with a total of 1,655 FTEs (of all types) created in Ontario and 1,828 FTEs added nationwide. Almost all direct FTEs (975 of 998) were added in Ontario, representing approximately 58% of the total FTEs added in Ontario, and 55% of all FTEs created across Canada.

Table 5-7: Total Job Impacts by Type

Job Impact Type					
Direct	975	998	1,119	1,141	25.3
Indirect	354	430	425	516	11.5
Induced	326	400	443	541	12.0
Total¹	1,655	1,828	1,987	2,198	48.8

Calculating relative performance as a function of jobs created per \$1M spent is useful for comparing the Retrofit program between years. In 2019, each \$1M of the program spent resulted in the creation of 29.3 total jobs. This year, each \$1M of the program spent resulted in the creation of 48.8 jobs. This is likely the result of incentives catalyzing more participant investment per dollar than in 2019. In 2019, participants were responsible for \$0.37 of every dollar spent on projects within the Retrofit program. In 2020, participants accounted for \$0.67 of every dollar spent. This indicates that for each dollar spent for the program administration in 2020, participants spent 45% more than they did the year prior. This leads to larger economic

² Annual Planning Outlook – A view of Ontario's electricity system needs; 2020. IESO.

demand shocks, thus leading to the observed increase in job creation per \$1M of the program spending.

In addition to year over year comparisons of the same program, it is useful to compare job impacts estimated using the same IO model and methodology to examine differences between programs. Job impacts were also estimated for the Small Business Lighting (SBL) program using the StatCan IO Model. The budget for the Retrofit program was \$45.0 million and it generated 2,198 total jobs while the SBL program had a budget of \$4.3 million and generated 140 total jobs. The Retrofit program thus yielded one job per \$20,500 of program budget (49 jobs/\$M), compared to one job per \$31,000 of program budget (32 jobs/\$M) for SBL. The Retrofit program catalyzed a significantly higher portion of spending on EE projects by participants (\$93.0M – or 207% of program budget) than the SBL program (\$280,500 – or 7% of program budget), which likely resulted in the higher number of jobs created per million dollars of program spend.

The model does not provide year-by-year results for job impacts, but some estimates about the temporal nature of the impacts can be made. Table 5-8 presents the total jobs created due to program activities and energy savings in the first year versus after the first year. The table assumes that “first-year activities” are the initial demand shock for EE products and services, the program funding shock, and the first-year energy savings (resulting in bill savings and reinvestment). Job impacts after the first year are due to energy savings throughout the measures’ EULs. Job impacts from first-year activities make up roughly 64% of the total, with 1,408 out of the total of 2,198 person-years. Ninety of these person-years come from first-year energy savings. The remaining 790 total job-years are due to energy savings after the first year and the reinvestment generated by the bill savings.

Table 5-8: Job Impacts from First Year Shocks

Job Impact Type			
Direct	766	375	1141
Indirect	291	225	516
Induced	352	189	541
Total¹	1,408	790	2,198

Table 5-9 shows the job impacts in more detail, with jobs added by type and industry category. Industries are sorted from top to bottom by those with the most impacts to the least, with industries that showed no impacts not included in the table. The table presents the industry with the largest job impacts was Administrative and support, waste management and remediation services. This category is large and non-specific and reflects the need to hire individuals to fill a large range of roles based on program needs (for example, office administration, call centre operations, program management, etc.). *Retail trade* and *Wholesale Trade* were the industries with the next most added jobs, adding 207 and 169 jobs, respectively.

Table 5-9: Job Impacts by Industry

Output Industry Category	FTE (in person-years)		Total Jobs (in person-years)	
	Ontario	Total	Ontario	Total
Administrative and support, waste management and remediation services	732	741	857	870
Retail trade	141	153	191	207
Wholesale trade	142	165	146	169
Professional, scientific and technical services	90	110	116	142
Manufacturing	91	132	95	138
Non-residential building construction	95	95	113	113
Finance, insurance, real estate, rental and leasing and holding companies	71	84	88	104
Accommodation and food services	37	49	56	73
Transportation and warehousing	41	53	49	63
Other services (except public administration)	25	30	35	43
Engineering construction	38	38	42	42
Government education services	30	31	36	37
Information and cultural industries	20	27	24	32
Health care and social assistance	15	16	25	27
Residential building construction	18	18	24	24
Repair construction	15	17	18	20
Arts, entertainment and recreation	7	9	14	18
Educational services	5	5	10	11
Non-profit institutions serving households	8	9	10	11
Other municipal government services	9	10	10	11
Crop and animal production	3	5	6	10
Other federal government services	8	8	9	9
Utilities	5	6	6	7
Government health services	4	5	5	6
Mining, quarrying, and oil and gas extraction	3	6	3	5
Other provincial and territorial government services	1	2	1	2
Other activities of the construction industry	0	0	1	1
Support activities for agriculture and forestry	0	1	1	1
Forestry and logging	0	1	0	1
Total¹	1,655	1,828	1,988	2,198

¹ Columns may not add to totals due to rounding. Real values are rounded to the nearest whole number and the whole numbers do not sum exactly to the whole number total in every column.

The Retrofit Contractor and Applicant Representative survey responses support the results of the model showing positive job impacts. The survey instrument contained questions for contractors and applicant representatives related to the impact of the Retrofit program on their firms and employment levels. Two questions, in particular, were informative to understand the nature of the impacts to respondents, which would be considered direct impacts. These two questions with relevant illustrative verbatim responses are presented below:

- 1) Did the 2020 program help or hinder the growth of your business in any way? If so, please explain how:

The program helped the growth of my business in the following ways:

- *“Convince customers that were on the fence to proceed with energy efficient upgrades.”*
- *“It provided an additional selling point and differentiation compared to competitors.”*
- *“With the rebates offered it made customer more inclined to spend the money to save Hydro, knowing they would get money back as well to save hydro.”*
- *“Increase in lighting sales.”*
- *“The projects that we completed would not have been implemented without the incentive justification to do so.”*

The program hindered the growth of my business in the following ways:

- *“Rebates show confidence in new technologies. Not having a prescriptive solution may be hampering.”*
- *“The incentive rebates were reduced. The complexity and requirements increased.”*
- *“Decreased measures and lesser incentives reduced the customer cash flow and payback.”*
- *“Lost all of my LDC supporters who would support our mutual customers. Unclear on COVID situation and installations. Missed several applications due to the deadline change of Dec 31 to Dec 4th and I’m still dealing with pre-approvals from last year.”*

Did the 2020 program have an impact on the number of people you hired in the last year?

Yes, the program impacted the number of people hired in the last year in the following ways:

- *“Was able to hire an additional salesperson and tech.”*
- *“Built an energy team around efficiencies and incentives.”*
- *“We have grown and hired multiple staff as a result.”*

Respondents indicated the program generally resulted in slight increases in staffing overall. No respondents indicated decreases in staffing due to the Retrofit program. This may be due in part to the fact that jobs lost this year were instead attributed to the COVID-19 pandemic and resultant business disruptions. Customer verbatims further support the direct job gains estimated by the model, with multiple customers indicating that more than one additional staff member had been hired as a result of the Retrofit program. This reveals the potential for beneficial impacts the program can have on firms. Respondents that indicated a negative effect on their business primarily stated that the biggest driver was decreased incentives compared to previous years. Additionally, some customers reported that increased application complexity and program requirements or changes to program deadlines had hampered their business. These issues could be examined further if parts of the program were redesigned to enhance job impacts.

Input-Output models are informative for understanding the potential magnitudes and dynamics of economic shocks created by policies and programs. While useful, the StatCan IO Model is a simplified representation of the Canadian economy and thus has limitations. The model is based on the assumption of fixed technological coefficients. It does not take into account economies of scale, constraint capabilities, technological change, externalities, or price changes. This makes analyses less accurate for long-term, and large impacts, where firms would adjust their production technology and the IO technological coefficients would become outdated. Assuming that firms adjust their production technology over time to become more efficient implies that the impact of a change in the final demand will tend to be overestimated. For household consumption, the model is based on the assumptions of constant consumption behaviour and fixed expenditure shares relative to incomes.

Appendix A Impact Evaluation Methodology

A.1 Sample Plan

Independently verifying the energy and demand savings and attributing these savings first requires selecting sample projects that represent the program's population. The goal of a representative sample ensures results can be applied to the population's reported savings to verify gross and net impacts with minimal uncertainty. To enhance the evaluation results, previously evaluated projects from 2020-P1 were combined with new 2020-P2 projects to create a rolling sample that reduces uncertainty by including a larger number of evaluated projects from a greater population. A random sampling of projects was completed by studying the population and developing a sampling plan based on the following factors:

- Participation levels provided in the program database extract
- Overall confidence/precision targets of 90/10 for the program assuming a coefficient of variation (C_v) of 0.5

A.2 Project Counts

Due to the broad range of measures incentivized through the Retrofit program, several variables are considered when defining a unique project, and include:

- Application identification (ID)
- Track (prescriptive/custom)
- Measure type (lighting/non-lighting)

As a result, a number of IESO-defined projects were split into various evaluation projects, often due to different tracks within the same application or different measure types installed within the same track. This sorting process resulted in a greater count of evaluation projects, thus exceeding the count of projects reported by the IESO.

A.3 Project Audits

Subsequent to the sampling process, project audits representing the entire Retrofit population were completed. Sampled projects received Level 1 audits, which consist of desk reviews of project documentation available from the program delivery vendor. These documents include project applications, equipment specification sheets, notes on equipment installed, invoices for equipment, and any other documentation submitted to the program. Evaluation of the Retrofit program often includes Level 2 audits with on-site visits and extensive metering to estimate equipment hours of use and operational load. However, the 2020 evaluation cycle was disrupted by the COVID-19 pandemic with corresponding facility closures and social distancing requirements, leading to the suspension of on-site visits.

To maximize participant responses, we expanded the types of outreach conducted for the impact evaluation. In addition to verification phone calls, the evaluation added an internally developed self-assessment survey for lighting projects and an option to complete virtual site visits through a software solution.

The web-based self-assessment survey imported project-specific details from the program, including measure name, and provided the participant with an opportunity to verify the equipment installed and other key operating parameters. Information provided by the participant was then cross-referenced against the program database to ensure the accuracy of their responses.

Virtual site visits permitted the EM&V staff to view through the phone, tablet, or computer camera with the approval of the participant. The software acts like a virtual meeting that allows screen sharing and can be moved around a facility to verify equipment installation, quantities, and operating parameters. However, we faced difficulty as many participants were still working from home, which limits the opportunity to complete a virtual site visit, or were uncomfortable sharing access through their mobile equipment.

A.4 Reported Savings

Gross reported savings are the energy and summer peak demand savings derived from information submitted on participant applications. They reflect the equipment installed throughout the program. This information was provided to the evaluation team through the program participation data extract provided by the IESO.

A.5 Verified Savings

Energy and demand savings are verified for all sampled projects and rely on data collected and verified during the project audit. This information is evaluated utilizing analytical tools to determine the savings attributable to each project. For a specific stratum, the verified savings are compared to the reported savings to define the stratum realization rate. This realization rate is then applied to all projects' gross reported savings in a stratum's population to estimate the stratum verified savings. Equation A-1 shows the formula for calculating a stratum's realization rate.

Equation A-1: Realization Rate

$$\text{Realization Rate} = \frac{\sum_i^n \text{Savings}_{\text{verified}}}{\sum_i^n \text{Savings}_{\text{reported}}}$$

Where:

$\text{Savings}_{\text{verified}}$ = Energy (kWh) or demand (kW) savings verified for each project in the sample

$\text{Savings}_{\text{reported}}$ = Energy (kWh) or demand (kW) savings reported by the program for each project in the sample

The total verified savings reflect the direct energy and demand impact of the program's operations. However, these savings do not account for customer or market behaviour impacts that may have been added to or subtracted from the program's direct results. These market effects are accounted for through the net impact analysis.

A.6 Interactive Effects for Lighting Equipment

The Retrofit program incentivizes the installation of lighting equipment that has higher efficiency levels compared to commonly installed lamps and fixtures. Ideally, this high-efficiency equipment should consume less energy. However, it is understood that the equipment's energy

consumption in an enclosed space cannot be viewed in isolation. Building systems interact with one another, and a change in one system can affect a separate system's energy consumption. This interaction should be considered when calculating the benefits provided by the program. Examining cross-system interactions provides a comprehensive view of building-level energy changes, rather than limiting the analysis to solely the energy change that directly relates to the modified equipment. The IESO Evaluation Measurement and Verification (EM&V) Protocols state that interactive energy changes should be quantified and accounted for whenever possible. Based on this guidance, interactive effects were calculated for all energy-efficient lighting measures installed through the program to capture the changes in the operation of heating, ventilation and air-conditioning (HVAC) equipment due to lower heat loss from energy-efficient lighting equipment.

A.7 Lifetime Savings

When performing the impact evaluation, it is important to consider the total amount of savings over the lifetime of retrofitted equipment. This consideration is necessary given that energy savings, demand savings, avoided energy costs, and other benefits continue to accrue each year the equipment is in service. The method of calculating lifetime energy savings of a measure level is presented in Equation A-2.

Equation A-2: Lifetime Energy Savings

$$\text{Lifetime Energy Savings} = EUL \times \text{Annual Energy Savings}$$

Where:

EUL = Estimated useful life of the retrofitted equipment

Appendix B Net-to-Gross Methodology

This appendix provides detail on the sampling plans for collecting NTG data, the instruments used to assess FR and SO, the implementation of the data collection, and the analysis methods.

An effective questionnaire was developed to assess FR and SO. The approach has been used successfully in many previous evaluations. The NTG ratio presented in Equation B-1 is defined as follows:

Equation B-1: Net-to-gross Ratio

$$NTG = 100\% - FR + SO$$

Where FR is free-ridership, and SO is spillover.

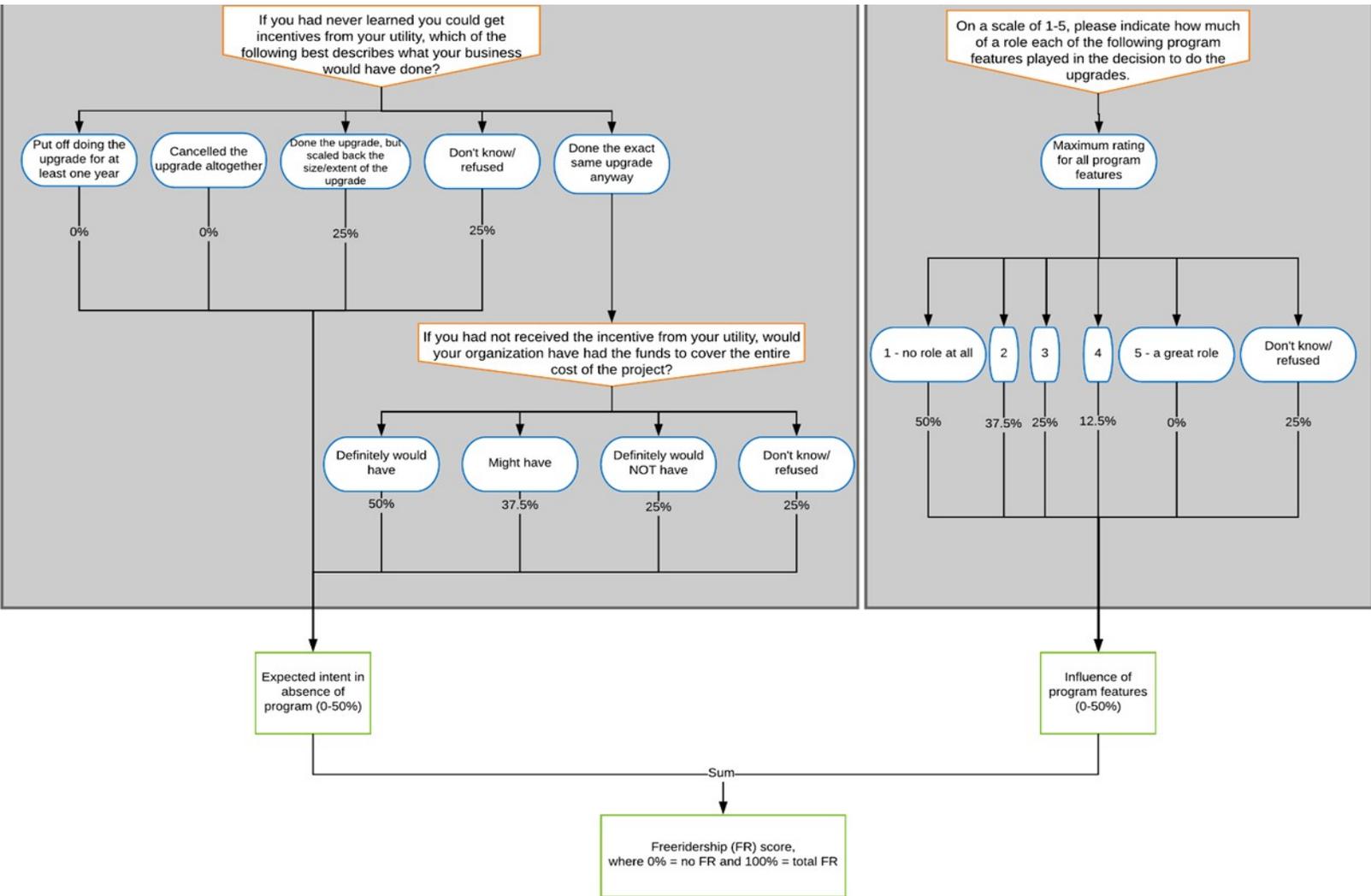
B.1 Free-ridership Methodology

The survey addressed the attribution of savings for each sampled project or type of equipment through two main components:

- Intention of the expected behaviour in the program's absence; and
- Influence of various program features, such as the incentive, program marketing and outreach, and any technical assistance received.

Each component produces scores ranging from 0 to 50. The two components are summed to produce a total FR score ranging from 0 (not a free-rider) to 100 (complete free-rider). The total score is interpreted as a percentage (0% to 100%) to calculate the mean FR level for a given program. Figure B-1 illustrates the FR methodology.

Figure B-1: Free-ridership Methodology



Intention Component

The FR score’s intention component asks participants how the evaluated project would have differed in the program’s absence. The two key questions that determine the intention score are as follows:

Question 1: If you had never learned you could get incentives/upgrades at no cost through the program, which of the following best describes what your business would have done? Your business would have...

1. Put off doing the upgrade for at least one year.
2. Cancelled the upgrade altogether.
3. Done the upgrade, but scaled back the size or extent of the upgrade.
4. Done the exact same upgrade anyway → Ask Question 2
98. Don't know
99. Refused

[ASK ONLY IF RESPONSE TO QUESTION 1=4: Done the exact same upgrade anyway] Question 2: If you had not received the incentive/upgrades at no cost from the program, would you say your organization definitely would have, might have, or definitely would not have had the funds to cover the entire cost of the project?

1. Definitely would have
2. Might have
3. Definitely would NOT have
98. Don't know
99. Refused

Table B-1 indicates the possible intention scores a respondent could have received depending on their responses to these two questions.

Table B-1: Key to Free-ridership Intention Score

Question 1 Response	Question 2 Response	Intention Score (%)
1 or 2	Not asked	0 (no FR for intention score)
3, 98 (Don't Know), or 99 (Refused)	Not asked	25
4	3, 98 (Don't Know), or 99 (Refused)	25
4	2	37.5
4	1	50 (high FR for intention score)

If a respondent provided an answer of 1 or 2 (would postpone or cancel the upgrade) to the first question, the respondent would receive an FR intention score of 0% (on a scale from 0% to 50%, where 0% is associated with no FR and 50% is associated with high FR). If a respondent answered 3 (would have done the project but scaled back the size or extent) or stated they did not know or refused the question, the respondent would receive an FR intention score of 25% (associated with moderate FR). If the respondent answered 4 (would have done the exact same project anyway), they are asked the second question before an FR intention score can be assigned.

The second question asks the participants who stated they would have done the exact same project, regardless of whether their organization would have had the funds available to cover the entire project cost. If the respondent answered 1 (definitely would have had the funds), the respondent receives a score of 50% (associated with high FR). If the respondent answered 2 (might have had the funds), they receive a slightly lower FR score of 37.5%. If the respondent answered 3 (definitely would not have had the funds) or did not know or refused the question, the respondent would receive an FR intention score of 25% (associated with moderate FR).

The bullet points below display the same FR intention scoring approach in a list form. As mentioned above, for each respondent, an intention score was calculated, ranging from 0% to 50%, based on the respondent's report of how the project would have changed had there been no program:

- Project postponement or cancellation = 0%
- Reduction in size or scope or use of less energy-efficient equipment = 25%
- Respondent does not know what they would have done in the absence of the program = 25%
- No change and respondent states firm would not have made funds available = 25%
- No change but respondent is not sure whether firm would have made funds available = 37.5%
- No change and respondent confirms firm would have made funds available = 50%

Influence Component

The influence component of the FR score asks each respondent to rate how much of a role various potential program-related influence factors had on their decision to do the upgrade(s) in question. Influence is reported using a scale from one (1) to five (5), where one indicates "it played no role at all" and five indicates "it played a great role." The potential influence includes the following:

- Availability of the incentives
- Information or recommendations provided to you by an IESO representative (if applicable)
- The results of any audits or technical studies done through this or another program provided by the IESO (if applicable)

- Information or recommendations provided from contractors or vendors or suppliers associated with the program
- Information from Enbridge Gas
- Information from another government entity
- Marketing materials or information provided by the IESO about the program (email, direct mail, etc.)
- Information or resources from the IESO website
- Information or resources from social media
- Previous experience with any energy-saving program
- Others (identified by the respondent)

Table B-2 indicates the possible influence scores a respondent could receive depending on how they rated the influence factors above. For each respondent, the program influence is set equal to the maximum influence rating that a respondent reports across the various influence factors. For example, suppose the respondent provided a score of 5 (great role) to at least one of the influence factors. In that case, the program is considered to have had a great role in their decision to do the upgrade, and the influence component of FR is set to 0% (not a free rider).

Table B-2: Key to Free-ridership Influence Score

Maximum Influence Rating	Influence Score (%)
5 - program factor(s) highly influential	0
4	12.5
3	25
2	37.5
1 - program factor(s) not influential	50
98 – Don't know	25
99 - Refused	25

The bullet points below display the same FR Influence scoring approach in a list form. As mentioned above, for each project, a program influence score was calculated, also ranging from 0% to 50%, based on the highest influence rating given, among the potential influence factors:

- Maximum rating of 1 (no influencing factor had a role in the decision to do the project) = 50%
- Maximum rating of 2 = 37.5%
- Maximum rating of 3 = 25%
- Maximum rating of 4 = 12.5%
- Maximum rating of 5 (at least one influence factor had a great role) = 0%
- Respondent does not know how much influence any factor had = 25%

The intention and program influence scores were summed for each project to generate an FR score ranging from 0 to 100. The scores are interpreted as % FR: a score of 0 indicates 0% FR (the participant was not at all a free rider), a score of 100 indicates 100% FR (the participant was a complete free rider), and a score between 0 and 100 indicates the participant was a partial free rider.

B.2 Spillover Methodology

To assess the SO, respondents were asked about installing energy-efficient equipment or services that were done without a program incentive following their participation in the program. The equipment-specific details assessed are as follows:

- ENERGY STAR Appliance: type and quantity
- Fan: type, size, quantity
- HVAC: air conditioner replacement, above code minimum: tonnage and quantity
- Lighting: type, quantity, wattage, hours of operation, location, and fixture length
- Lighting – controls: type of control, type and quantity of lights connected to control, hours of operation, and percentage of time the timer turns off lights
- Motor/Pump Upgrade: type, end-use, horsepower, and efficiency quantity
- Motor/Pump Drive Improvement (VSD and Sync Belt): type, end-use, horsepower, and quantity
- Others (identified by the respondent): description of the upgrade, size, quantity, hours of operation

For each equipment type, the respondent reports installing without a program incentive. The survey instrument asks about the extent of influence that earlier involvement in the program had on the decision to carry out the upgrades. Influence is reported using a scale from one (1) to five (5), where one indicates “it played no role at all” and five indicates “it played a great role.” Suppose the influence score is between 3 and 5 for a particular equipment type. In that case, the survey instrument solicits details about the upgrades to estimate the quantity of energy savings that the upgrade produced.

For each upgrade, the program influence rating was converted to an influence score ranging from 0% to 100%, as follows:

- Maximum rating of 1 or 2 (no influence) = 0%
- Maximum rating of 3 = 50%
- Maximum rating of 4 or 5 (great influence) = 100%
- Respondent does not know how much influence any factor had = 0%

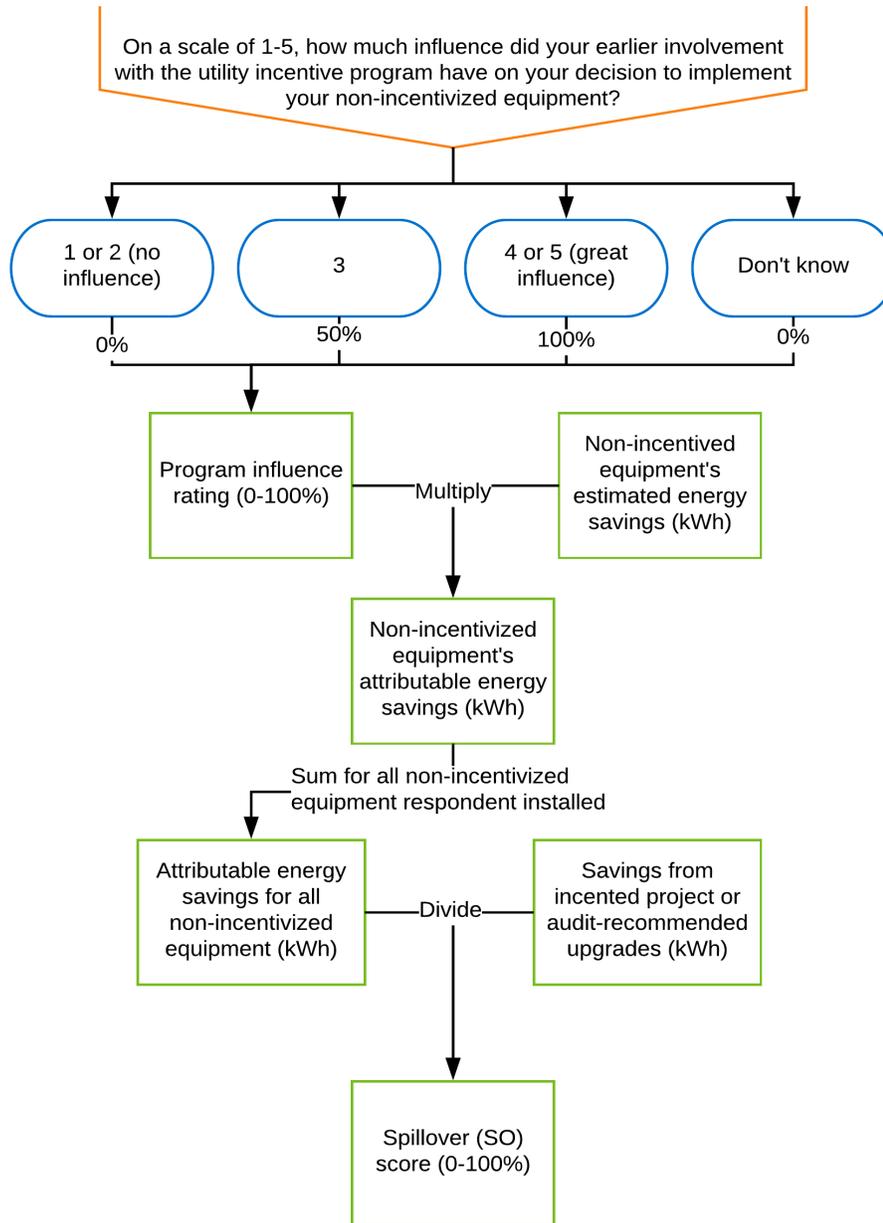
The following procedure was used to calculate an SO percentage for each respondent:

- Multiplying the estimated energy savings for each upgrade by the influence percentage to calculate the upgrade’s program-attributable energy savings.

- Summing program-attributable energy savings from all identified upgrades for each respondent to calculate the respondent’s total SO savings.
- Dividing each respondent’s total SO savings by the savings from the incented project.

Figure B-2 illustrates the SO methodology.

Figure B-2: Spillover Methodology



B.3 Identification of Project or Upgrade for NTG Assessment

Participants were asked to consider all their completed projects during the program year through the particular program in question. This approach allowed for the respondent's NTG value across all the projects they completed in the program year to be applied rather than just one.

B.4 Other Survey Questions

In addition to the questions addressing FR and SO, the survey included the following topics to provide additional context:

- Whether the respondent is the person primarily involved in decisions about upgrading equipment at their company. Suppose the respondent is not the appropriate contact. In that case, they are asked by the interviewer to be transferred to or be provided contact information for the appropriate person in the case of a phone survey. In the case of a web survey, the web link will be forwarded to the appropriate contact.
- Whether the respondent had primary or shared responsibility for the budget or expenditure decisions for the program-incentivized work completed at their company.
- The respondent's job title.
- When the respondent first learned about the program incentives relative to the upgrade in question (before planning, after planning but before implementation, after implementation began but before project completion, or after project completion).
- When the respondent submitted their application to the program, and their reasons for submitting it after the work was started or completed, if applicable.
- How the respondent learned about the program.

The responses to these questions are not included in the algorithms for calculating FR or SO but provide additional context. The first question ensures that the appropriate person responded to the survey. The other questions provide feedback about responsibility for budget and expenditure decisions, the respondent's job title, application submission process details, and how and when program influence occurs.

B.5 Net-to-gross Survey Implementation

The survey was implemented over the web and phone. The survey lab was instructed to avoid collecting duplicate responses by no longer calling on respondents if they had responded to the web survey or deactivating the respondent's survey web link if they had responded to the phone survey.

For each of the phone surveys, the survey lab called participants in a randomized order. After reaching the identified contact for a given participant, the interviewer explained the survey's purpose and identified the IESO as the sponsor. The interviewer asked if the contact was involved in decisions about upgrading equipment at that organization. If the contact was not involved in decisions about upgrading equipment, the interviewer asked to be transferred to or for the contact information of the appropriate decision-maker. The interviewer then attempted to reach the identified decision-maker to complete the survey.

It was assumed that all contacts who responded to the web version of the survey were the appropriate contacts to answer the questions. The introductory text in the survey asked the respondent to forward the survey web link to the appropriate contact to fill it out if they were not the appropriate contact to do so.

Appendix C Detailed Process Evaluation Methodology

This appendix provides additional detail about the process evaluation methodology. A summary of the methodology was provided in Section 4.1. The process evaluation collected primary data from key program actors, including the IESO program staff, program delivery vendor staff, applicant representatives, contractors, and participants (Table C-1). Data were collected using different methods including web surveys, telephone surveys, or telephone-based IDIs, depending on what was the most suitable for a particular respondent group. This data, when collected and synthesized, provides a comprehensive understanding of the program.

All process evaluation data collection activities were carried out or managed by the evaluators. All survey instruments, interview guides, and sample files were developed by the evaluators for interviews and surveys. The IESO EM&V staff approved the survey instruments and interview guides. The data used to develop the sample files was retained from program records supplied either by the IESO EM&V staff or the program delivery vendor.

Table C-1: Process Evaluation Primary Data Sources

Respondent Type	Methodology	Population	Completed	90% CI Error Margin
IESO Program Staff	Phone IDIs	2	2	0%
Program Delivery Vendor Staff	Phone IDIs	3	3	0%
Applicant Representatives and Contractors	Web Survey	471	74	8.8%
Participants (P1 & P2) ¹	Web and Phone Survey	1,804	431	3.5%

The following subsections provide additional details about the process evaluation methodology.

C.1 IESO Program Staff and Program Delivery Vendor Staff Interviews

IDIs were completed with two members from the IESO program staff and three members from the program delivery vendor staff (Table C-2). The purpose of the interview was to better understand the perspectives of the IESO program staff and the program delivery vendor staff related to the program design and delivery.

¹ The participant survey was completed twice with the first survey completed with participants who completed projects in Q1 or Q2 of PY2020 (referred to as Period 1, or P1) and the second survey completed with participants who completed projects in Q3 or Q4 of PY2020 (referred to as Period 2, or P2).

Table C-2: IESO Program Staff and Program Delivery Vendor Staff IDI Disposition

Disposition Report	IESO Program Staff	Program Delivery Vendor Staff	Total
Completes	2	3	5
No Response	0	0	0
Unsubscribed	0	0	0
Partial Complete	0	0	0
Bad Contact Info (No Replacement Found)	0	0	0
Total Invited to Participate	2	3	5

The interview topics covered included program roles and responsibilities, program design and delivery, marketing and outreach, applicant representative and contractor engagement, program strengths and weaknesses, and suggestions for improvement.

The appropriate staff to interview were identified in consultation with the IESO EM&V staff. Telephone IDIs were conducted with the IESO program staff and program delivery vendor staff using in-house staff (rather than through a survey lab). The interviews were completed between May 5 and May 14, 2021. Each interview took approximately one hour to complete.

C.2 Applicant Representative and Contractor Survey

A total of 74 application representatives and contractors were surveyed from a sample of 471 unique companies (Table C-3). The purpose of the survey was to better understand the applicant representative and contractors' perspectives related to program delivery.

Table C-3: Applicant Representative and Contractor Survey Disposition

Disposition Report	Total
Completes	74
Emails bounced	23
Bad Contact Info (No Replacement Found)	0
Unsubscribed	0
Partial Complete	18
Screened Out	20
No Response	336
Total Invited to Participate	471

The survey topics included firmographics, program roles and responsibilities, audits and/or projects completed, impacts of the new incentive cap on project scope, program-specific communications from IESO, how customers heard about the program, training and education, barriers to participation, satisfaction with various aspects of the program, program improvement suggestions, FR and SO, jobs impacts, and impacts of the COVID-19 pandemic.

The sample was developed from the program records provided by the IESO EM&V staff. A census-based approach was employed to reach the largest number of respondents possible, given the small number of unique contacts.

The survey was delivered over the web by the NMR staff using Qualtrics survey software. Survey implementation was conducted between March 19 and April 16 of 2020. The survey took an average of 18 minutes to complete after removing outliers.² Weekly e-mail reminders were sent to non-responsive contacts through web survey fielding.

C.3 Participant Survey

A total of 431 participants were surveyed from a sample of 1,804 unique contacts (Table C-4). The purpose of the survey was to better understand the participant perspectives related to program experience.

Table C-4: Participant Survey Disposition

Disposition Report			
Completes	133	298	431
Emails Bounced	2	32	34
Bad Contact Info (No Replacement Found)	0	0	0
Unsubscribed	0	0	0
Partial Complete	4	52	56
Screened Out	12	34	46
No Response	284	953	1,237
Total Invited to Participate	435	1,369	1,804

The survey topics included firmographics, energy management training path or certification, experiences with and suggestions for improvement of the Retrofit Application Portal (P1 only) and application process, impacts of the new incentive cap on project scope, satisfaction with program-specific communications from the IESO (P1 only), experience with and suggestions for improvement of the program website and Retrofit Support Line (P2 only), the impact of program deadline on participation (P2 only), participation in other programs, FR and SO, job impacts, and impacts of the COVID-19 pandemic.

The sample was developed from program records provided by the IESO EM&V staff. A census-based approach was employed to reach the largest number of respondents possible given the small number of unique contacts.

The survey was delivered both over the phone and over the web in partnership with the Nexant survey lab using Qualtrics survey software. NMR staff worked closely with the Nexant survey lab to test the programming of the surveys and to perform quality checks on all data collected.

² Note that the survey was designed to allow the respondent to come back to it at a later time to complete it if they preferred. The average survey time was calculated with this in mind and assumed that any survey that took 40 minutes or more to complete was likely completed by a respondent who took a break before completing the survey.

The P1 survey implementation was conducted between September 10 and October 22 of 2020, and the P2 survey was conducted between March 15 and April 20 of 2021. The survey took an average of 17 minutes to complete after removing outliers. Weekly e-mail reminders were sent to non-responsive contacts through web survey fielding.

Appendix D Additional NTG and Process Evaluation Results

This appendix provides additional results in support of the NTG and process evaluation.

D.1 Contractor NTG Results

This section provides a summary of the FR and SO results collected as part of the Retrofit applicant representative and contractor survey. Given that only a small number of contractors responded to these survey questions, these results were not used to calculate the Retrofit program's NTG. Only the FR and SO results collected as part of the participant survey were used to calculate NTG.

Contractor FR. The survey collected feedback from respondents to better understand contractors' perspectives on the extent of FR within the Retrofit program. Contractors were asked to estimate the percentage of various equipment types that would have been installed with the same efficiency level had there been no incentive available through the program. Sixteen contractors responded to the questions in the survey.

Eleven of the sixteen surveyed contractors stated that at least some of their projects would have installed the same equipment with the same efficiency level in the Retrofit program's absence. Of the 595 total projects reported among these contractors, they indicated a total of 155 would have installed the same equipment (26%). This was heavily driven by one contract who reported a total of 400 projects, 60 of which would have installed the same equipment in the absence of the program.

Of those projects that would have installed the same equipment with the same efficiency level in the program's absence, the FR rate was higher among prescriptive projects (54%) than custom projects (25%).

The contractors were asked to estimate the percentage of various equipment types that would have been installed with the same efficiency level had there been no incentive available through the program. The average percentage among the ten contractors who made an estimate for lighting was 29%.

Contractor SO. To estimate SO, contractors were asked if they installed any energy-efficient equipment that did not receive incentives. The ten contractors who responded to this question reported that of the 803 projects that did not go through the program, 534 (67%) installed equipment that would have been eligible for an incentive but did not receive one. This was largely driven by one contractor who stated that 500 of their 600 non-program projects had efficient equipment that would have been eligible to receive an incentive. The respondents rated the program's influence on the decision to install that equipment as an average of 2.8 out of 5 on a scale from one (1) to five (5), where one indicates the program had "no influence at all" and five indicates the program was "extremely influential."

D.2 Applicant Representative and Contractor Process Results

This section provides additional detail regarding the process evaluation results collected as part of the Retrofit applicant representative and contractor survey.

Figure D-1: Satisfaction with Aspects of the Retrofit Program (n=74)

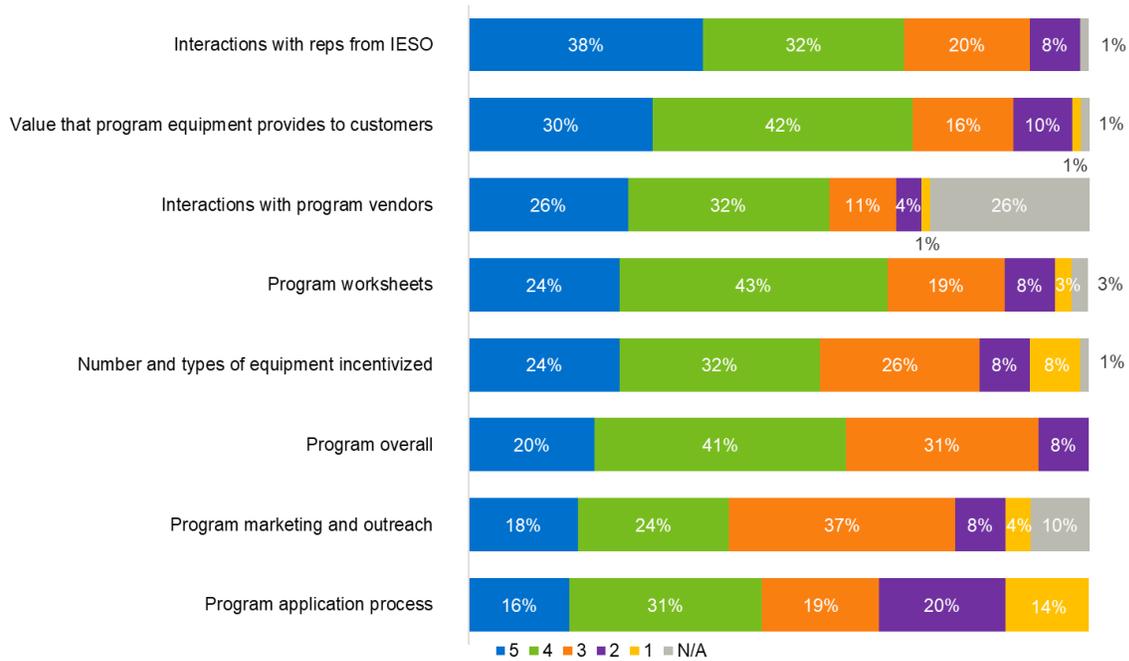


Table D-1: Suggestions for Additional Measure Offerings

Suggested Measure	Number of Respondents
Custom projects	11
Exterior lighting	9
High bay >200W	4
Booster pumps	1
Air compressor controls	1
Solar net metering	1
Refrigeration	1

D.3 Additional Participant NTG Results

This section provides additional detail regarding the NTG results for the Retrofit participants.

Table D-2: Influence on Upgrade Decision Expanded Results (n=431)

Program Feature	5 – Extremely Influential	4	3	2	1 – Not at all influential	Don't know / Refused	NA
Availability of the incentive	49%	23%	15%	3%	5%	2%	3%
Information or recommendations provided from contractors or vendors or suppliers associated with the program	51%	21%	10%	5%	7%	3%	4%
Previous experience with any energy saving program	31%	17%	14%	4%	19%	3%	12%
Information or recommendations provided to you by an IESO representative	20%	17%	14%	9%	25%	3%	12%
Information or resources from the IESO website	12%	13%	19%	15%	29%	4%	7%
The results of any audits or technical studies done through this or another program provided by the IESO	12%	12%	13%	8%	33%	6%	17%
Marketing materials or information provided by the IESO about the program	10%	11%	16%	15%	33%	3%	11%
Information from another government entity	6%	7%	12%	10%	42%	5%	18%
Information from Enbridge Gas	6%	7%	10%	6%	45%	5%	21%

**Table D-3: Reasons for Beginning Installations before Retrofit Program Application
(n=52)**

Reasons for Upgrade Timing	Respondents
Needed to stick to an internal schedule to complete upgrade	48%
Needed to complete work for an unplanned replacement for recently failed existing equipment	25%
Time or resource constraints at your company	12%
Difficulty submitting the application through the program application system	6%
Don't know / Refused	10%

*Does not sum to 100% due to rounding.

**Table D-4: Scaled Back Size or Extent of Upgrade in Absence of Program Incentives
(n=120)**

Scope Reduction	Respondents
A large amount	19%
A moderate amount	58%
A small amount	15%
Don't know / Refused	8%

Table D-5: Availability of Funds in Absence of Program Incentives (n=88)

Availability of Funds	Respondents
Definitely would have	60%
Might have	31%
Definitely would not have	2%
Don't know / Refused	7%

Table D-6: Program Influence on Equipment Installed Outside the Program
(Multiple response allowed; n=69)

Equipment	5-Extremely Influential	4	3	2	1- Not at all Influential
Lighting (n=45)	16%	21%	21%	7%	35%
HVAC - Air conditioner replacement, above code minimum (n=14)	--	23%	8%	8%	62%
Lighting - Controls (n=13)	25%	17%	33%	--	25%
Motor/Pump Upgrade (n=10)	--	--	22%	11%	67%
Fan (n=8)	14%	14%	--	--	71%
Motor/Pump Drive Improvement (n=6)	20%	--	40%	20%	20%
ENERGY STAR Appliance (n=5)	40%	--	20%	--	40%
Other (n=7)	29%	--	14%	14%	28%

Table D-7: Type of ENERGY STAR® Appliance Installed
(Multiple response allowed; n=3)

Spillover Appliance	Respondents
Refrigerator	2
Dishwasher	1

Table D-8: Size of Fan Installed
(Multiple response allowed; n=3)

Spillover Fan Diameter (ft.)	Respondents
1 – 1.99	1
8+	1

Table D-9: Size of Air Conditioner Installed
(Multiple response allowed; n=3)

Size (tons)	Respondents
< 5.4	3
20.01 – 63.6	1

Table D-10: Type of Lighting Installed
(Multiple response allowed; n=26)*

Spillover Lighting	Respondents
Compact fluorescent	4%
LED exterior	58%
LED linear or troffers	73%
LED screw base	12%
Linear fluorescent	8%

*Does not sum to 100% due to rounding.

Table D-11: LED Screw Base Wattage (n=3)

Wattage	Respondents	Equipment
< 10	3	181

Table D-12: LED Exterior Lighting Mount (n=15)

Location	Respondents	Equipment
Pole mount	1	104
Against building	14	196

Table D-13: Type of Linear Fluorescent Fixtures (n=2)

Type	Respondents	Equipment
T5	1	3
T8	1	5,000

Table D-14: Quantity of LED Linear Lamps (n=4)

Respondents	Equipment	Max Installed
4	1,428	1,174

Table D-15: Lighting Controls and Lighting Type
(Multiple response allowed; n=9)

Control Type	LED exterior	LED linear	LED screw base	Linear fluorescent	Don't know / Refused
Occupancy Sensor	4	4	1	1	1
Timer	1	0	0	0	1

Table D-16: End Uses of Motor/Pump Upgrades (n=2)

End-use	Efficiency	Size (hp)	Respondents	Equipment
HVAC Water Pump	Standard	1.1 – 5	1	4
Process	Premium	5.1 - 15	1	1

Table D-17: Size of Motor/Pump Drive Improvements Installed (n=3)

Type	Size (hp)	Respondents	Equipment
Variable speed drive	5.1 - 15 hp	2	3
Synchronous belt	< 1	1	6

Appendix E Job Impacts Methodology

E.1 Developed Specific Research Questions

The first step in modelling the job impacts from the Retrofit program was to determine which specific research questions (RQs) the model would answer. In a scenario without the existence of the Retrofit program, customers receive electricity from the IESO and pay for it via the monthly billing process. Implementing the Retrofit program introduces a set of economic supply and demand shocks to different sectors of the economy. The four research questions below illustrate these shocks:

- 1) **What are the job impacts from new demand for EE measures and related program delivery services?** Funds collected for the Retrofit program generate a demand for efficient equipment and appliances. They also generate demand for services related to program delivery, such as general overhead for program implementation and staffing. This demand creates jobs among firms that supply these products and services. Third-party implementers collect funds from the IESO to cover a portion of the project cost, while the participant covers the remainder of the costs.
- 2) **What are the job impacts from business reinvestments?** Once energy-efficient equipment is installed, the customers realize annual energy savings for the useful life of the measures. Businesses can choose to use this money to pay off debt, disburse it to shareholders as dividends, or reinvest it in the business. This additional money and the decision to save or spend has implications for additional job creation. For instance, additional business spending on goods and services generates demand that can create jobs in other sectors of the economy.
- 3) **What are the job impacts from funding the EE program?** IESO EE programs are funded via volumetric bill charges for all customers—both residential and non-residential. This additional charge can reduce the money that households have for savings and for spending on other goods and services, which results in a negative impact on jobs in the Canadian economy.
- 4) **What are the job impacts from reduced electricity production?** The energy-efficient measures will allow businesses to receive the same benefit while using less electricity. The program as a whole will reduce the demand for electricity in the commercial sector. This reduced demand could have upstream impacts on the utility industry (for example, generation) and related industries, such as companies in the generator fuel supply chain.

E.2 Developed Model Inputs

The second step in modelling job impacts was to gather the data required for the StatCan IO model to answer each of the research questions. Model input data included the dollar values of the exogenous shocks from program implementation. The sources of data for each research question were as follows:

- 2) **Demand for EE measures and related program delivery services:** The StatCan IO Model divides the Canadian economy into 240 industry classifications and 500 SUPCs. Each measure installed as part of the program was classified into one of the SUPCs. The dollar value for each product-related demand shock was calculated using the project cost and measure savings data from the impact evaluation (see Section 5). Services that were part of the implementation process were also classified into SUPCs. These services were entirely program administrative services, the value of which was obtained from program budget actuals.

It was necessary to specify the amount of each demand shock attributed to labour versus non-labour. For the product categories, we used a representative sample of invoices to estimate the average labour versus non-labour cost proportions. For the service categories, the IO model contained underlying estimates that defined the portion of labour versus overhead (non-labour).

Business energy bill savings: This value was calculated for the model as the net present value (NPV) of the discounted future stream of energy bill savings by participants. It was calculated by multiplying net energy savings (in kWh) in each future year by that future year's retail rate (\$/kWh). This calculation was performed for each future year through the end of the measure's expected useful life (EUL). Savings beyond the EUL were assumed to be zero. Project-level net energy savings were obtained using results from the impact evaluation and already accounted for other calculation parameters (i.e. discount rate, measure EULs, and retail rate forecast).

Customers' intentions for whether to reinvest, save, or distribute to owners/shareholders the money saved on energy bills was obtained via a short section on the participant surveys, as follows:

J1. How do you anticipate your company will spend the money it saves on its electricity bill from the energy-efficient equipment upgrade?

1. *Pay as dividends to shareholders or otherwise distribute to owners*
2. *Retain as savings*
3. *Reinvest in the company (labour/additional hiring, materials, equipment, reduce losses, etc.)*
4. *Split – Reinvest and pay as dividends/retain as savings*
96. *Other, please specify:*
98. *Don't know*
99. *Refused*

J2. Do you anticipate the distribution of these electricity bill savings to be treated differently than any other earnings?

1. *Yes – More distributed to shareholders/owners*
2. *Yes – More to savings*

3. *Yes – More to reinvestment*
4. *No*
98. *Don't know*
99. *Refused*

J3. Approximately what would be the split between distribution, retention, and reinvestment of money saved on electricity bills? [ALLOW MULTIPLE RESPONSE OPTION]

1. *Percent distribute [NUMERIC RESPONSE BETWEEN 0 AND 100]*
2. *Percent save/retain earnings [NUMERIC RESPONSE BETWEEN 0 AND 100]*
3. *Percent reinvest [NUMERIC RESPONSE BETWEEN 0 AND 100]*

For estimating job impacts, the key input value was the amount of bill savings that businesses would reinvest as opposed to paying down debt or redistributing to shareholders.

Retrofit funding: IESO EE programs are funded by a volumetric charge on electricity bills and, volumetrically, residential customers accounted for 35 percent of consumption and non-residential customers accounted for 65 percent in 2019. The overall program budget was distributed between these two customer classes by these percentages and used as input values for the analysis.

Reduced electricity production: The NPV of retail savings (estimated as part of RQ2) was also the input for examining the potential impact of producing less electricity.

E.3 Run Model and Interpret Results

Determining the total job impacts from the Retrofit program required considering possible impacts from each of the four shocks represented by the research questions. Addressing the four research questions above required three runs of the StatCan IO model, as certain components of the shocks could be consolidated and others addressed without full runs of the model. The three shocks that were modelled were as follows:

- 3) Demand shock, as outlined in RQ1, representing the impact of the demand for EE products and services due to the Retrofit program.

Business Reinvestment shock representing the net amount of additional spending that the commercial sector would undertake as described in RQ2. This was estimated by taking the NPV of energy bill savings and subtracting the amount of project costs covered by participants.

Household Expenditure shock representing the portion of household funds that are captured by increased bill charges and thus acts as a negative shock on the economy (RQ3). This was estimated by taking the portion of program funding that is paid for by increases to residential electricity bills.

The model output generated three types of job impact estimates:

Direct Impacts

Jobs created during the initial round of spending from the exogenous shocks. For the demand shock for EE products and services, direct impacts would be from first adding employees to install measures and handle administrative duties. For the business reinvestment shock, direct impacts could be internal jobs created by businesses reinvesting savings back into the company, or they could be jobs created by businesses buying additional goods and services with energy bill savings.

Indirect Impacts

Job impacts due to inter-industry purchases as firms respond to the new demands of the directly affected industries. These include jobs created up supply chains due to the demand created by the EE program – such as the manufacturing of goods or the supply of inputs.

Induced Impacts

Job impacts due to changes in the production of goods and services in response to consumer expenditures induced by households' incomes (i.e., wages) generated by the production of the direct and indirect requirements.

The IO model provides estimates for each type of job impact in the unit of *person-years* or a job for one person for one year. It further distinguishes between two types of job impacts:

Total number of jobs: This covers both employee jobs and self-employed jobs (including persons working in a family business without pay). The total number of jobs includes full-time, part-time, temporary jobs and self-employed jobs. It does not take into account the number of hours worked per employee.

Full-time Equivalent (FTE) number of jobs: This includes only employee jobs that are converted to full-time equivalence based on the overall average full-time hours worked in either the business or government sectors.

Model run results are presented in terms of the above job impact types (direct, indirect, and induced) and also the type of job (total jobs vs. FTEs). These results—along with the model input shock values—are presented and discussed in Section 5.



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