2021-2024 CDM Framework Retrofit PY2024 Evaluation Results

Submitted to IESO

in partnership with NMR Group

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Date – November 25, 2025

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Acknowledgements

The evaluation team would like to thank Alice Herrera, and Cass Heide at the Independent Electricity System Operator (IESO) for their assistance in coordinating this evaluation effort. With their support and guidance, the evaluation team was able to complete their activities as efficiently and successfully as possible.

Additionally, the evaluation team would like to thank the hundreds of participants that supported the evaluation team's impact telephone and web-based surveys, and site visits. Their cooperation with the evaluation team's efforts has produced high-quality data that will serve Ontario conservation efforts for years to come.

Acronyms and Abbreviations

CDM-IS	Conservation and demand management information system
DCKV	Demand control kitchen ventilation
DCV	Demand control Ventilation
EM&V	Evaluation, measurement, and verification
EUL	Effective useful life
FR	Free-ridership
GW or GWh	Gigawatt or Gigawatt-hour
HVAC	Heating, ventilation, and air conditioning
IDI	In-depth interview
IESO	Independent Electricity System Operator
IF	Interim Framework
kW or kWh	Kilowatt or Kilowatt-hour
LED	Light emitting diode
MW or MWh	Megawatt or Megawatt-hour
NTG	Net-to-gross
PY	Program year
SO	Spillover
VFD	Variable frequency drive
VSD	Variable speed drive

1 Executive Summary

The Independent Electric System Operator (IESO) retained Resource Innovations, Inc., and its subcontractor, NMR Group, Inc., (referenced throughout this report as 'the evaluation team'), for the evaluation of the 2021-2024 Conservation and Demand Management (CDM) Framework business programs. This report presents the results of the impact and process evaluations, cost-effectiveness assessment, and non-energy benefits (NEBs) analysis for the Program Year (PY) 2024 Retrofit program.

1.1 Program Description

The Retrofit program offers incentives to industrial, commercial, institutional, and multifamily residential facility clients interested in upgrading existing equipment with energy-efficient alternatives. The program requirements on the Save on Energy website[1] outline eligibility criteria for participants, facilities, and projects. The 2021-2024 CDM Framework Retrofit offers Prescriptive Lighting, Prescriptive Non-Lighting, Custom Lighting, Custom Non-Lighting and Greenhouse track measures. The program also offers midstream incentives through the Instant Discount Program (IDP). The Retrofit program includes a Greenhouse stream which offers incentives for horticulture facilities across the province. The Greenhouse stream consists of projects funded under the Targeted Greenhouse Program (TGP), as well as Greenhouse projects funded under the broader Retrofit Program. TGP results can be found in the 2021-2024 CDM Framework Targeted Greenhouse Program PY2024 Evaluation Report. Greenhouse projects under the broader Retrofit Program are included throughout this report. In PY2024, an Enhanced Local Initiatives Program (ELIP) was also offered that had increased incentives. The ELIP is delivered in locally constrained regions in Ontario targeting demand savings. This initiative is delivered in the same way as the standard Retrofit tracks and were evaluated altogether. However, since the ELIP participants received top-up incentives, they are separated out in the Process and Net-to-gross evaluations.

Note that all results presented in this report refer to the Retrofit downstream program, unless otherwise noted. See the 2021-2024 CDM Framework IDP PY2024 Evaluation Results report for more information on the IDP program. ELIP results are also summarized throughout this report and are identified separately, where applicable.

[1] Save on Energy website: https://saveonenergy.ca

1.2 Evaluation Objectives

For the PY2024 Retrofit program evaluation, the IESO outlined the following objectives:

- Conduct audits of completed projects to evaluate, measure, and verify completion and operating parameters through desk reviews, site visits, and on-site inspections and metering.
- Annually verify Retrofit program gross energy and summer peak demand savings province-wide at 90% confidence level and 10% precision.
- Assess free-ridership and participant spillover to determine an appropriate net-to-gross (NTG) ratio.
- Research specific areas of interest to help the IESO improve the Retrofit program and prepare for future program designs and evaluations.
- Perform a cost-effectiveness assessment, Greenhouse gas (GHG) reduction estimate, non-energy benefits (NEBs) analysis, and job impact quantification.
- Deliver annual reports, memos, impact result templates, and a final report that meets the IESO's requirements and timelines.
- Provide thoughtful recommendations for program improvements, based on feedback obtained through the evaluations.

1.3 Summary of Results

1.3.1 Impact Evaluation Results

The evaluation analyzed the program's impacts and quantified savings realized due to implementation of energy-efficiency retrofit projects in the province of Ontario during PY2024. This section summarizes the savings and cost-effectiveness results verified through the impact evaluation.

Table 1-1 presents overall impact results for the PY2024 Retrofit program which includes Prescriptive Lighting, Prescriptive Non-Lighting, Custom Lighting, Custom Non-Lighting, Greenhouse and IDP track measures. PY2024 results for ELIP are also shown in Table 1-2 but are not included in the Retrofit program totals. During PY2024, 2,576 Retrofit downstream projects were completed in the province, which is slightly higher than the number of projects (2,419) completed in the province during PY2023, hence indicating stable participation levels. In the first year of the program, the IDP midstream track enrolled 129 distributors serving all five regions of Ontario resulting in 7,948 projects for PY2024. The first-year net verified energy and summer peak demand savings for Retrofit downstream were 231,097 MWh and 32,680 kW, respectively. The net verified energy and demand savings persisting in 2026 is estimated to be 231,097 MWh and 32,680 kW, respectively. Gross verified savings for applicable lighting measures include interactive effects and baseline shift-adjustment factors. For the IDP midstream track, the PY2024 first-year net verified energy and summer peak demand savings were 70,746 MWh and 15,399 kW, respectively. The net verified energy and demand savings persisting in 2026 is estimated to also be 70,746 MWh and 15,399 kW, respectively. In total, the PY2024 Retrofit program including both the Retrofit downstream and IDP midstream tracks resulted in 301,843 MWh and 48,079 kW of first-year net verified energy and summer peak demand savings, respectively. The net verified energy and demand savings persisting in 2026 is estimated to also be 301,843 MWh and 48,079 kW for the Retrofit program, respectively.

The first-year net verified energy and summer peak demand savings for ELIP were 2,284 MWh and 433 kW, respectively. The net verified energy and demand savings persisting in 2026 is estimated to also be 2,284 MWh and 433 kW, respectively. Again, ELIP savings are not included in the Retrofit program totals.

Table 1-1: Energy and Summer Peak Demand Impacts

Program	Savings Type	Gross Reported Savings	Gross Verified Savings	Net Verified Savings	Net Verified Savings at 2026	Net-to-Gross
Retrofit (Downstream)	First Year Energy (MWh)	319,933	280,792	231,097	231,097	82.3%
Retrofit (Downstream)	First Year Summer Peak Demand (kW)	46,021	40,540	32,680	32,680	80.6%
IDP (Midstream)	First Year Energy (MWh)	183,619	150,845	70,746	70,746	46.9%
IDP (Midstream)	First Year Summer Peak Demand (kW)	30,559	32,833	15,399	15,399	46.9%
Total	First Year Energy (MWh)	503,552	431,637	301,843	301,843	69.9%
Total	First Year Summer Peak Demand (kW)	76,580	73,373	48,079	48,079	65.5%

Table 1-2: ELIP Energy and Summer Peak Demand Impacts

Program	Savings Type	Gross Reported Savings	Gross Verified Savings	Net Verified Savings	Net Verified Savings at 2026	Net-to-Gross
ELIP	First Year Energy (MWh)	3,280	2,906	2,284	2,284	78.6%
ELIP	First Year Summer Peak Demand (kW)	831	551	433	433	78.6%

Figure 1-1 and Figure 1-2 display PY2024 net verified first-year energy and summer peak demand savings percentages for the Prescriptive Lighting, Prescriptive Non-Lighting, Custom, Greenhouse and IDP tracks of the Retrofit program. The Prescriptive Lighting track accounts for 36% of total net verified first-year energy savings achieved by the program, with the IDP track accounting for 23% and Custom 21%. The Greenhouse and Prescriptive Non-Lighting tracks account for the remaining 13% and 6%, respectively.

Figure 1-1: First-Year Net Verified Energy Savings % by Track

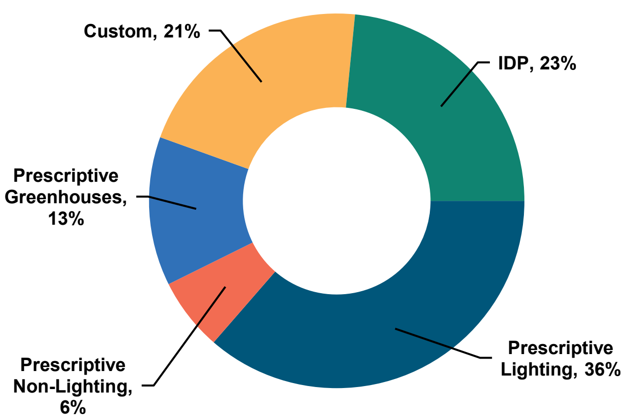
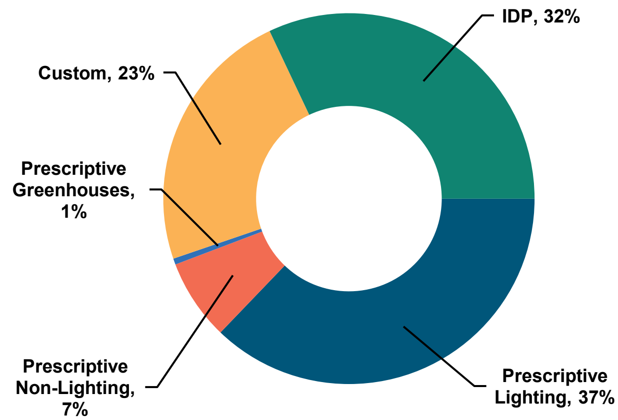


Figure 1-2: First-Year Net Verified Summer Peak Demand Savings % by Track & Type



For summer peak demand savings, the Prescriptive Lighting track accounts for 37% of total net verified first-year summer peak demand savings with the IDP track accounting for 32% and Custom 23%. The Prescriptive Non-Lighting and Greenhouse tracks account for the remaining 7% and 1% respectively. The Prescriptive Greenhouse track has a lower overall contribution to summer peak demand savings when compared to energy savings due to greenhouse lighting operating more during winter peak periods and not being utilized during IESO's peak demand window.

These trends differ slightly when compared to the PY2023 results (which did not include the IDP program). Prescriptive Lighting downstream projects represented 39% of total net verified first-year energy savings achieved by the program, the Prescriptive Non-Lighting accounting for 8% and the Custom track accounting for 5%, showing an increase in PY2024 in the Custom track. In PY2023, the Prescriptive Lighting track represented 70% of total net verified first year summer peak demand savings achieved by the program, with Prescriptive Non-lighting accounting for 16%.

Table 1-3 shows the PY2024 cost effectiveness results for the Retrofit (including IDP), and ELIP programs. The PY2024 Retrofit and ELIP programs achieved a Program Administrator Cost (PAC) ratio of 2.62 and 1.14 respectively, with both exceeding the 1.00 target threshold. The PY2024 Retrofit CE results are consistent with the PY2023 CDM Framework Retrofit program (which did not include IDP), which achieved a PAC ratio of 3.01.

Table 1-3: 2024 Cost Effectiveness Results

Program	PAC (Ratio)
Retrofit (Including IDP)	2.62
ELIP	1.14

Table 1-4 shows avoided GHG emissions for the Retrofit (including IDP) and ELIP programs. First-year avoided GHG emissions from electricity savings for the Retrofit program were reduced by the increase in GHG consumption due to interactive effects[2], resulting in 31,231 Tonnes of CO_2 equivalent (CO_2e). PY2024 Retrofit program projects are expected to achieve a total of 445,554 Tonnes of CO_2e in avoided GHG throughout the effective useful life of the installed measures. First-year avoided GHG emissions from electricity savings for ELIP achieved 407 Tonnes of CO_2e. PY2024 ELIP projects are expected to achieve a total of 5,671 Tonnes of CO_2e in avoided GHG throughout the effective useful life of the installed measures.

Table 1-4: 2024 Avoided GHG Emissions Results in Tonnes of CO_2e

Program	Electric First Year GHG Avoided (tonnes of CO_2e)	Gas First Year GHG Avoided (tonnes of CO_2e)	Total First Year GHG Avoided (tonnes of CO_2e)	Electric Lifetime GHG Avoided (tonnes of CO_2e)	Gas Lifetime GHG Avoided (tonnes of CO_2e)	Total Lifetime GHG Avoided (tonnes of CO_2e)
Retrofit (Including IDP)	45,579	(14,348)	31,231	640,817	(195,262)	445,554
ELIP	417	(10)	407	5,843	(172)	5,671

[2] Interactive effects refer to the indirect effect on HVAC energy usage due to the installation of energy efficient lighting measures.

1.4 Key Findings and Recommendations

Finding 1: Behavioral Energy Management Systems. Three projects, which represented the entire sample for this measure, in PY2023-24 reported energy savings for IoT (Internet of Things)-based behavioral energy management systems designed to provide building operators with operational insights to optimize buildings' performance. During the evaluation site visits, building managers reported that the service has been canceled due to perceived redundancy with existing Building Automation Systems (BAS). As a result, these systems were no longer in use, and the associated projects achieved no measurable savings.

Recommendation 1: Consider updating custom measure eligibility requirements to explicitly address behavioral or operational measures – such as IoT-based analytics platforms – by requiring evidence of continued use and integration into building management practices. Consider incorporating post-installation verification protocols to ensure the upgrades remain active and deliver actionable value to building operators, thereby supporting persistence of claimed savings. Additionally, explore a tiered or performance-based payment structure tied to verified annual savings over a defined post-installation period, to help ensure sustained savings and better alignment with actual performance.

Finding 2: Advanced Lighting Controls. Network and Advanced lighting controls were found to be installed in hybrid lighting systems, where reported kW-controlled included a mix of pre-existing inefficient fixtures and LED fixtures. However, some legacy technologies, such as HPS, have limited or no dimming capability and cannot be controlled by advanced systems. Including these fixtures in the claimed controlled load overstates potential savings. During the evaluation, lighting systems that do not have dimming/control capabilities were excluded from savings calculations, resulting in lower realization rates for those projects.

Recommendation 2: Consider revising measure eligibility and savings calculations to ensure that only lighting systems capable of meaningful control (e.g. dimming, scheduling) are eligible for Advanced Lighting Controls incentives. Require documentation verifying that the controlled fixtures are compatible with advanced control strategies.

Finding 3: LED-to-LED Retrofits. Several projects in the PY2024 sample involved retrofits from existing LED lighting to more advanced LED systems that offer enhanced control capabilities, such as local dimming and scheduling. While these upgrades can offer incremental savings and operational flexibility, the Retrofit program Prescriptive track does not include LED-to-LED measures or account for their control-based savings.

As a result, savings assumptions are often misaligned with verified operations/savings, contributing to lower realization rates for these projects.

Recommendation 3: For future lighting programs, consider developing a dedicated track for LED-to-LED retrofits that incorporates control-based functionality as a key savings factor. This track can include updated baseline assumptions, revised savings algorithms, and potentially control-specific eligibility criteria or documentation requirements. Another option would be for these types of projects to go through the custom track. By aligning measure design with evolving lighting retrofit market, the program can improve accuracy of savings estimates, while supporting customer needs.

2 Introduction

This report presents the evaluation results for PY2024 of the 2021-2024 CDM Framework Retrofit program and includes projects completed and reported to the IESO between January 1 and December 31, 2024.

2.1 Program Description

The Retrofit program offers incentives to industrial, commercial, institutional, and multifamily residential facility customers that express interest in upgrading existing equipment with energy-efficient alternatives. The program requirements and eligibility criteria for participants, facilities, and projects can be found on the Save on Energy website. The PY2024 Retrofit program consisted of the following streams:

- **Prescriptive Stream**: Prescriptive applications offer a program-defined list of approved lighting and non-lighting equipment and fixed incentives available for installation. Limited documentation is required for this track to ensure a simplified experience for program participants.
- **Greenhouse Stream**: Customers receive incentives for common measures in this sector, such as horticulture top and inter-lighting, as well as new advanced lighting controls measures incentivized at $0.35/kWh.
- **Custom Stream**: The Custom stream provides customers with the flexibility to incorporate measures not covered by the Prescriptive stream and enables the program to incent more energy-efficiency measures (at the greater of $1,200/kW or $0.13/kWh, capped at 50% of project costs) in non-standard projects more reflective of actual operating conditions, thus capturing more savings.
- **Instant Discount Program**: Launched in 2024, the IDP program provides financial incentives to participating distributors to lower the upfront costs and increase the market share of qualified energy efficient lighting products commonly sold to non-residential customers. The program offerings include point-of-sale rebates for Tubular LEDs (TLEDs), integrated LED fixtures, and high and low bay LED fixtures.

The PY2024 Retrofit Program also included an Enhanced Local Initiatives Program (ELIP), which offered increased incentives to support electricity demand reductions in locally constrained regions of Ontario. While ELIP projects were delivered through the same channels and followed the same processes as the standard Retrofit Program tracks, participants received additional "top-up" incentives to encourage participation in priority areas. As such, ELIP projects were included in the gross impact evaluation together with the broader Retrofit Program. Given the enhanced incentive levels and localized delivery, ELIP participants were evaluated separately in the NTG assessment and Process evaluation.

2.2 Evaluation Objectives

The PY2024 Retrofit program evaluation goals and objectives included the following:

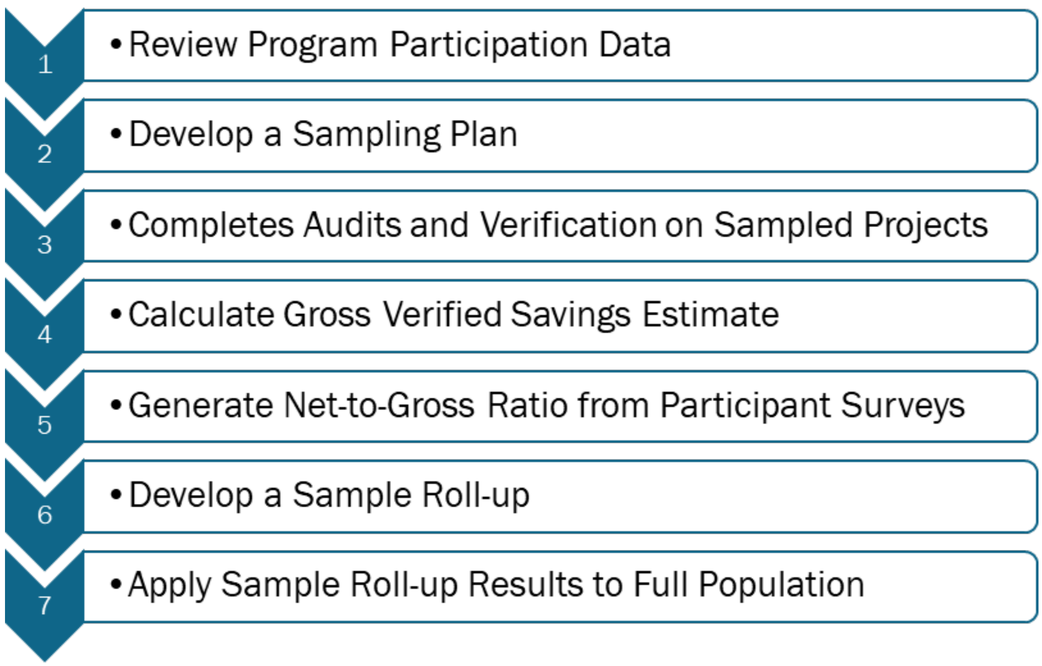
- Conduct audits of completed projects to evaluate, measure, and verify completion and operating parameters through desk reviews, virtual site visits, and on-site inspections and metering.
- Annually verify gross energy and summer peak demand savings province-wide for the Retrofit program at a 90% confidence level and 10% precision.
- Assess free-ridership and participant spillover to determine an appropriate net-to-gross (NTG) ratio.
- Research specific areas of interest to help the IESO improve the Retrofit Program and to prepare for future program designs and evaluations.
- Perform a cost-effectiveness assessment, greenhouse gas (GHG) reduction estimate, non-energy benefits (NEBs) analysis, and job impact quantification.
- Deliver annual reports, memos, an impact results template, and a final report that meets the IESO's requirements and timelines.
- Provide thoughtful recommendations on program improvements, based on feedback obtained through the evaluations.

3 Methodology

3.1 Impact Evaluation Methodology

Figure 3-1 presents the impact evaluation methodology, comprised of the following distinct components.

Figure 3-1: Impact Evaluation Methodology



Appendix C provides additional details on the impact and NTG methodology.

3.1.1 Project Participation and Sampling

The evaluation team drew the impact evaluation sample from a list of PY2024 projects, post-approved and paid between January 1 and December 31, 2024. Note that the following sampling information in this section is for the downstream Retrofit tracks only and that there was a different sampling framework for the IDP program which can be found in the separate IDP report.

Impact sampling first involved stratifying the population into similar project types to minimize variability and improve the confidence and precision of the sample results. The team then stratified the population by measure and stream type, followed by randomly sampling from each. The number of projects selected from each stratum targeted achieving a 90% confidence level at a 10% precision level, assuming a coefficient of variation of 0.5. As shown in Table 3-1, the PY2024 program population was stratified into the following strata: Prescriptive Lighting, Prescriptive Non-Lighting, Prescriptive Greenhouses, and Custom tracks. To improve the evaluation results' precision, the team added rolling samples using previously evaluated projects (from PY2023) for all strata. Final rolling samples are discussed in more detail in Section 4.1.

Table 3-1: PY2024 Impact Evaluation Sample

Measure Type	Population Project Count	Sample Project Count
Prescriptive Lighting	1140	66
Prescriptive Non-Lighting	339	62
Prescriptive Greenhouses	49	11
Custom	1048	73
TOTAL	**2576**	**212**

Each sampled project received a desk review, or a site visit as well as an independent project analysis using equipment-specific data collected from participants during the desk review or using data collected on-site to verify gross savings. Using these individual sample project results, the team calculated realization rates for each stratum which were applied to stratum population savings.

3.1.2 Net-to-Gross Evaluation Methodology

The evaluation team utilized the participant self-report survey results to estimate the NTG ratio for each Retrofit Program stream: Prescriptive, Greenhouse, Custom, and the Enhanced Local Initiatives Program. The survey's sample design was the same for the NTG and process evaluations as the participant self-report survey included both evaluation areas. The sample was developed at the province-wide level. The survey sought and achieved a NTG at 90% confidence and 10% precision for the Prescriptive, Greenhouse, Custom, and Enhanced Local Initiatives results. Overall, the Retrofit program achieved a NTG at 90% confidence and 10% precision.

The evaluation team calculated net energy and summer peak demand savings attributable to each stream of the Retrofit Program by multiplying the gross verified energy and summer peak demand savings by the NTG. This equation and general methodology were used for estimating net energy and summer peak demand savings. The NTG ratio was based on measurement of free-ridership (FR) and spillover (SO) rates, as defined in Equation 3-1.

Equation 3-1: NTG Ratio

$$NTG = 1 - Free\ Ridership + Spillover$$

Appendix B provides additional detail on the NTG methodology.

3.2 Process Evaluation Methodology

The process evaluation focused on program design and delivery. The evaluation team assessed program processes through interviews and surveys with relevant program actors, including IESO staff, program delivery vendor staff, applicant representatives, contractors, and participants. The team developed customized interview guides or survey instruments for each respondent type to ensure responses produced comparable data and allowed for the inference of meaningful conclusions. Table 3-2 presents the survey methodology, the total population invited to participate in the surveys or in-depth interviews (IDIs), the total number of completed surveys, and the sampling error at the 90% confidence level for each respondent type. Appendix C provides additional detail regarding the process evaluation methodology.

Table 3-2: Process Evaluation of Primary Data Sources

Respondent Type	Methodology	Population	Completed	Response Rate	90% CI Error Margin
IESO Staff	Phone IDIs	4	4	100%	0%
Program Delivery Vendor Staff	Phone IDIs	3	3	100%	0%
Applicant Representatives and Contractors	Web Survey	300	50	17%	10.7%
Retrofit Participants[3]	Web and Phone Survey	1,516	255[4]	17%	10.4%

[3] This includes participants from the Prescriptive stream (n=139), Custom stream (n=106), Greenhouse stream (n=14), and the Local Initiative (n=14). Note: the total number of participants by stream was greater than the total number of participants overall as some participants completed projects in multiple streams.

[4] The NTG evaluation included more respondents (n=312) than the process evaluation (n=255) as 57 respondents did not fully answer the process evaluation survey questions.

3.3 Other Energy Efficiency Benefits Methodology

3.3.1 Non-Energy Benefits Methodology

The NEBs methodology for the PY2024 Retrofit Program followed the same methodology as that from the four previous studies (the *PY2023, PY2022 and PY2021 2021-2024 CDM Retrofit Evaluation Report;* and the *Non-Energy Benefits Study: Phase II*). These studies assessed NEBs from energy-efficiency projects funded by the IESO over the 2017-2024 period.[5]

The evaluation team calculated NEBs using two different techniques—the relative scaling approach and the willingness to pay approach—to determine the value of NEBs that program participants realized by installing program measures. All surveys required respondents to value all NEBs using both techniques. Data collected from these questions was then used to quantify the NEBs. Appendix H provides additional details regarding the NEBs methodology.

3.3.2 Job Impacts Assessment Methodology

The evaluation team's analysis of job impacts utilized the Statistics Canada (StatCan) Input-Output (IO) model to estimate direct, indirect, and induced job impacts. IO models are used to analyze the propagation of exogenous economic shocks throughout an economy. The models represent relationships (or flows) of inputs and outputs between industries. Funding and implementing an energy efficiency program, such as the Retrofit program, creates a set of "exogenous shocks"— or events occurring outside of the system (e.g. demand for specific products and services, additional reinvestment by businesses from energy bill savings). These shocks propagate throughout the economy and their impacts can be measured in terms of variables such as economic output and employment. Appendix F provides additional detail regarding the job impacts used in the evaluation methodology.

[5] Dunsky. (July 2021). *Non-Energy Benefits: Phase II; Quantified Benefits and Qualitative Insights*. https://www.ieso.ca/-/media/Files/IESO/Document-Library/conservation-reports/Non-Energy-Benefits-Study-Phase-II.ashx

4 Impact Evaluation Results

The evaluation team performed an impact evaluation to assess energy and summer peak demand savings attributable to the program and to quantify savings generated by implementing Retrofit projects in Ontario during PY2024.

4.1 Energy and Demand Savings

Table 4-1 shows the number of projects and savings results for the last four years of the downstream Retrofit program. The total number of projects in PY2022-PY2024 indicate stable participation levels over the last three years. In its first delivery year, the IDP midstream track enrolled 129 distributors serving all five regions of Ontario resulting in 7,948 projects for PY2024 which are not included in the PY2024 Retrofit number of projects below.

Table 4-1: PY2021-PY2024 Number of Projects and Savings Results

Program Year	Number of Projects	Net Verified Energy Savings (MWh)	Net Verified Peak Demand Savings (kW)
PY2021	848	63,794	11,792
PY2022	2,310	265, 878	29,471
PY2023	2,419	229,529	25,341
PY2024	2,576	231,097	32,680

Table 4-2 presents overall impact results for the PY2024 Retrofit program which includes Prescriptive Lighting, Prescriptive Non-Lighting, Custom Lighting, Custom Non-Lighting, Greenhouse and IDP track measures. PY2024 results for ELIP are shown in Table 4-3 as they are not included in the Retrofit program totals.For the IDP midstream track, the PY2024 first-year net verified energy and summer peak demand savings were 70,746 MWh and 15,399 kW, respectively. The net verified energy and demand savings persisting in 2026 is estimated to also be 70,746 MWh and 15,399 kW, respectively. In total, the PY2024 Retrofit program including both the Retrofit downstream and IDP midstream tracks resulted in 301,843 MWh and 48,079 kW of first-year net verified energy and summer peak demand savings, respectively. The net verified energy and demand savings persisting in 2026 is estimated to also be 301,843 MWh and 48,079 kW for the Retrofit program, respectively.

Table 4-2: Energy and Summer Peak Demand Savings

Program	Savings Type	Gross Reported Savings	Gross Verified Savings	Net Verified Savings	Net Verified Savings at 2026	Net-to-Gross
Retrofit (Downstream)	First Year Energy (MWh)	319,933	280,792	231,097	231,097	82.3%
Retrofit (Downstream)	First Year Summer Peak Demand (kW)	46,021	40,540	32,680	32,680	80.6%
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Total	**First Year Energy (MWh)**	**503,552**	**431,637**	**301,843**	**301,843**	**69.9%**
Total	**First Year Summer Peak Demand (kW)**	**76,580**	**73,373**	**48,079**	**48,079**	**65.5%**

Table 4-3: ELIP Energy and Summer Peak Demand Savings

Program	Savings Type	Gross Reported Savings	Gross Verified Savings	Net Verified Savings	Net Verified Savings at 2026	Net-to-Gross
ELIP	First Year Energy (MWh)	3,280	2,906	2,284	2,284	78.6%
ELIP	First Year Summer Peak Demand (kW)	831	551	433	433	78.6%

Table 4-4 presents energy and summer peak demand sample realization rates for PY2024's Retrofit and IDP program sample. The program achieved an effective energy realization rate of 90.1% and 88.7% summer peak demand realization rate. The Prescriptive Lighting sample achieved a 15% precision at 90% confidence, while the Prescriptive Non-Lighting sample achieved just above the 10% target at the 90% confidence level. The Prescriptive Greenhouse sample, which achieved an 11.5% precision at the 90% confidence level, and the Custom sample which achieved 7.5% precision at the 90% confidence level, consisted solely of PY2024 projects. Prescriptive Lighting and non-lighting tracks used a rolling sample of PY2023 and PY2024 to achieve the listed confidence and precision values. The IDP program achieved an effective energy realization rate of 82.2% with 10.2% precision at 85% confidence and a 107.4% summer peak demand realization rate with 9.3% precision at 85% confidence.

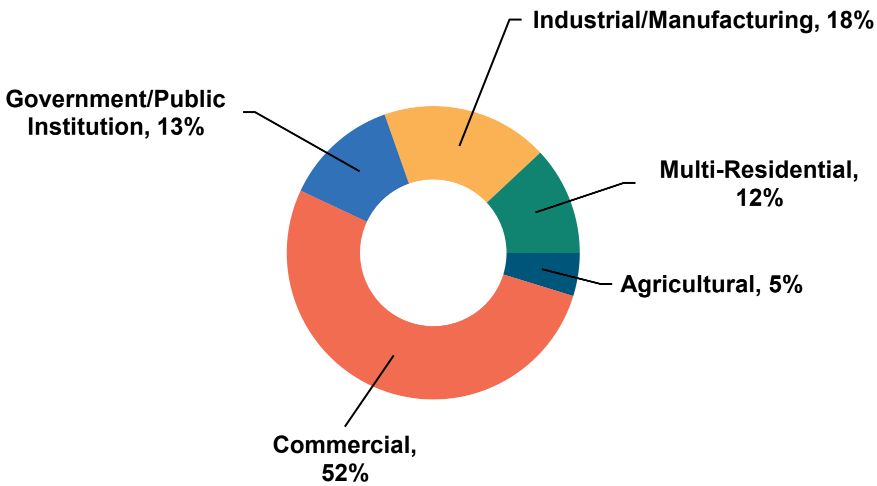
Table 4-4: PY2024 Sample Realization Rates

Measure Type	Energy Realization Rate	Energy RR Relative Precision	Summer Peak Demand Realization Rate	Demand RR Relative Precision
Prescriptive Lighting	87.0%	14.6%	90.0%	14.4%
Prescriptive Non-Lighting	88.8%	10.8%	65.0%	19.5%
Prescriptive Greenhouses	94.8%	11.5%	174%	41.0%
Custom	85.9%	7.5%	95.0%	8.3%
IDP	82.2%	10.2%	107.4%	9.3%

4.2 Participation and Net Savings by Facility Type

During PY2024, 2,576 Retrofit downstream projects were completed which included ELIP projects. This section describes the makeup of these projects, and first-year net verified savings by facility types. Note that all results in section 4.2 are focused on downstream Retrofit projects. IDP results can be found in the separate IDP report. Figure 4-1 displays the breakdown of total projects by facility type within the population.

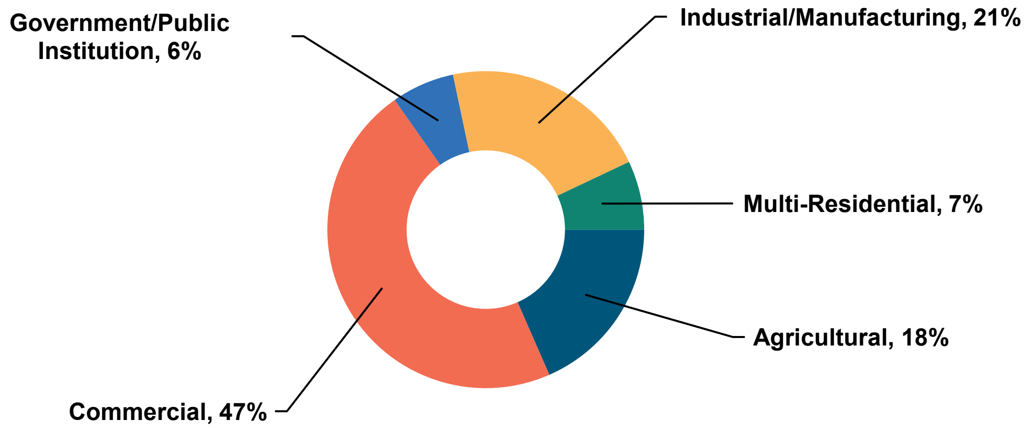
Figure 4-1: Project Count Percentage by Facility Type



Commercial facility types made up 52% of all completed projects. The Commercial facility type contained subcategories such as Retail (12%), Office (10%), Warehouse/Wholesale (11%), Restaurant (1%) and "Other" commercial types (16%). These trends remained consistent with PY2023's results, where the Commercial facility type was the most common by project count, with 54% of all completed projects.

As shown in Figure 4-2, Agricultural facilities made up 5% of completed projects and accounted for 18% of total net verified first-year energy savings in PY2024. The majority of PY2024 Agricultural facilities savings (89%) were derived from LED grow lighting (68%) and horticultural inter-lighting (21%) in vegetable greenhouses. This contrasts with PY2023 Agricultural savings where 99% of total savings were made up of LED grow lighting (81%) and horticultural inter-lighting (18%) in vegetable greenhouses.

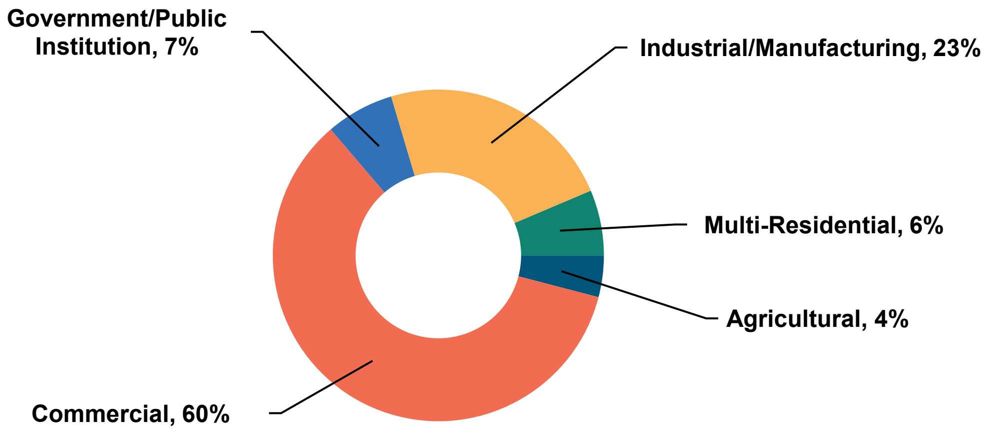
Figure 4-2: Net Verified First-Year Energy Savings Percentage by Facility Type



Despite Agricultural facilities achieving 18% of net verified first year energy savings, they represented only 4% (1,325 kW) of summer peak demand savings for the program, as shown in Figure 4-3. These levels are lower than PY2023, where they represented 8% (2,082 kW) of summer peak demand savings. This mainly resulted from operation schedules that were not in use during summer months.

52% of completed projects were implemented in various Commercial facilities, accounting for 47% (108,193 MWh) of total net verified first year energy savings and 60% (19,502 kW) of total net verified first year summer peak demand savings. Industrial/Manufacturing facilities accounted for 18% of projects, 21% (49,214 MWh) of net verified first-year energy savings, and 23% (7,590 kW) of net first-year summer peak demand savings. Government/Public Institution facilities accounted for 13% of projects, 6% (14,851 MWh) of net verified first year energy savings and 7% (2,178 kW) of net first-year summer peak demand savings.

Figure 4-3: Net Verified First Year Summer Peak Demand Savings Percentage by Facility Type



4.3 Measure Categories

PY2024 downstream Retrofit projects are divided into four main tracks: Prescriptive Lighting, Prescriptive Non-Lighting, Prescriptive Greenhouse, and Custom measures. The Prescriptive Non-Lighting measure track is further subdivided into Prescriptive HVAC and Prescriptive Process tracks. Table 4-5 presents the first-year energy savings and persisting savings in 2026 for each PY2024 Retrofit project track including ELIP savings achieved under those measure tracks. Note that the following sections discuss results for the downstream retrofit track measure categories only. See the 2021-2024 CDM Framework IDP PY2024 Evaluation Results report for more information on the IDP program's measure category results.

Table 4-5: Energy Savings by Project Track

Project Track	Gross Reported Savings (MWh)	Gross Verified Savings (MWh)	Net Verified Savings (MWh)	Net Verified Energy Savings % Program Contribution	Net Verified Energy Savings at 2026 (MWh)	Number of Projects
Prescriptive Lighting	154,968	134,709	109,802	36.10%	109,802	1135
Prescriptive Lighting - ELIP	167	145	114	0.04%	114	5
Prescriptive Non-Lighting	26,227	23,287	18,981	6.24%	18,981	293
Prescriptive Non-Lighting - ELIP	3,050	2,708	2,128	0.70%	2,128	46
Prescriptive Greenhouses	44,276	41,970	38,784	12.75%	38,784	49
Custom Lighting	78,317	67,259	52,865	17.38%	52,865	951
Custom Non-Lighting	16,145	13,568	10,664	3.51%	10,664	96
Custom - ELIP	63	53	42	0.01%	42	1
IDP	183,619	150,845	70,746	23.26%	70,746	7,948
TOTAL	**506,832**	**434,544**	**304,126**	**100%**	**304,126**	**10,524**

The Prescriptive Lighting track represents the majority of the program's total net verified first-year energy (36%) and summer peak demand (37%) savings. While the Prescriptive Greenhouse tracks represent 13% of total net verified first-year energy savings achieved by the program, it contributes the lowest (0.5%) towards the program's total net verified first-year summer peak demand savings. This is due to the greenhouse lights popular winter operation and lights not being utilized during most of the IESO peak demand window. Table 4-6 presents the first-year and persisting summer peak demand savings in 2026 for each PY2024 Retrofit project track.

Table 4-6: Summer Peak Demand Savings by Project Category

Project Track	Gross Reported Summer Peak Demand Savings (kW)	Gross Verified Summer Peak Demand Savings (kW)	Net Verified Summer Peak Demand Savings (kW)	Net Verified Summer Peak Demand Savings % Program Contribution	Net Verified Summer Peak Demand Savings at 2026 (kW)	Number of Projects
Prescriptive Lighting	24,472	21,934	17,869	36.83%	17,869	1135
Prescriptive Lighting - ELIP Adder	24	21	17	0.04%	17	5
Prescriptive Non-Lighting	6,377	4,164	3,393	6.99%	3,393	293
Prescriptive Non-Lighting - ELIP Adder	797	520	409	0.84%	409	46
Prescriptive Greenhouses	158	275	254	0.52%	254	49
Custom Lighting	13,353	12,684	9,995	20.60%	9,995	951
Custom Non-Lighting	1,661	1,483	1,169	2.41%	1,169	96
Custom - ELIP Adder	11	9	7	0.01%	7	1
IDP	30,559	32,833	15,399	31.74%	15,399	7,948
TOTAL	**77,412**	**73,923**	**48,512**	**100.00%**	**48,512**	**10,524**

4.3.1 Prescriptive Lighting Measures

The Prescriptive Lighting track (both standard and ELIP) contributed 47% (109,916 MWh) and 54% (17,886 kW) of total net verified first-year energy and summer peak demand savings in downstream Retrofit, respectively. This represents an increase in energy but decrease in demand savings compared to PY2023 projects, where prescriptive lighting projects represented 39% (106,221 MWh) and 70% (18,056 kW) of total net verified first-year energy and summer peak demand savings.

Figure 4-4 displays the project count percentage of total installed Lighting projects by measure category.

Figure 4-4: Lighting Project Count Percentages

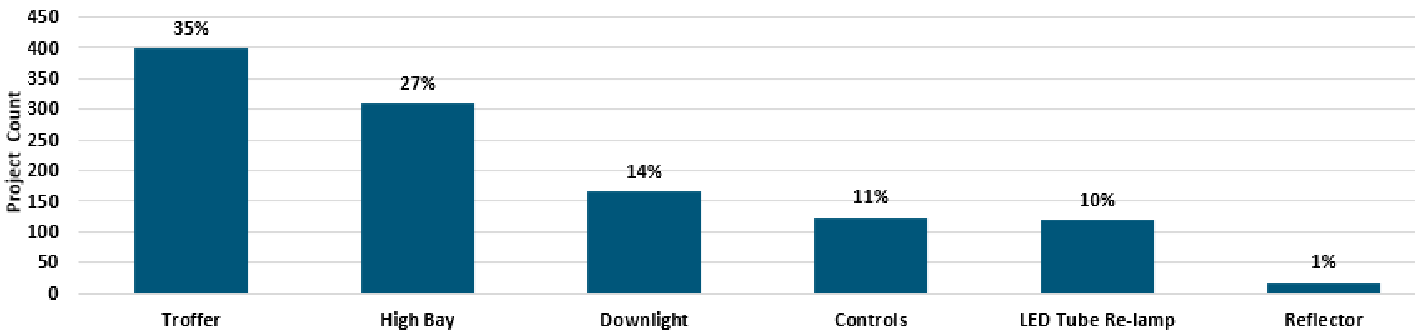


Figure 4-5 and Figure 4-6 display the percentage of net verified energy and summer peak demand savings by Lighting measure category within downstream Retrofit projects. While troffers remained the most commonly installed Lighting measure, they ranked third for savings achieved. High-Bay measures achieved the greatest share of energy and summer peak demand savings at 67% and 68%, respectively. This trend remained consistent with PY2023 total share of energy and summer peak demand savings results, where High-Bay measures contributed 67% and 70% of energy and summer peak demand savings, respectively.

Figure 4-5: Lighting Net Verified Energy Savings Percentages

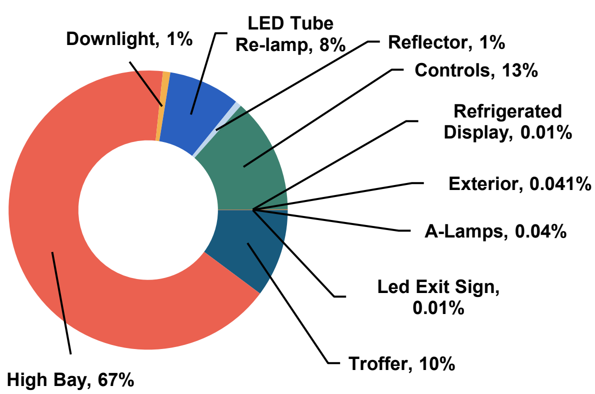
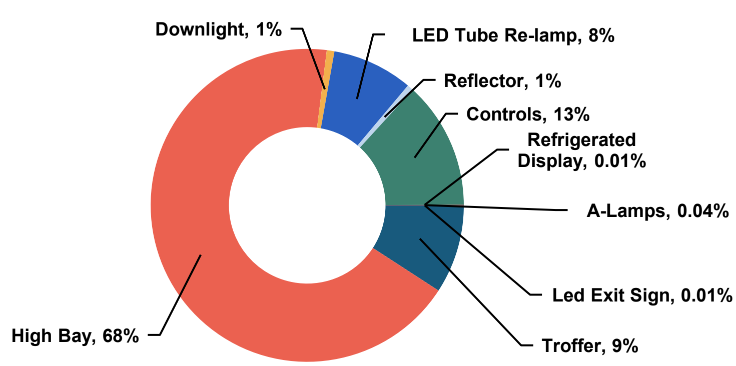


Figure 4-6: Lighting Net Verified Summer Peak Demand Savings Percentages



4.3.2 Prescriptive Non-Lighting Measures

The Prescriptive Non-Lighting measures included Process and HVAC projects. Together, they contributed 9% (21,109 MWh) and 11% (3,802 kW) of total program first-year and persisting net verified first-year energy and summer peak demand savings in downstream Retrofit, respectively. The Non-Lighting projects' energy and demand savings contribution slightly decreased in comparison to the PY2023 projects, where they accounted for 8% and 16% of total program first-year and persisting net verified energy and summer peak demand savings.

Table 4-7 presents the first-year and persisting energy savings in 2026 for the Process and HVAC projects. The Process sub-track represented 6.8% (15,936 MWh) and the HVAC sub-track represented 2.2% (5,173 MWh) of the total net verified energy savings in PY2024 for downstream Retrofit.

Table 4-7: Energy Savings by Non-Lighting Project Track

Non-Lighting Project Track	Gross Reported Savings	Gross Verified Savings	Net Verified Savings	Net Verified Energy Savings % Program Contribution	Net Verified Energy Savings at 2026
Process (MWh)	22,096	19,619	15,936	6.83%	15,936
HVAC (MWh)	7,181	6,376	5,173	2.22%	5,173
TOTAL	**29,277**	**25,995**	**21,109**	**9.05%**	**21,109**

Table 4-8 presents the first-year and persisting summer peak demand savings in 2026 for the Process and HVAC projects. The Process sub-track represents 6.0% (1,969 kW) of total net verified first-year summer peak demand savings and the HVAC sub-track represents 5.5% (1,832 kW) within the downstream Retrofit program.

Table 4-8: Summer Peak Demand Savings by Non-Lighting Project Track

Non-Lighting Project Track	Gross Reported Summer Peak Demand Savings	Gross Verified Summer Peak Demand Savings	Net Verified Summer Peak Demand Savings	Net Verified Summer Peak Demand Savings Contribution	Net Verified Summer Peak Demand Savings at 2026 (kW)
Process (kW)	3,721	2,430	1,969	5.95%	1,969
HVAC (kW)	3,454	2,255	1,832	5.53%	1,832
TOTAL	**7,174**	**4,685**	**3,802**	**11.48%**	**3,802**

4.3.2.1 Process Measures

Figure 4-7 displays the project count percentage of total Process Non-Lighting projects by measure category.

Figure 4-7: Process Non-Lighting Project Count Percentages

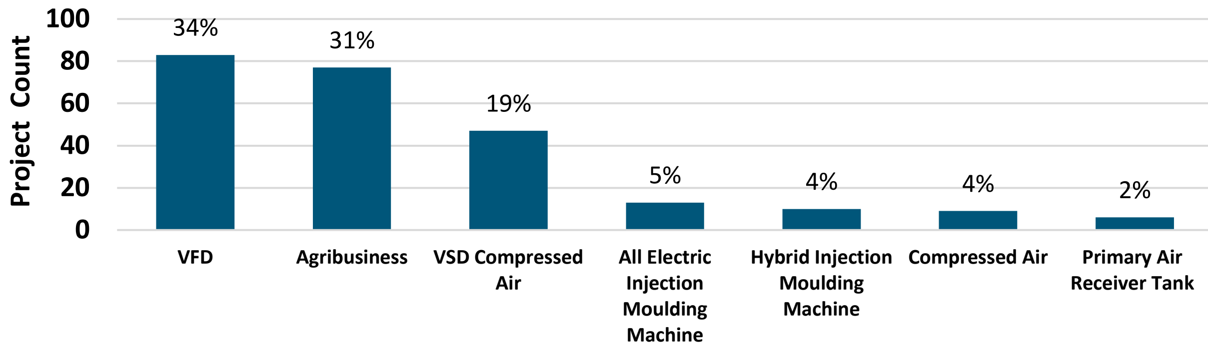


Figure 4-8 and Figure 4-9 display the percentage of net verified energy and summer peak demand savings by the Process Non-Lighting measure category.

Figure 4-8: Process Non-Lighting Net Verified Energy Savings Percentages

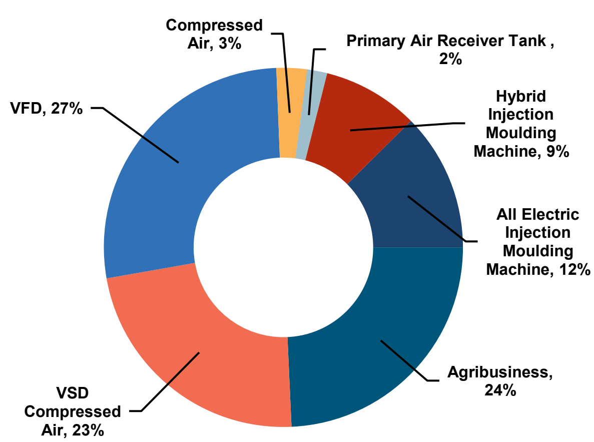
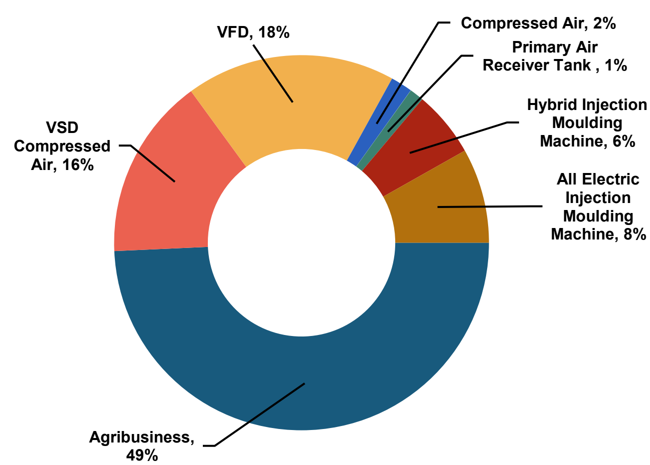


Figure 4-9: Process Non-Lighting Net Verified Summer Peak Demand Savings Percentages

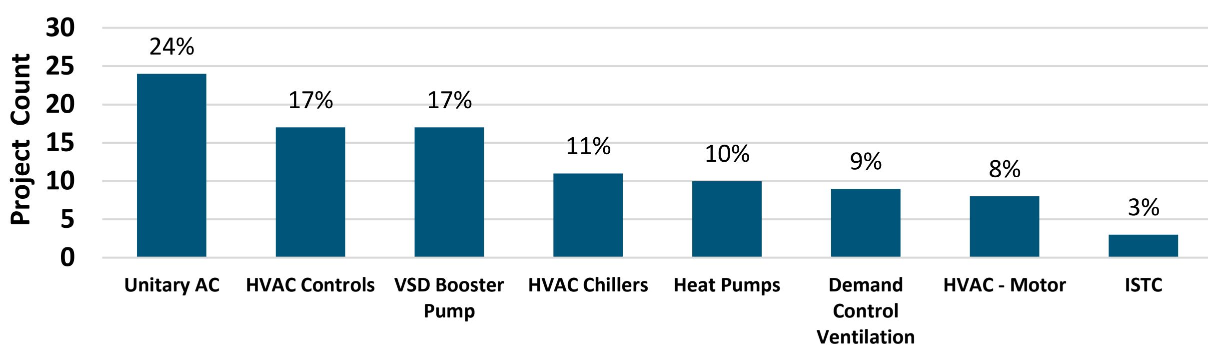


The Variable Frequency Drive (VFD) measure was implemented in 34% of Process Non-Lighting projects and achieved the greatest energy savings (27%), followed by Variable Speed Drive (VSD) compressed air measure savings, accounting for 23% of total net verified energy savings for this category in PY2024. This remained consistent with PY2023, where VFD measures achieved the category's greatest net verified energy savings (49%). Agribusiness Process measures achieved the greatest summer peak demand savings (49%) in PY2024 contrary to PY2023 where VFDs achieved the greatest summer peak demand savings. This is due to Agribusiness measures in PY2024 consisting primarily of 2 HP high-volume, low-speed fans.

4.3.2.2 HVAC Measures

Figure 4-10 displays the project count percentage of total HVAC Non-Lighting projects by measure category.

Figure 4-10: HVAC Non-Lighting Project Count and Percentages



4-11 and Figure 4-12 display the percentage of net verified energy and summer peak demand savings in the HVAC Non-Lighting measure category.

Figure 4-11: HVAC Non-Lighting Net Verified Energy Savings Percentages

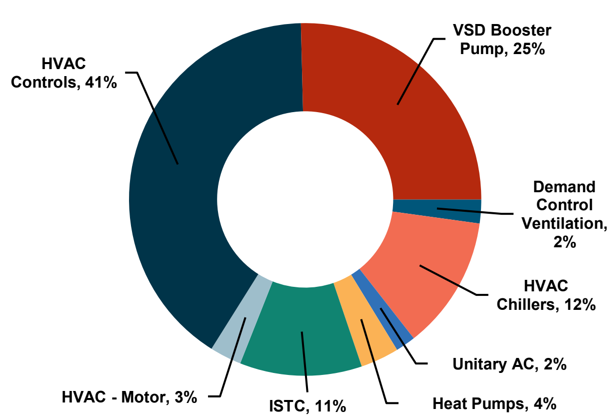
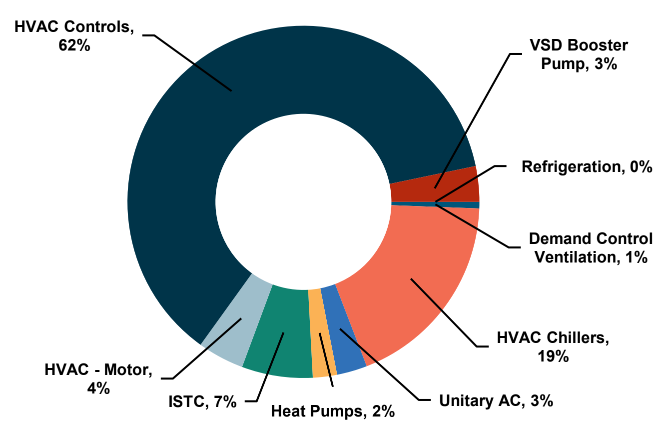


Figure 4-12: HVAC Non-Lighting Net Verified Summer Peak Demand Savings Percentages



The HVAC Controls measure achieved 41% of the overall HVAC non-lighting net verified energy savings in PY2024 even though it was implemented in only 17% of projects in PY2024. The majority of savings were from advanced control retrofits on roof top units between 11.4 and 19.9 tons. The large percentage of savings is due to the higher average savings per project for HVAC Controls measures compared to Unitary AC and Booster Pump measures which represented a similar or even larger overall number of projects but have lower average savings per project. These results were different compared to the PY2023 program results where the In-Suite Temperature Controls measure represented the greatest energy savings in the HVAC category. However, it was consistent with PY2022 results where the HVAC Controls measure achieved the greatest energy savings (38%) for the HVAC non-lighting category.

4.3.3 Prescriptive Greenhouse Measures

Prescriptive Greenhouse measures contributed 17% and 1% of the total net verified first-year and persisting energy and summer peak demand savings in 2026 in downstream Retrofit, respectively. The contribution of Prescriptive Greenhouse projects is lower in comparison to the PY2023 projects, where the same measures contributed 32% and 4% of total net verified energy and summer peak demand savings, respectively. However, TGP savings in PY2024 were significantly higher than in PY2023 showing a shift from Prescriptive to TGP program tracks. Additional details on this comparison can be found in the 2021-2024 CDM Framework Targeted Greenhouse Program PY2024 Evaluation Report.

Figure 4-13 displays the project count percentage of total Greenhouse projects by measure category.

Figure 4-13: Lighting–Greenhouse Project Count Percentages

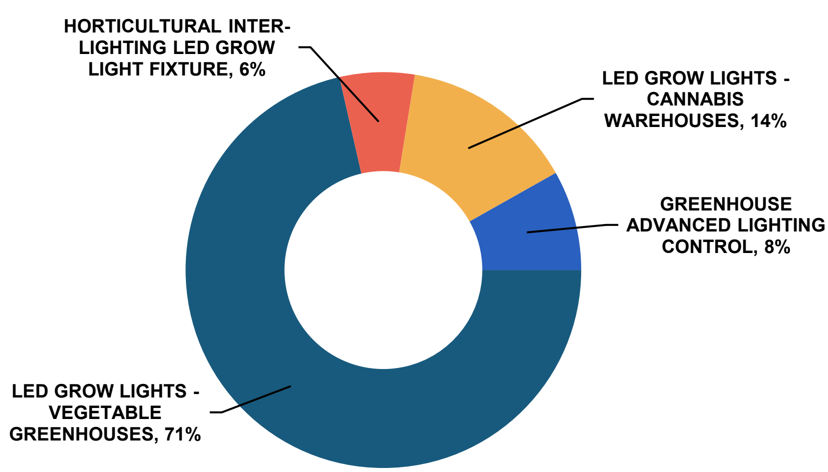


Figure 4-14 and Figure 4-15 display the percentage of net verified energy and summer peak demand savings by the Greenhouse measure category. LED Grow Lights – Vegetable Greenhouses contributed the most to overall net verified energy and summer peak demand savings in the Greenhouse track at 63% and 68% respectively.

Figure 4-14: Lighting—Greenhouse Net Verified Energy Savings Percentages

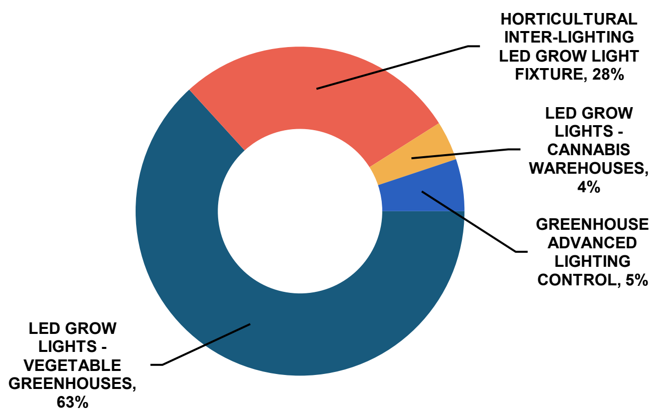
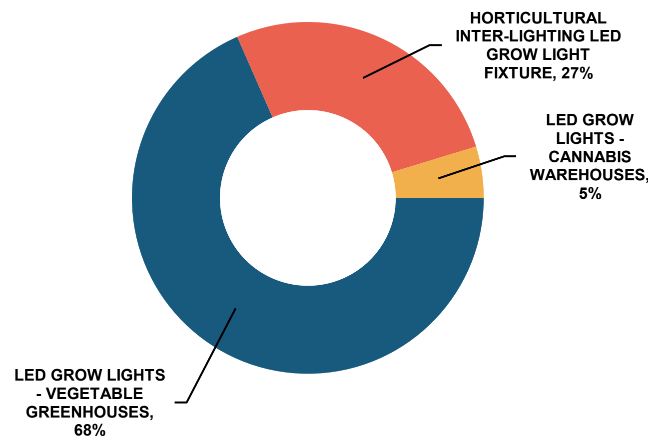


Figure 4-15: Lighting—Greenhouse Net Verified Summer Peak Demand Savings Percentages



4.3.4 Custom Measures

In PY2024, the Custom track included lighting and non-lighting measures. Custom Lighting projects were the most common, accounting for 91% of Custom projects, and the Custom Non-Lighting projects accounted for the remaining 9%.

Together, the two strata contributed 27% and 34% of total program first-year and 2026 persisting net verified energy and summer peak demand savings in downstream Retrofit, respectively. Table 4-9 presents the energy savings for the Custom Lighting and Custom Non-Lighting projects.

Table 4-9: Energy Savings by Custom Project Track

Custom Project Track	Gross Reported Savings (MWh)	Gross Verified Savings (MWh)	Net Verified Savings (MWh)	Net Verified Energy Savings % Program Contribution (MWh)	Net Verified Energy Savings at 2026 (MWh)
Custom Lighting	78,317	67,259	52,865	23%	52,865
Custom Non-Lighting	16,208	13,621	10,706	4%	10,706
TOTAL	**94,525**	**80,880**	**63,571**	**27%**	**63,571**

Table 4-10 presents the first-year and persisting summer peak demand savings in 2026 for the Custom Lighting and Custom Non-Lighting projects. The Custom Lighting subtrack represented 30% of total net verified first-year summer peak demand savings, and the Custom Non-Lighting subtrack represented 4%.

Table 4-10: Summer Peak Demand Savings by Custom Project Track

Custom Project Track	Gross Reported Summer Peak Demand Savings (kW)	Gross Verified Summer Peak Demand Savings (kW)	Net Verified Summer Peak Demand Savings (kW)	Net Verified Summer Peak Demand Savings Contribution (kW)	Net Verified Summer Peak Demand Savings at 2026 (kW)
Custom Lighting	13,353	12,684	9,995	30%	9,995
Custom Non-Lighting	1,672	1,493	1,176	4%	1,176
TOTAL	**15,024**	**14,176**	**11,171**	**34%**	**11,171**

4.3.4.1 Custom Lighting Measures

Custom Lighting projects comprise 38% of total completed projects in the PY2024 Retrofit program and contributed to 23% of total downstream Retrofit program net verified energy savings and 30% of total downstream Retrofit net verified summer peak demand savings. The net verified energy and summer peak demand savings for this stratum were 52,865 MWh and 9,995 kW, respectively. 84% of Custom Lighting savings were from the Government/Public institution and Industrial/Manufacturing sectors with the remaining savings split between the Commercial and Multi-Residential sectors. The average, net verified energy savings per project in the Custom Lighting stratum (56 MWh) was lower than the average Prescriptive Lighting project size (97 MWh).

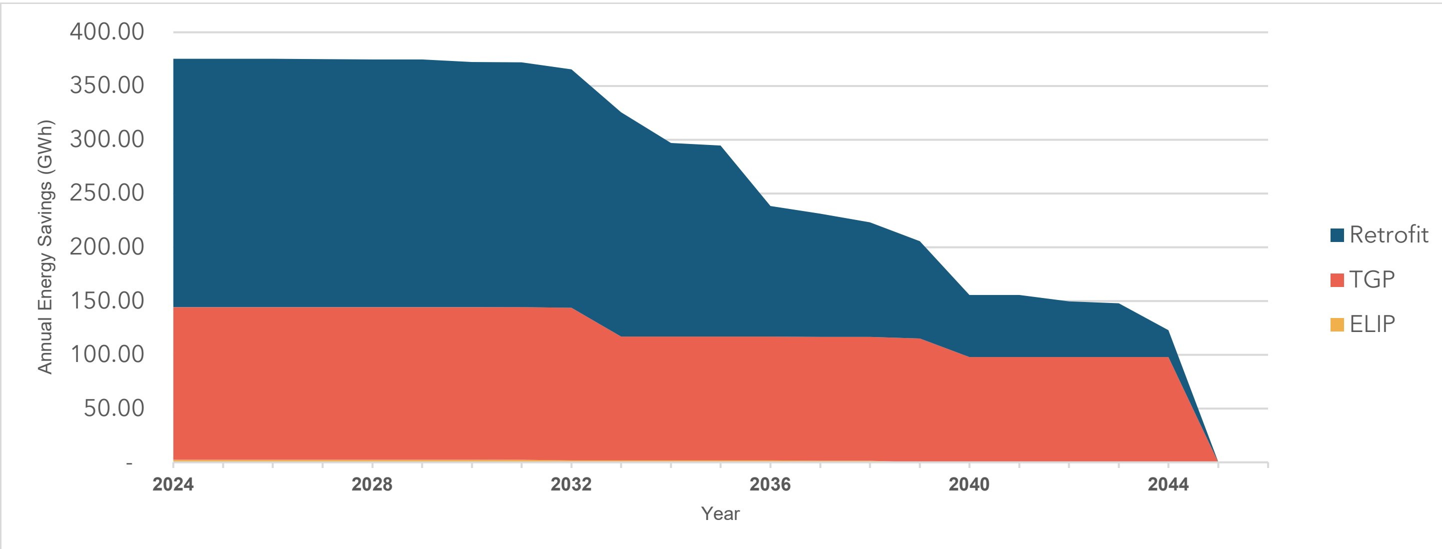
4.3.4.2 Custom Non-Lighting Measures

Custom Non-Lighting measures typically cover the implementation of a wide range of Non-Lighting equipment upgrades and/or replacements. Non-Lighting measures installed within the Custom track included HVAC upgrades, pump upgrades, refrigeration system and chiller upgrades, HVAC controls, and VFD installations. Custom Non-Lighting projects comprised 4% of total completed projects in the PY2024 Retrofit program, and contributed 5% of total program net verified energy savings and 4% of total net verified summer peak demand savings. Net verified energy and summer peak demand savings for this stratum were 10,706 MWh and 1,176 kW, respectively. Although this measure subtrack contributed low savings to the overall program, the average net verified energy savings per project in the Custom Non-Lighting stratum (110 MWh) was close to two times the average Prescriptive Non-Lighting project size (65 MWh).

4.4 Savings Persistence

The following results show the PY2024 savings persistence for the Retrofit downstream, TGP and ELIP programs. The PY2024 Retrofit downstream program is expected to achieve 5,910 GWh of lifetime net-verified energy savings, based on installed measures and their respective effective useful lives (EULs) with 100% of net savings persisting until 2026. Persisting annual savings begin to reduce after the third program year, when certain measures reach the end of their EUL. The weighted average EUL for lighting and non-lighting measures was just over 15 years. Figure 4-16 shows the annual net-verified energy savings for the 2024 Retrofit program over time.

Figure 4-16: Net Energy Savings Persistence



4.5 Key Impact Evaluation Findings

This section provides key impact findings related to all evaluated measure tracks.

4.5.1 Prescriptive Non-Lighting Measures

4.5.1.1 HVAC Controls

HVAC Controls measures have the largest proportion of energy savings in this track contributing 41% of verified net energy savings of the Prescriptive HVAC projects savings.

Participation in this measure increased compared to PY2023 as 17 HVAC Controls projects were implemented in PY2024 compared to 12 projects in PY2023. During the PY2024 evaluation, four out of the 17 HVAC Controls projects were evaluated. All four evaluated projects were for Advanced Rooftop Controls where two of the four projects had an energy realization rate of 104% and 90% with the remaining two projects having a lower energy realization rate of 74% and 57%.

The projects with a 74% and 57% realization rate had lower verified savings per equipment size compared to the prescriptive approach. The verified energy savings calculation used a customized approach which considered the exact size of the equipment and applied a facility-type-specific savings factor as determined by detailed eQUEST modeling. This is compared to a fixed energy savings approach (e.g. 5,201 kWh for RTUs between 5.4 and

11.4 tons; 7,106 kWh for RTUs between 11.4 and 19.9 tons and 20,825 kWh for RTUs between 19.9 to 63.4 tons) used in the prescriptive methodology.

4.5.1.2 Prescriptive VFD Deemed Assumptions and Delivery.

The VFD measures contributed 27% of verified net energy savings for Prescriptive Process projects and were the most prevalent measure, making up 44% of all PY2024 installed measures in the Prescriptive Process track.

Current measure eligibility criteria only require that a VFD is installed to control a 1-100 hp motor and that the system must operate a minimum of 2,000 hours per year. The measure assumptions used to calculate deemed savings only apply to VFDs controlling centrifugal fans and pumps. These measure assumptions rely on affinity laws, which only apply to the hydraulic flow of fluids (liquids and gasses). As such, the deemed savings assumptions are not appropriate for all end-uses installing a VFD.

During the PY2024 evaluation, 12 VFD projects were evaluated with end-uses including HVAC fans, pumps and process equipment. Low energy realization rates of 19%, 26% and 36% were observed for three process projects based on discrepancies between verified and deemed operating conditions and hours of use. For two projects, low realization rates were due to verified savings confirming that installed VFDs were operating at full load conditions compared to deemed savings that assumed reductions in equipment load. The third project had a lower realization rate due to verified hours of use that were 50% less than deemed hours of use. High realization rates of 202% and 159% were observed in two projects, one Process and one HVAC. The first project had a high realization rate doubling deemed savings due to BAS data analysis that verified significantly higher reductions in part load ratios compared to reported savings. The second project's high realization rate was due to verified hours of use for a set of fans that confirmed full-time operation compared to deemed hours of use of 4,000 hours.

4.5.2 Prescriptive Greenhouse Measures

As mentioned in Section 4.3, Prescriptive Greenhouse measures contributed 17% (38,784 MWh) and 1% (254 kW) of total net verified first-year energy and summer peak demand savings, respectively, in the PY2024 downstream Retrofit program. Three prescriptive greenhouse projects had low energy realization rates of 55%, 41% and 39% due to higher verified kW values compared to reported. However, these three projects only made up 9% of the PY2024 sample prescriptive greenhouse reported energy savings.

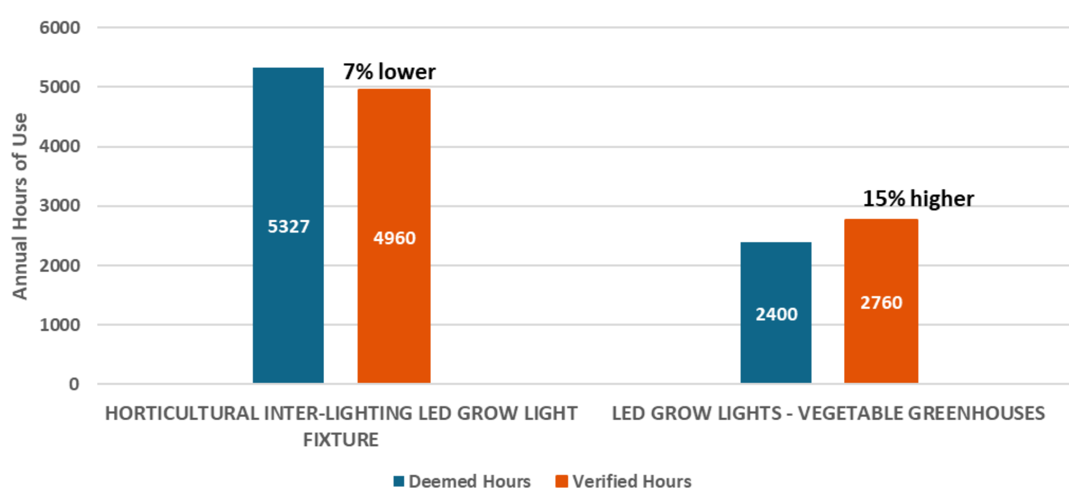
Consistent with PY2023 evaluation results, verified demand savings for greenhouse projects are significantly higher than reported due to the evaluation team validating in PY2024 that inter-lighting LED grow light fixtures are used for extended times during the IESO summer peak demand period.

Analysis of Operating Hours and Conservation Case Wattages based by Measure Type

The differences between average deemed and verified annual hours of use (HOU) and conservation case wattages across all greenhouse projects are the main drivers of the realization rates in this stream and consequently the overall Retrofit program's realization rate. To obtain a comprehensive understanding, the evaluation team combined results from PY2021 through PY2024 to verify operating hours and conservation case wattages for each horticultural lighting measure type.

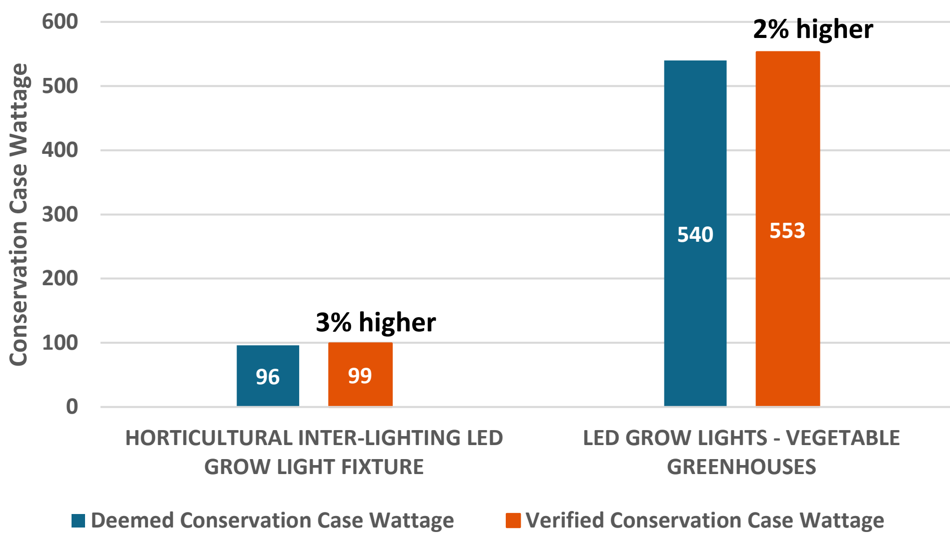
Verified HOU from the combined PY2021 through PY2024 projects for Inter-lighting LED grow light fixtures were 7% lower than deemed hours. Conversely, HOU for LED grow lights—vegetable greenhouses were verified to be 15% higher than deemed hours for this measure. Figure 4-17 illustrates the difference between the deemed annual HOU and verified annual HOU for the PY2021 through PY2024 data for both Inter-lighting fixtures and LED grow lights – vegetable greenhouses.

Figure 4-17: Deemed vs Verified HOU for Horticultural Lighting Measures



Additionally, the verified conservation case wattage from the PY2021 through PY2024 projects for both Inter-lighting LED grow-light fixtures and LED grow lights—vegetable greenhouses exceeded the deemed values, with increases of 3% higher for Inter-lighting LED grow-light fixtures and 2% higher for LED grow lights—vegetable greenhouses. Figure 4-18 illustrates the difference between the deemed conservation case wattages and verified conservation case wattages for the PY2021 through PY2024 data for both Inter-lighting LED grow light fixtures and LED grow lights – vegetable greenhouses. Verified results closely align with deemed results when using conservation case wattages for PY2021 through PY2024 program years.

Figure 4-18: Deemed vs Verified Retrofit Case Wattage for Horticultural Lighting Measures

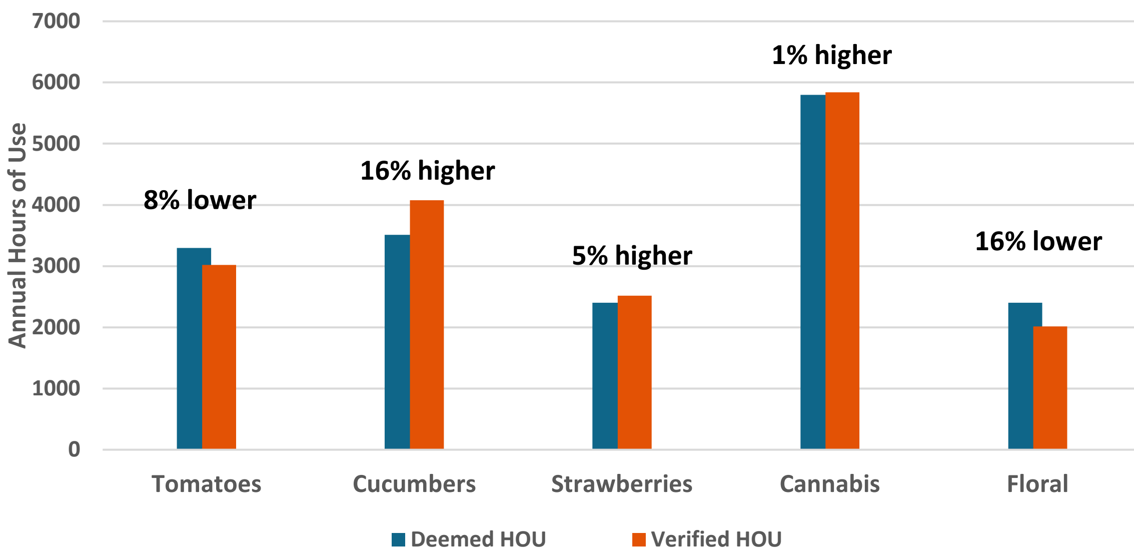


Analysis of Operating Hours and Conservation Case Wattages for different Crop Types

Using crop data collected during site visits and desk reviews, the evaluation team conducted an analysis of deemed and verified annual HOU based on crop types. The IESO deemed HOU for different crop types were obtained from the Advanced Lighting Controls measure in the Measure Substantiation Sheet (MSS) which lists deemed HOU per crop type. Overall, the verified HOU from the PY2024 projects for tomatoes and floral were 8% and 16% lower, respectively, than the deemed hours. However, the verified HOU for cucumbers and strawberries were 16% and 5% higher, respectively, than the deemed hours.

Figure 4-19 illustrates the difference between the deemed annual HOU and verified annual HOU for the PY2024 projects for various crop types.

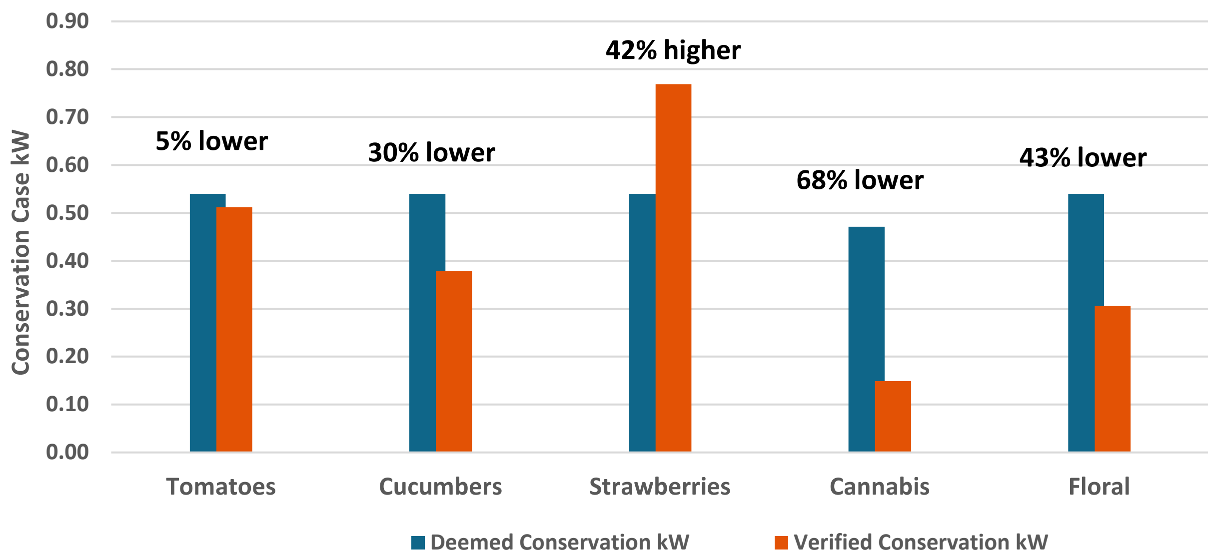
Figure 4-19: Hours of Use by Crop Type (PY2024 data)



The evaluation team also conducted an analysis of deemed and verified conservation case wattages based on crop types. The IESO deemed conservation case wattages for different crop types were obtained based on the measure type installed at these facilities. The verified conservation case wattages for PY2024 LED grow light fixtures installed for strawberries were 42% higher than the deemed conservation case wattages (0.54 kW). However, the verified conservation case wattages were lower than the deemed conservation case wattages for all other crop types as seen in Figure 4-20. The evaluation team conducted similar analysis on conservation case wattages by crop type over the last few program cycles and have made recommendations to IESO on updating measure design. IESO is currently working on updating these measures using evaluation data/recommendations.

Figure 4-20 illustrates the difference between the deemed and verified conservation case wattages for various crop types.

Figure 4-20: Conservation Case Wattage by Crop Type (PY2024 data)



4.5.3 Custom Measures

In PY2024, the Custom track continued the implementation of lighting and non-lighting projects. Custom lighting projects were the most common, accounting for 91% of custom projects. Custom non-lighting projects accounted for the remaining 9%. Together, the Custom track contributed 27% and 34% of total downstream Retrofit program net verified first-year energy and summer peak demand savings, respectively. This is an overall increase in the Custom track's proportion of total program savings compared to PY2023 where custom measures contributed 5% and 8% of total program net verified first-year energy and summer peak demand savings, respectively.

4.5.3.1 Custom Lighting

Four Custom lighting projects which made up 18% of the PY2024 sample Custom lighting reported energy savings had energy realization rates of 50% (two projects), 42% and 32%. The low realization rates were primarily due to lower verified HOU compared to the reported HOU which were all reported to be always-on. With respect to the demand savings, three other Custom lighting projects which made up 12% of the PY2024 sample Custom lighting reported demand savings had realization rates of 79%, 8% and 43%. These low realization rates were primarily due to the lights not being utilized during the entirety of the IESO summer peak demand hours when compared to verified operating schedules[6].

4.5.3.2 Custom Non-Lighting

Two Custom Non-lighting projects which made up 43% of the PY2024 sample reported energy savings had energy realization rates of 66% and 0%. The lower 66% realization rate for the first project was due to reported savings using an adjusted baseline based on changes in production quantities. However, verification indicated that there was no correlation between production quantities and energy consumption therefore deeming the baseline adjustments unnecessary. The second realization rate of 0% was from a site where the property manager verified that they were no longer using the installed equipment. See the Key Findings and Recommendations section for more detailed information. These two projects also resulted in lower Custom Non-lighting demand realization rates due to the same reasons as the lower energy realization rates mentioned above.

4.6 Net-to-Gross Evaluation

The evaluation team utilized the participant self-report survey results to estimate the NTG ratio for each Retrofit Program streams including Prescriptive, Greenhouse, and Custom, and for the ELIP. We utilized distributor, contractor, and end-user self-report surveys results to estimate the NTG ratio for IDP (midstream). The surveys sought and achieved an NTG at 90% confidence and 10% precision for each downstream and midstream track and for the ELIP. Please note that the results of the IDP NTG evaluation are included in a separate report.

Table 4-11 presents the NTG results the PY2024 CDM Retrofit Program by each downstream and midstream track. Table 4-12 presents the historical NTG results for the CDM Retrofit Program during the 2021 through 2023 program years of the CDM Retrofit Framework. NTG was not stratified by program stream in PY2021 and PY2022 as it was for PY2023 and PY2024. When stratified by program stream, some NTG values are lower than the program-

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

level NTG values in PY2021 and PY2022 because FR represents a higher proportion of the savings in the Custom and Prescriptive tracks. The Retrofit Program-level NTG, shown in Table 1-1 in the Impact section, shows that PY2024 is comparable to PY2021 and PY2022 results. Table 4-13 presents the NTG results for the ELIP.

Table 4-11: CDM Retrofit Stream-Level NTG Results

Program Year	Program Stream	Unique Participants	NTG Responses	Savings Weighted Free-ridership	Spillover–Energy	Spillover–Summer Demand	Weighted NTG–Energy	Weighted NTG–Summer Demand	Energy NTG Precision at 90% Confidence
PY2024	Prescriptive (Downstream)	903	173	18.7%	0.2%	0.1%	81.5%	81.5%	± 5.6%
PY2024	Greenhouse (Downstream)[7]	53	17	7.6%	0%	0%	92.4%	92.4%	± 7.2%
PY2024	Custom (Downstream)	685	126	22.3%	0.9%	1.1%	78.6%	78.8%	± 4.5%
PY2024	IDP(Midstream)	Distributors: 122 Contractors: 1,391 End-Users: 1,738	Distributors: 50 Contractors: 182 End-Users: 137	Stocking: 73.8% Upselling: 50.6% Pricing: 34.9%	--	--	46.7%	46.7%	3.3%

[7] Please note that Targeted Greenhouse Projects are included along with the CDM Retrofit Program greenhouse projects for the NTG analysis.

Table 4-12: Historical CDM Retrofit Program NTG Results

Program Year	Program Stream	Savings Weighted Free-ridership	Spillover–Energy	Spillover–Summer Demand	Weighted NTG–Energy	Weighted NTG–Summer Demand	Energy NTG Precision at 90% Confidence
PY2023	Prescriptive (Downstream)	22.7%	0.8%	1.2%	78.1%	78.5%	± 4.7%
PY2023	Greenhouse (Downstream)[8]	2.2%	0%	0%	97.8%	97.8%	± 2.2%
PY2023	Custom (Downstream)	32.5%	0.8%	0.3%	68.3%	67.8%	± 6.5%
PY2022	N/A (Province-Wide)	8.0%	0.4%	2.3%	92.5%	94.3%	± 6.0%
PY2021	N/A (Province-Wide)	11.6%	3.7%	12.6%	92.1%	101.0%	± 7.3%

Table 4-13: ELIP NTG Results

Program Year	Program	Unique Participants	NTG Responses	Savings Weighted Free-ridership	Spillover–Energy	Spillover–Summer Demand	Weighted NTG–Energy	Weighted NTG–Summer Demand	Energy NTG Precision at 90% Confidence
PY2024	ELIP	46	17	21.4%	0.0%	0.0%	78.6%	78.6%	± 5.9%

4.6.1 Prescriptive Stream

Table 4-14 presents the results of the PY2024 Retrofit Program Prescriptive stream NTG evaluation. The evaluation team targeted and achieved 90% confidence and 10% precision levels in the savings results. Appendix E provides additional analyses performed to assist in interpreting these values.

[8] Please note that Targeted Greenhouse Projects (TGP) are included along with the CDM Retrofit Program greenhouse projects for the NTG analysis.

Table 4-14: Retrofit – Prescriptive Stream NTG Results

Unique Participants	NTG Responses	Savings Weighted Free-ridership	Spillover–Energy	Spillover–Summer Demand	Weighted NTG–Energy	Weighted NTG–Summer Demand	Energy NTG Precision at 90% Confidence
903	173	18.7%	0.2%	0.1%	81.5%	81.5%	± 5.6%

As the table shows, participant feedback indicated moderate FR levels at 18.7%. Recent historical results included a Prescriptive Stream FR value of 22.7% in PY2023, which contributed to a slightly lower NTG of 78.1%. FR is lower in PY2024 than PY2023 due to respondents indicating that less of their project savings would have been achieved without the help of the program. Nearly one-fourth of respondents (23%) stated they would have done the "exact same upgrade" in the program's absence, indicative of higher FR for these respondents. Over one-third of respondents (34%) showed no indication of FR as they stated they would have put off the upgrade for at least one year (24%) or would have cancelled their upgrade altogether (10%). Other respondents were considered partial free riders if they reported that they would have scaled back on their project's size, efficiency, or scope (34%) or if they did not know what they would have done or they declined to answer (9%). The team combined these responses with results indicating moderate FR levels for the surveyed participants. Program participation resulted in low SO at 0.2%, with the installation of LED linear lighting measures primarily driving SO savings. Appendix E provides additional analyses performed to assist in interpreting these values.

4.6.2 Greenhouse Stream

Table 4-15 presents the results of the PY2024 Retrofit Program Greenhouse stream NTG evaluation. Please note that Targeted Greenhouse Projects (TGP) are included along with the CDM Retrofit Program greenhouse projects for the NTG analysis. The evaluation team targeted and achieved 90% confidence and 10% precision levels in the savings results. Appendix E provides additional analyses performed to assist in interpreting these values.

Table 4-15: Retrofit – Greenhouse Stream NTG Results

Unique Participants	NTG Responses	Savings Weighted Free-ridership	Spillover – Energy	Spillover – Summer Demand	Weighted NTG – Energy	Weighted NTG – Summer Demand	Energy NTG Precision at 90% Confidence
53	17	7.6%	0%	0%	92.4%	92.4%	± 7.2%

As the table shows, participant feedback indicated low FR levels at 7.6%. Recent historical results included a Greenhouse Stream FR value of 2.2% in PY2023, which contributed to a higher NTG of 97.8%. FR is higher in PY2024 than PY2023 due to respondents indicating that a greater amount of their project savings would have been achieved without the help of the program. Twelve respondents showed no indication of FR since they stated they would have put off the upgrade for at least one year (6 respondents) or would have cancelled their upgrade altogether (6 respondents) had the program not been available to them. Three of 17 respondents would have scaled back on the size, scope, or efficiency of their project in the absence of the program. These respondents, along with those who did not know what they would have done in the program's absence or declined to answer (2 respondents), were considered partial free riders. The evaluation team combined these responses, with results indicating low FR levels for the surveyed participants. Respondents did not install any spillover measures in the Greenhouse stream. Appendix E provides additional analyses performed to assist in interpreting these values.

4.6.3 Custom Stream

Table 4-16 presents the results of the PY2024 Retrofit Program Custom stream NTG evaluation. The evaluation team targeted and achieved 90% confidence and 10% precision levels in the savings results. Appendix E provides additional analyses performed to assist in interpreting these values.

Table 4-16: Retrofit – Custom Stream NTG Results

Unique Participants	NTG Responses	Savings Weighted Free-ridership	Spillover – Energy	Spillover – Summer Demand	Weighted NTG – Energy	Weighted NTG – Summer Demand	Energy NTG Precision at 90% Confidence
685	126	22.3%	0.9%	1.1%	78.6%	78.8%	± 4.5%

As the table shows**,** participant feedback indicates moderate FR levels at 22.3%. Recent historical results include a Custom Stream FR value of 32.5% in PY2023, which contributed to a lower NTG of 68.3%. Nearly one-sixth of respondents (15%) stated they would have done the "exact same upgrade" in the program's absence, indicative of higher FR for these respondents. Nearly one-half of respondents (45%) showed no indication of FR as they stated they would have put off the upgrade for at least one year (28%) or would have cancelled their upgrade altogether (17%) had the program not been available to them. Other respondents were considered partial free riders if they reported that they would have scaled back on their project's size, efficiency, or scope (25%) or if they did not know what they would have done in the program's absence or declined to answer (14%). The evaluation team combined these responses, with results indicating moderate FR levels for the surveyed participants. Program participation resulted in low SO at 0.9%, with the installation of LED linear lighting measures primarily driving SO savings. Appendix E provides additional analyses performed to assist in interpreting these values.

4.6.4 Enhanced Local Initiatives Program

Table 4-17 presents the results of the PY2024 Retrofit Program Enhanced Local Initiatives Program NTG evaluation. The evaluation team targeted and achieved 90% confidence and 10% precision levels in the savings results. Appendix E provides additional analyses performed to assist in interpreting these values.

Table 4-17: Retrofit – Enhanced Local Initiatives Program NTG Results

Unique Participants	NTG Responses	Savings Weighted Free-ridership	Spillover - Energy	Spillover - Summer Demand	Weighted NTG - Energy	Weighted NTG - Summer Demand	Energy NTG Precision at 85% Confidence
46	17	21.4%	0.0%	0.0%	78.6%	78.6%	± 5.9%

As the table shows, participant feedback indicates moderate FR levels at 21.4%. Four respondents stated they would have done the “exact same upgrade” in the program’s absence, indicative of higher FR for these respondents. Five respondents showed no indication of FR as they stated they would have put off the upgrade for at least one year (one respondent) or would have cancelled their upgrade altogether (four respondents) had the program not been available to them. Other respondents were considered partial free riders if they reported that they would have scaled back on their project’s size, efficiency, or scope (seven respondents) or if they did not know what they would have done in the program’s absence or declined to answer (one respondent). The evaluation team combined these responses, with results indicating moderate FR levels for the surveyed participants. Respondents did not install any spillover measures in the Enhanced Local Initiatives Program. Appendix E provides additional analyses performed to assist in interpreting these values.

5 Cost-Effectiveness Evaluation

Cost-effectiveness for the Retrofit program was conducted using IESO's CE Tool V9.1. Table 5-1 presents the historical results which include IDP for PY2024. The PY2024 Retrofit program achieved a Program Administrator Cost (PAC) ratio of 2.62, exceeding the 1.00 target threshold (designed to determine if a program proves cost-effective).

The PY2024 Retrofit program passed the PAC test, with benefits exceeding their respective costs with a PAC ratio of 2.62 and a levelized unit energy cost of $0.02 per kWh and $155.03 per kW. The PY2024 Retrofit cost-effectiveness results were slightly lower than the PY2023 Retrofit cost-effectiveness results, where the PY2023 Retrofit Program achieved a PAC ratio of 3.01 and a levelized unit energy cost of $0.02 per kWh and $217.09 per kW. Within the downstream Retrofit program, the Commercial sector contributed the largest share of overall benefits with 47% of total PAC benefits at a PAC ratio of 3.0, followed by Industrial and Agricultural with contributions of 23% and 17% respectively.

The PY2024 ELIP passed the PAC test, with benefits exceeding their respective costs with a PAC ratio of 1.14 and a levelized unit energy cost of $0.06 per kWh and $303.14 per kW as shown in Table 5-2.

Table 5-1: Historical Retrofit Program Cost-Effectiveness Results

PAC Test	PY2024	PY2023	PY2022	PY2021
PAC Costs ($)	$75,740,090	$56,930,596	$39,876,640	$15,590,964
PAC Benefits ($)	$198,241,017	$171,529,334	$145,967,491	$34,515,135
PAC Net Benefits ($)	$122,500,927	$114,598,738	$106,090,851	$18,924,172
PAC (Ratio)	2.62	3.01	3.66	2.21
Levelized Unit Energy Cost (LUEC)	**PY2024**	**PY2023**	**PY2022**	**PY2021**
$/kWh	$0.02	$0.02	$0.01	$0.02
$/kW	$155.03	$217.09	$129.99	$125.57

Table 5-2: PY2024 Enhanced Local Initiatives Program Cost-Effectiveness Results

PAC Test	PY2024
PAC Costs ($)	$1,239,695
PAC Benefits ($)	$1,408,604
PAC Net Benefits ($)	$168,909
PAC (Ratio)	1.14
Levelized Unit Energy Cost (LUEC)	**PY2024**
$/kWh	$0.06
$/kW	$303.14

5.1 Prescriptive Measures

Table 5-3 presents the cost-effectiveness results for Prescriptive measures in the downstream Retrofit program. The PY2024 Prescriptive measures, consisting of Prescriptive Lighting and Non-Lighting projects, passed the PAC test, with benefits exceeding their respective costs, at a PAC ratio of 3.39, and a levelized unit energy cost of $0.02 per kWh and $116.45 per kW. Overall, Prescriptive measures produced the highest PAC ratio when compared to Greenhouse and Custom measures.

Table 5-3: Prescriptive Track Cost-Effectiveness Results

PAC Test	PY2024
PAC Costs ($)	$25,247,703
PAC Benefits ($)	$85,664,198
PAC Net Benefits ($)	$60,416,496
PAC (Ratio)	3.39
Levelized Unit Energy Cost (LUEC)	**PY2024**
$/kWh	$0.02
$/kW	$116.45

Measure-level cost-effectiveness analysis showed that lighting measures, such as LED High-Bay fixtures, had a higher-than-average PAC ratio of 6.8[9]. LED High-Bay fixtures contributed $49,938,174 of PAC benefits to the PY2024 Retrofit program.

Prescriptive non-lighting measures, such as Totally Enclosed Fan Cooled Motors, had the highest PAC ratio of 5.4, but only contributed 0.01% of total non-lighting net verified energy savings. Furthermore, Packaged Terminal Heat Pumps had the lowest PAC ratio of 0.25 but only contributed 0.8% of total non-lighting net verified energy savings.

Prescriptive non-lighting measures like HVAC Controls that contribute a larger percentage of total non-lighting net verified energy savings (as discussed in section 4.5) had a slightly higher-than-average PAC ratio of 3.0.

As discussed in Section 4.3.1 High-Bay measures achieved the greatest share of energy and summer peak demand savings at 67% and 68%, respectively. This is consistent with PY2023 results where LED High-Bay fixtures had higher-than-average PAC ratio of 6.4 contributing $43,496,064 of PAC benefits to the PY2023 Retrofit program.

5.2 Greenhouses Measures

Table 5-4 presents the cost-effectiveness results for Greenhouse measures in the PY2024 Retrofit program. Greenhouse measures passed the PAC test, with benefits exceeding their respective costs, with a PAC ratio of 3.22, and a levelized unit energy cost of $0.02 per kWh and $2,327.57 per kW[10]. The high $/kW LUEC is due to the low summer peak demand savings resulting from the Greenhouse projects.

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[9] Measure-level benefit-to-cost ratios do not include program administrative costs. Administrative costs are included in the tables, showing overall program- and track-level cost-effectiveness results. Track-level cost-effectiveness results are directional in nature and should be used for comparison purposes.
[10] The $/kW LUEC for Greenhouse measures is based on province wide-peak demand definition (June 1st to Aug 31st from 1:00 PM to 7:00 PM) and does not reflect the local South-West region peak demand benefits.

Table 5-4: Greenhouse Track Cost-Effectiveness Results

PAC Test	PY2024
PAC Costs ($)	$6,556,780
PAC Benefits ($)	$21,102,844
PAC Net Benefits ($)	$14,546,063
PAC (Ratio)	3.22
Levelized Unit Energy Cost (LUEC)	**PY2024**
$/kWh	$0.02
$/kW	$2,327.57

LED Grow Lights and Horticultural Inter-Lighting contributed the greatest PAC benefits to PY2024 Retrofit program, at $16,992,279 and $3,074,853, respectively. These two measures produced high PAC ratios of 3.76 and 13.47, respectively; combined, they contributed 16% of the total downstream Retrofit program's net verified energy savings and 1% of the total net verified summer peak demand savings.

Conversely, Greenhouse Advanced Lighting Controls contributed $1,035,712 in PAC benefits at a slightly lower than average PAC ratio of 2.46.

5.3 Custom Measures

Table 5-5 presents the cost-effectiveness results for Custom measures in the Retrofit program. The PY2024 Custom measures, consisting of custom lighting and non-lighting projects, passed the PAC test, with benefits exceeding their respective costs, with a PAC ratio of 1.79, and a levelized unit energy cost of $0.03 per kWh and $193.33 per kW.

Table 5-5: Custom Track Cost-Effectiveness Results

PAC Test	PY2024
PAC Costs ($)	$19,859,669
PAC Benefits ($)	$35,583,121
PAC Net Benefits ($)	$15,723,451
PAC (Ratio)	1.79
Levelized Unit Energy Cost (LUEC)	**PY2024**
$/kWh	$0.03
$/kW	$193.33

Custom Lighting projects contributed a total of $29,764,570 PAC benefits to the overall PY2024 Retrofit program, with a PAC ratio of 2.0[11]. Custom Lighting projects contributed 23% and 30% of the downstream Retrofit program's overall net verified energy and summer peak demand savings. Custom non-lighting projects contributed a total of $5,818,551PAC benefits, with a PAC ratio of 3.06. Custom non-lighting projects also provided a minimal contribution to the overall program, with only 5% and 4% of the overall program's net verified energy and summer peak demand savings.

5.4 IDP

Table 5-6 presents the cost-effectiveness results for IDP measures in the Retrofit program. The PY2024 IDP measures passed the PAC test, with benefits exceeding their respective costs, with a PAC ratio of 2.32, and a levelized unit energy cost of $0.03 per kWh and $144.87 per kW.

[11] Measure-level benefit-to-cost ratios do not include program administrative costs. Administrative costs are included in the tables to show overall program- and track-level cost-effectiveness results. Track-level cost-effectiveness results are directional in nature and should be used for comparison purposes.

Table 5-6: IDP Cost-Effectiveness Results

PAC Test	PY2024
PAC Costs ($)	$24,075,938
PAC Benefits ($)	$55,890,855
PAC Net Benefits ($)	$31,814,917
PAC (Ratio)	2.32
Levelized Unit Energy Cost (LUEC)	**PY2024**
$/kWh	$0.03
$/kW	$144.87

6 Process Evaluation Results

The evaluation team performed a process evaluation to better understand the Retrofit program's design and delivery. The team interviewed IESO and delivery vendor staff and completed applicant representative, contractor, and participant surveys to gather primary data for supporting this evaluation. In the following sections, if fewer than 20 respondents answered a question, counts are shown rather than percentages. These results should be considered directional, given the small number of respondents.

6.1 IESO Staff and Program Delivery Vendor Staff Perspectives

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

6.1.1 Key Findings

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

- The most significant change to the Retrofit Program's design occurred at the end of 2023 when most lighting measures – except for horticultural lighting – were officially moved to the Instant Discount Program (IDP). However, program savings were still significantly impacted by lighting measures in PY2024 due to projects being completed that had been initiated in prior years.
- The program's overall goals were to maximize participation and achieve its savings targets within its budget; IESO staff reported that the program did well in meeting those goals.
- The IESO and vendor staff reported that the equipment and services offered generally met customer needs with the availability of both prescriptive and custom streams giving customers increased flexibility.
- Most IESO staff and delivery vendors believed the incentives were generally adequate to drive participation, though one delivery vendor reported that, other than solar, incentives were not enough compared to the cost of the projects.
- IESO staff indicated that there was more marketing for the Retrofit Program in PY2024 than in previous years, with IESO primarily continuing to focus on its digital-first approach and delivery vendors assisting with material development (such as sell sheets), attending in-person events, and reaching out to their networks (e.g., to chambers of commerce, contractor networks, business associations, local distribution companies (LDCs).

- IESO staff and delivery vendors recommended increased marketing, especially in northern Ontario, where customer awareness is still low. Other marketing-related suggestions included increasing marketing budgets to allow delivery vendors to attend more conferences and trade shows, increasing usage of paid on-line advertising and of social media, and offering additional IESO-led webinars to better communicate the program rules and processes.
- The IESO and delivery vendors offered various suggestions for additional equipment and services including data centers; battery storage; larger sized prescriptive variable frequency drives (VFDs) and booster pumps and coil cleaning for heat pumps.
- Delivery vendors recommended making the Save on Energy website easier to navigate and identified several improvement opportunities to consider for the Retrofit portal (i.e., adding a field for the incentive invoice approval date; allowing the portal to communicate with delivery vendor software; configuring the portal to generate incentive invoice documents for customers or providing a template detailing the specific incentive information that needs to be included; and making the disposal form document a mandatory field).
- Other recommendations included creating additional resources to help customers identify which Save on Energy programs will best serve their needs, developing more province-wide sell sheets and case studies, collaborating with LDCs where feasible, increasing custom incentives, offering heat pump installation training, more cross-program promotion, and ensuring that customers quickly receive the assistance they need.

6.1.2 Design and Delivery

As in prior years, the IESO was responsible for the program's administration and design in PY2024, and three delivery vendors were responsible for the program's delivery. A major change to the program design occurred at the end of PY2023 when most lighting measures,[12] a major component of the Retrofit Program, were officially moved to IDP. However, prescriptive lighting and custom lighting streams were still significant contributors to PY2024 program savings given that many lighting projects that were initiated in previous years were completed in PY2024.

IESO staff reported that the program's overall goals were to maximize participation and achieve the savings targets within the budgets established in the CDM plan, making up for any deficits in reaching savings targets from previous years as well as striving for a seamless transition given that PY2024 was the final year of the 2021-2024 CDM framework and given the changes made to the program's design. IESO staff and delivery vendors reported that

[12] With the exception of horticultural lighting.

the program generally did very well in meeting these goals. One IESO staff member noted that they would have liked to see slightly higher demand savings.

IESO staff reported that the delivery vendors mobilized and worked hard to administer the program and effectively manage relationships with applicant representatives, contractors, and participants. Delivery vendors reported that they communicated with other delivery vendors to stay in touch and coordinate when needed. Delivery vendors reported that the process of coordinating with the IESO generally went very well, with one delivery vendor noting that they hoped some questions had been addressed more quickly.

IESO staff and delivery vendor estimates of what percentage of the project cost the program incentives covered ranged between 10-40%. They noted that projects' incentives rarely reach the 50% maximum project cost cap. Most believed the incentives were generally adequate to drive participation, though one delivery vendor reported that other than solar, incentives were not enough compared to the cost of the projects. IESO staff and delivery vendors were split on whether the Enhanced Local Initiatives Program led to increases in the scope, size, timing, or approval of projects and whether it motivated customers to participate in other IESO energy-efficiency programs. Delivery vendors reported that prescriptive measures can take anywhere from three months to a year to purchase and install; they noted that it can be measure dependent, with options like chillers and motors sometimes taking longer.

According to one IESO staff member, the most time-intensive part of implementing a project can be the post-project approval process because delivery vendors may need to recontact customers multiple times to request additional details if there is not enough information provided (e.g., itemized invoices, additional photos). IESO staff also noted that it can be time consuming to determine custom project eligibility because of the supplemental information and metering data required. Delivery vendors suggested the business case and the delivery time for ordering equipment are often the most time-intensive part, noting that certain equipment types, such as custom, injection molding machines, and building envelope upgrades often take longer.

6.1.3 Outreach and Marketing

IESO staff reported that there was more marketing for the Retrofit Program in PY2024 than in previous years. They indicated that while the Retrofit Program is generally well established in the marketplace, in PY2024, the forecasted energy savings for all programs were lower than their associated target savings. This in turn spurred increased marketing to generate more participation in the Retrofit Program.

As in previous years, IESO staff indicated taking a digital-first approach to marketing, meaning that they lean into digital based tactics and channels (e.g., the Save on Energy website; social media platforms like YouTube, Meta, LinkedIn; webinars; and e-newsletters) to promote the program, generate awareness, and provide deeper education. IESO staff also reported doing search engine marketing through Google assets and social media and creating new guides to help compare different programs.

IESO staff stressed that their creative philosophy is to position marketing to showcase real businesses and real participants (e.g., sharing testimonials or developing print and video case studies). Additionally, IESO staff reported using more traditional marketing such as through print ads in trade magazines to reach contractors and through local newspaper ads to reach customers, though they noted that they believed these methods to be less impactful compared to their digital-based efforts.

Some delivery vendors developed sell sheets and offered informational webinars. Delivery vendors also reported attending various in-person events; one noted that these events were good opportunities to develop new relationships with customers and contractors and to solidify existing relationships. Delivery vendors also reported reaching out to chambers of commerce as well as organizations that may be affiliated with certain business sectors. One delivery vendor reported collaborating with cities and local distribution companies (LDCs) to promote the program.

6.1.4 Equipment and Services

The IESO and vendor staff reported that equipment and services offered generally met customer needs. They noted that the availability of both prescriptive and custom streams provides customers the flexibility to typically complete the work of interest to them, though custom applications can be challenging to submit, depending on the project, as noted in Section 6.1.5.

Delivery vendors reported that most of the non-lighting equipment replaced through the program is pre-emptive; that is, it is not replacing equipment that has already failed. They reported that some of the equipment replaced is nearing the end of its useful life while other equipment is replaced as part of preventative maintenance. Delivery vendors indicated that the desire to reduce carbon emissions and take advantage of program incentives also drives some customers to replace their equipment.

One IESO staff member reported that the program began to offer incentives for solar panels in PY2024 in the Ottawa region as a pilot offering in response to customer interest in previous years. One delivery vendor thought they would see a few applications and received over fifty as part of this pilot effort. IESO staff reported that this customer interest led them to expand solar offerings across the province in January 2025.

IESO staff also commented on uneven skill levels among contractors installing heat pumps. When new incentives were made available for heat pumps, some contractors rushed into the market without the necessary skills; heat pumps were thus installed incorrectly or not running at maximum efficiency levels in these instances. (One delivery vendor had made a similar observation in PY2023).

IESO staff and delivery vendors offered various suggestions for equipment and services to consider adding to the program. These included measures for data centers (note that the program began offering an air conditioning incentive for data centers at the start of 2025); battery storage; larger sized variable frequency drives (VFDs) and booster pumps and coil cleaning for heat pumps. IESO staff and delivery vendors also noted that the custom stream offered customers significant flexibility so there was not a great need for additional equipment or services.

6.1.5 Barriers and Opportunities

The IESO staff and delivery vendors identified several common program barriers and opportunities for improvement. While there was increased marketing of the program in PY2024 as described in Section 6.1.3, one IESO staff member and two delivery vendors noted that many customers, particularly in northern Ontario, are still not familiar with the program and have to be convinced of its legitimacy. Two other IESO staff members recommended further increases to marketing to allow delivery vendors to attend additional conferences and trade shows. Two delivery vendors recommended the program create additional resources to help customers identify which Save on Energy programs will best serve their needs. Another two delivery vendors recommended that the IESO consider developing sell sheets of their own (rather than relying on the delivery vendors to develop them) to ensure province-wide consistency.

Two delivery vendors noted that while the increased prescriptive incentives have been of interest to and have helped simplify the participation process for customers, it can lead to less savings claimed for the program compared to if the customer were to have completed a custom project. Another delivery vendor suggested revisiting the incentives, especially for custom, which they recommended be increased by one-third.

Delivery vendors recommended that IESO consider paid on-line advertising and greater use of social media to increase the knowledge and perceived legitimacy of the program. IESO staff and delivery vendors also recommended developing additional case studies of successful projects completed with program support. One IESO staff member recommended providing heat pump installation training to contractors and another recommended offering additional informational webinars.

Two IESO staff members said that each program partner has different levels of marketing sophistication and trying to provide the right level of support to each can be challenging and complex. Another IESO staff member stressed the need to place more emphasis on the customer and their experience. Ensuring that they quickly receive the assistance they need is critical to customer retention and satisfaction. IESO staff also noted that there was room for more cross-program marketing to help customers and contractors identify the Save on Energy programs best suited to their needs. Delivery vendors also recommended making the Save on Energy website easier to navigate and suggested that the program continue to identify opportunities to work with LDCs where it is feasible.

Delivery vendors recommended continuing to make improvements to the Retrofit portal. One recommendation included adding a specific field to the Retrofit portal for the incentive invoice approval date to ensure there is alignment with when projects are approved. Another recommendation involved allowing the Retrofit portal to communicate both ways with the delivery vendor software (e.g., the portal currently communicates with other software to read in data, but it cannot be read data back). A third recommendation included updating the portal to allow it to generate an incentive invoice document for customers based on the information already included in the portal, or showing them a template with the specific information that needs to be filled out. A final delivery vendor suggestion on the portal included making the disposal form document a mandatory field since it is required by the program and is sometimes forgotten.

6.2 Applicant Representative and Contractor Perspectives

The following subsections highlight feedback received from the applicant representative and contractor survey. Appendix E.1 provides additional results.

6.2.1 Key Findings

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

- Close to one-third (30%) of respondents worked as both an applicant representative and a contractor for clients who received their incentive through the program in 2024. Over three-fifths (64%) worked only as an applicant representative, and less than one-tenth (6%) worked only as a contractor.
- Over one-half (56%) of respondents reported that the primary way that their customers learned of the Retrofit Program was through the respondents' companies contacting them directly.

- The most-requested training and education topics include the application process (32%), the offerings associated with the program (32%), and program rules (24%).
- The program aspect with the highest satisfaction rating was interactions with Save on Energy representatives (76% with a rating of four or five on a scale of one to five, where one indicates "not satisfied at all" and five indicates "completely satisfied"). The program aspect with the lowest satisfaction rating was program marketing and outreach (34% with a rating of four or five).
- Nearly three-fourths (72%) of respondents indicated that their customers typically were able to install all equipment that interested them through the Retrofit Program.
- Over two-fifths (44%) of respondents said it takes about two to six months to purchase and install the prescriptive equipment offered through the program.
- Most commonly, respondents said that obtaining buy-in from decision makers was the most time-consuming part of the project implementation process (32% of respondents).
- Most respondents reported that usually ten percent or less of their non-lighting project costs were covered by the program.
- To address barriers and increase customer participation, respondents suggested improving and increasing marketing to increase awareness (30%), increasing incentive amounts (22%), and providing better support during the application process (15%).
- Respondents' suggestions on how to improve the program going forward included making the Retrofit Portal more user friendly (three respondents) and streamlining the overall process (two respondents).
- The most common equipment recommendations included exterior lighting (41%), building automation system, fans, heat pumps, and the ability to install more than one smart thermostat (9% of responses each).
- The two responding contractors who had supported clients who had participated in the Enhanced Local Initiatives Program both indicated that their clients would have been unlikely to proceed with their projects if the incentive was reduced by any amount.

6.2.2 Program Awareness

Applicant representatives and contractors typically first became aware of the program from the Save on Energy website for the program (50%) or through outreach from IESO (20%). Respondents also first became aware of the program through word of mouth from contractors (12%) and from their current or previous job (10%). When asked about the *primary way* their customers learned of the program, they most frequently reported that their company contacted customers about the program (56%). Less than one-fifth (14%) said customers primarily became aware of the program from word of mouth from other contractors or equipment vendors (14%) or from prior experience participating in other

Save on Energy programming (12%). Figure 9-8 and Figure 9-9 in Appendix E.1 provide additional details regarding program awareness.

6.2.3 Training and Education

Three-fourths (76%) of respondents received training or education to support their work with the Retrofit Program and nearly one-fourth (24%) reported not receiving any training or education at all. Of those that received this support, nearly one-half (46%) received training or education on the application process, and nearly two-fifths (38%) received training or education on the program rules. When asked about *additional* training or education that would help support their future work with the program, close to three-fourths (74%) of respondents provided suggestions. These respondents most often suggested application process training or support (32%), training on the offerings associated with the program (32%), and training on the program rules (24%). Figure 9-10 and Figure 9-11 in Appendix E.1 provide additional details.

6.2.4 Program Experience

Applicant representatives and contractors were asked if customers were typically able to install equipment models that were of interest to them through the program. Nearly three-fourths (72%) of respondents said their customers were able to do so, while over one-tenth (16%) of respondents indicated that customers were not able to do so. A full list of the types of energy-efficient equipment or models that participants were interested in but were not able to install through the program can be found in Table 9-6 in Appendix E.1.

Respondents were asked why customers who were initially interested in energy-efficiency equipment ultimately chose not to install it at the time they completed their Retrofit projects. The most commonly cited reasons were incentives being too low (42%) and budget constraints (16%). Figure 9-12 in Appendix E.1 provides additional details.

Respondents were asked to rate their satisfaction with different aspects of the Retrofit Program on a scale of one to five, where one indicates "not satisfied at all" and five indicates "completely satisfied." The highest-rated program aspect compared to other aspects was interactions with Save on Energy representatives (76% with a rating of four or five). The lowest rated aspect compared to other aspects was marketing and outreach (34% with a rating of four or five). Figure 9-13 in Appendix E.1 provides additional details.

6.2.5 Equipment Purchase and Installation Timeline

Respondents were asked to identify any types of prescriptive equipment that experienced supply chain delays that impacted project completion. Respondents most frequently mentioned lighting fixtures (17%) followed by chillers, compressors, and HVAC equipment (5% of respondents each). Other responses can be found in Table 9-6 in Appendix E.1.

Respondents were asked to indicate how long prescriptive equipment offered through the program typically took to purchase and install. Respondents most commonly said it takes about two to six months to purchase and install the prescriptive equipment offered through the program (44%) and close to one-fourth (24%) of respondents said it takes one month or less. When asked which, if any, types of prescriptive equipment take longer than 12 months to purchase and install, a small number (5%) indicated that lighting and VFDs can take over 12 months to install. Further details on equipment installation timelines can also be found in Table 9-7 and Table 9-8 in Appendix E.1.

Respondents were asked to indicate which parts of the project implementation process were the most time intensive. Nearly one-third (32%) of respondents said that obtaining buy-in from decision makers was the most time consuming, followed by installing the equipment (14%), and waiting for the incentive (14%). For a full list of the most time intensive parts of the project process, as well as the amount of time it took to complete these parts of the project, see Figure 9-14 and Table 9-9 in Appendix E.1.

6.2.6 Non-Lighting Equipment

About one-fourth (26%) of respondents indicated that their clients' non-lighting upgrades were sometimes replaced on failure. When non-lighting equipment was upgraded for a reason other than failure, most respondents said their clients completed those upgrades because they either wanted to avoid the need for replacement on failure (five respondents) or it was new equipment (four respondents). A full breakdown of these results can be found in Table 9-10 and Table 9-11in Appendix E.1.

Most respondents reported that it was usual for ten percent or less of their non-lighting project costs to be covered by the program. When asked if these percentages were sufficient to encourage participation, responses varied. Table 9-12 and Table 9-13 in Appendix E.1 provide additional details.

6.2.7 Barriers and Opportunities

When asked to identify barriers that prevented more customers from participating in the program, respondents most commonly said customers did not know about the program (30%), did not view upgrades as a priority (26%), and did not perceive the upgrades to be worth the trouble of participation (24%). Regarding what the program could do to overcome customer participation barriers, respondents suggested improving and increasing marketing to increase awareness (30%), increasing incentive amounts (22%), and providing better support during the application process (15%). A full list of barriers and suggestions for addressing barriers can be found in Figure 9-15 and Figure 9-16 in Appendix E.1.

6.2.8 Recommendations for Program Improvement

Applicant representatives and contractors were asked to provide suggestions for improvements to the program going forward. Three respondents mentioned making the portal more user friendly and two respondents suggested streamlining the overall process. A full list of suggestions for improvements can be found in Table 9-14 in Appendix E.1.

Respondents were also asked what additional efficient equipment or services they would recommend for inclusion in the program. The most common recommendations included exterior lighting (41%), building automation systems, fans, heat pumps, and the ability to install more than one smart thermostat (9% of responses each). As many of these recommendations are already available through the Retrofit Program, this suggests that customer awareness of the program offerings might be a barrier to further participation. Table 9-15 in Appendix E.1 provides additional details.

6.2.9 Enhanced Local Initiatives Program

Respondents who had supported clients participating in the Enhanced Local Initiatives Program were asked on a scale of one to five, where one indicates “not at all likely” and five indicates “extremely likely,” how likely these clients would have been to complete their project through the Enhanced Local Initiatives Program with the same scope, timeline, and level of energy-efficiency if the incentive amount had been reduced by one-third, one-half, or two-thirds. While only two respondents provided usable responses to these questions, they both indicated that their clients would have been unlikely to proceed with their projects if the incentive was reduced by any amount. One respondent said the incentive had no impact on how long it took for their company to complete the approval process and the other said it reduced the time needed to complete the approval process. Appendix E.1 provides additional details on the Enhanced Local Initiatives Program.

6.3 Retrofit Participant Perspectives

The following subsections highlight the feedback received from the participant survey. Additional results can be found in Appendix E.3.

6.3.1 Key Findings

Key findings from participants’ responses include the following:

- Most respondents (58%) learned of the program through a contractor or equipment vendor.
- Most respondents (87%) indicated that participation in the program was easy (ratings of three and above). Of these respondents, more than one-half (55%) stated that a Save on Energy representative, contractor, vendor, or supplier made it easy to participate in the process.
- Of the one-tenth of respondents (11%) who indicated that it was not very easy or not at all easy to participate in the program, close to one-third of (29%) most commonly reported that the application process was not user-friendly.
- One-fifth (20%) of respondents reported that they decided not to install all energy-efficient equipment initially of interest to them as part of their program project. These respondents most commonly reported deciding not to install lighting (18%) and more than one-third (38%) reported the lack of resources or budget as the main reason for not installing everything of interest to them.
- On average, respondents said that 20% of non-lighting project costs were covered by the program incentives in the Prescriptive stream, 19% in the Custom stream, and 43% in the Enhanced Local Initiatives Program.
- On average, respondents indicated that their non-lighting upgrades most often replace inefficient functioning equipment (76%).
- Over one-fifth (21%) of respondents stated that installing equipment was the most time intensive aspect of implementing their project, outside of the application process.
- Close to one-third (30%) of respondents said that the most time intensive aspect of their projects took them approximately 1-5 months to complete.
- The one-fourth of respondents (25%) who offered recommendations for additional energy-efficient equipment or services for inclusion in the Retrofit Program most commonly mentioned HVAC equipment (42%) and expanded lighting offerings (11%).
- The one-fifth of respondents (20%) who provided recommendations to improve the program most commonly mentioned simplifying the overall process (41%) and providing more support services and customer service (31%).
- Respondents who participated in the Enhanced Local Initiatives Program indicated an increasing likeliness that they would not be able to complete their project with the same scope, timeline, or efficiency if their incentive were to have been reduced by one-third, one-half, or two-thirds.

6.3.2 Program Awareness

Most respondents (58%) learned of the program through a contractor or equipment vendor. Respondents also commonly heard about the program through previous participation in another Save on Energy program (32%), the IESO website (11%), and speaking to a Save On Energy representative (9%). Figure 9-62 in Appendix E.3 provides additional details.

6.3.3 Program Experience

When asked about the ease of participating in the program, respondents used a scale of one to five, where one meant “not at all easy” and five meant “extremely easy.” More than one-half (52%) of respondents rated their program participation as a four or five. Figure 9-63 in Appendix E.3 provides additional details. Respondents who indicated it was somewhat, very, or extremely easy to participate in the program were asked which program aspects made participation easy. More than one-half (55%) said that the facilitation by a Save on Energy representative, contractor, vendor, or supplier made the process easy. Respondents also commonly cited the Save on Energy website and online portal (17%) and the application process (14%) as factors that made participation easier. Figure 9-64 in Appendix E.3 provides additional details.

Respondents who found it not very easy or not at all easy to participate in the program were asked which program aspects impaired participation. Over one-fourth (29%) reported that the application process was not user friendly. Respondents also commonly mentioned the length of the overall process (22%) and lengthy and complex paperwork (21%) as aspects that made participation more difficult. Figure 9-65 in Appendix E.3 provides additional details.

One-fifth (20%) of respondents decided not to install all equipment initially of interest to them. These respondents commonly reported deciding not to install lighting (18%), lighting controls (11%), and building automation systems and energy management systems (9%). Figure 9-66 in Appendix E.3 provides additional details.

More than one-third (38%) of the respondents who had decided not to install all equipment initially of interest to them reported that lack of resources or budget were a reason for not installing all the equipment of interest. Respondents also commonly mentioned the incentive was too low (21%), the timing of the installation not being compatible with their company’s schedule (21%), and the long payback period (21%) as reasons for not installing this equipment. Figure 9-67 in Appendix E.3 provides additional details.

6.3.4 Non-Lighting Equipment

The survey asked respondents who completed a prescriptive, adder or custom project what percentage of their non-lighting project costs were covered by the incentive received through the program. Close to one-half (45%) of respondents reported not having completed any non-lighting upgrades. Of the respondents who had completed non-lighting projects, on average, 20% of non-lighting project costs were covered in the Prescriptive stream, 19% in the Custom stream, and 43% in the Enhanced Local Initiatives Program. Figure 9-68 in Appendix E.3 provides additional details.

Respondents who provided estimates of percentage of their non-lighting project costs that were covered by the program were then asked what percentage of these upgrades were made to replace failing equipment, nearly failing equipment, or inefficient functioning equipment. On average, respondents indicated that their non-lighting upgrades most often replace inefficient functioning equipment (76%). Less often they replace nearly failed equipment (18%) or failed equipment (6%). Figure 9-69 in Appendix E.3 provides additional details.

6.3.5 Time Intensive Aspects of Projects

Over one-fifth (21%) of respondents stated that installing equipment was the most time intensive aspect of implementing their project, outside of the application process. Respondents also commonly mentioned waiting for the incentive (17%), scheduling installation (11%), and understanding what equipment was included in the program (8%), as time intensive aspects of their projects. Figure 9-70 in Appendix E.3 provides additional details.

Close to one-third (30%) of respondents said that the most time intensive aspect of the project took them 1-5 months to complete and close to one-fourth (24%) stated that it took less than one week to complete. Figure 9-71 in Appendix E.3 provides additional details.

Respondents who reported a time intensive aspect for their project were asked if there was a particular equipment type that made completing this project so time intensive. Close to one-fifth (17%) reported LED fixtures as an equipment type that made their project time intensive. Respondents also mentioned HVAC/compressors (10%) with some frequency. Figure 9-72 in Appendix E.3 provides additional details.

6.3.6 Recommendations for Program Improvements

One-fourth of respondents (25%) offered recommendations for additional energy-efficient equipment and services to consider for inclusion in the program. Most commonly, these recommendations included HVAC equipment (42%), expanded lighting offerings (11%), heat pumps (9%), and solar PV/wind (6%). Figure 9-73 in Appendix E.3 provides additional details. One-fifth of respondents (20%) provided recommendations to improve the program. The most common suggestions included simplifying the overall process (41%), providing more support services and customer service (31%), and increasing the incentive amount (12%). Figure 9-74 in Appendix E.3 provides additional details.

6.3.7 Enhanced Local Initiatives Program

Respondents who participated in the Enhanced Local Initiatives Program were asked on a scale of one to five, where one indicates "not at all likely" and five indicates "extremely likely," how likely their business would have been to complete their project with the same scope, timeline, and level of energy-efficiency if the incentive amount had been reduced by one-third, one-half, or two-thirds. The larger the incentive reduction, the less likely respondents were to complete their project with the same scope, timeline, and level of energy efficiency as the incentive. Figure 9-75, Figure 9-76, and Figure 9-77 in Appendix E.3 provide additional details.

When asked if the availability of the higher incentive impacted how long it took for their company to complete the approval process, one-half of respondents (7 of 14) said that the higher incentive did not have an impact on the approval process timeline. Figure 9-78 in Appendix E.3 provides additional details.

7 Other Energy-Efficiency Benefits

7.1 Avoided Greenhouse Gas Emissions

Using the IESO CE Tool V9.1, the evaluation team calculated avoided GHG emissions for the first year, along with the measures' lifetime savings for Retrofit (including IDP) and ELIP in PY2024. Table 7-1 shows the results of these avoided GHG emissions calculations. First-year avoided GHG emissions from electricity savings for the Retrofit program were reduced by the increase in GHG consumption due to interactive effects, resulting in 31,231 Tonnes of CO_2 equivalent (CO_2e). PY2024 Retrofit program projects are expected to achieve a total of 445,554 Tonnes of CO_2e in avoided GHG emissions throughout the effective useful life of the installed measures. First-year avoided GHG emissions from electricity savings for ELIP achieved 407 Tonnes of CO_2e. PY2024 ELIP projects are expected to achieve a total of 5,671 Tonnes of CO_2e in avoided GHG emissions throughout the effective useful life of the installed measures.

Table 7-1: PY2024 Retrofit Program Avoided GHG Emissions in Tonnes of CO_2e

Program	Electric First Year GHG Avoided (tonnes of CO_2e)	Gas First Year GHG Avoided* (tonnes of CO_2e)	Total First Year GHG Avoided (tonnes of CO_2e)	Electric Lifetime GHG Avoided (tonnes of CO_2e)	Gas Lifetime GHG Avoided (tonnes of CO_2e)	Total Lifetime GHG Avoided (tonnes of CO_2e)
Retrofit (Including IDP)	45,579	(14,348)	31,231	640,817	(195,262)	445,554
ELIP	417	(10)	407	5,843	(172)	5,671

*Interactive gas heating penalty.

7.2 Non-Energy Benefits

The following subsection discusses NEBs from the PY2024 Retrofit Program as well as the Retrofit Program's aggregated NEBs for PY2021 through PY2024. Appendix G provides additional details regarding the NEB methodology and results. the Evaluation Team used Phase II study NEBs values within the PY2024 cost-effectiveness calculator per the IESO's request, with the PY2024 NEBs and the aggregated PY2021 through PY2024 NEBs presented for informational purposes and to assist in future research.

7.2.1 Key Findings

The NEBs analysis included the following key findings:

- Using the *hybrid, minimum approach*, PY2024 NEB values were $0.03/kWh for reduced building and equipment operations and maintenance (O&M), $0.02/kWh for thermal comfort, $0.01/kWh for improved air quality, and $0.005/kWh for reduced spoilage.

- Using the *hybrid minimum approach*, aggregated PY2021, PY2022, PY2023, and PY2024 NEBs values were $0.04/kWh for reduced building and equipment operations and maintenance (O&M) (compare with $0.08 in the Phase II study), $0.02/kWh for thermal comfort (compare with $0.05 in the Phase II study), $0.01/kWh for improved indoor air quality (compare with $0.01 in the Phase II study), and $0.004/kWh for reduced spoilage (compare with $0.0002 in the Phase II study).

7.2.2 Quantified NEBs Values

The PY2024 Retrofit participant survey included 163 participants that experienced at least one NEB from measures installed through the Retrofit Program. The Retrofit participant survey asked about participants' experiences with four NEBs:

- **Reduced building and equipment O&M:** Reduced labour or other costs associated with reduced operations and maintenance to maintain building systems.
- **Thermal comfort:** Improving the building's ability to maintain a comfortable temperature.
- **Improved indoor air quality:** Reduction in air pollutants in the indoor environment.
- **Reduced spoilage:** Reduced spoilage of perishable products due to improved refrigeration or ventilation.

The majority of PY2024 participants (81%) experienced NEBs from reduced building and equipment O&M. One-third (33%) experienced NEBs from improved thermal comfort, one-fifth (20%) experienced NEBs from improved indoor air quality, and four participants (2%) experienced NEBs from reduced spoilage, as shown in Figure 7-1.

Similarly, the majority of PY2021 through PY2024 participants (86%) experienced NEBs from reduced building and equipment O&M. One-fourth (26%) experienced NEBs from improved thermal comfort, 14% experiencing NEBs from improved indoor air quality, and 2% experiencing NEBs from reduced spoilage, also shown in Figure 7-1.

Figure 7-1: Participant Observation of NEBs, Phase II, PY2021, PY2022, PY2023, & PY2024, and Combined PY2021-PY2024

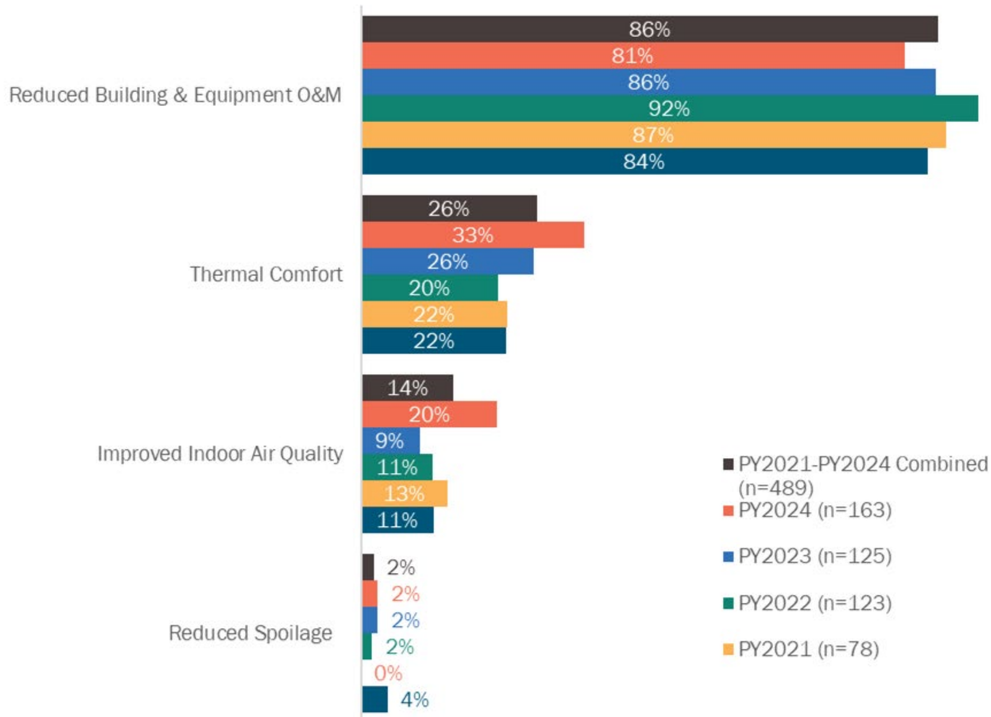


Table 7-2 presents quantified NEBs values for Phase II, PY2021, PY2022, PY2023, and PY2024, based on the hybrid, minimum ($/kWh) valuation—the approach recommended by the Phase II study.[13] Note that quantified NEBs from the Phase II study combined participants from the Retrofit and Small Business Lighting programs, but the PY2021, PY2022, PY2023, PY2024 and results only included Retrofit Program participants.

As in the previous studies, Retrofit participants in PY2024 assigned the highest values to reduced building and equipment O&M NEBs ($0.03/kWh), followed by thermal comfort ($0.02/kWh), improved air quality ($0.01/kWh), and reduced spoilage ($0.005/kWh).

PY2021 through PY2024 Retrofit respondents primarily valued reduced building and equipment O&M NEB ($0.04/kWh), followed by thermal comfort ($0.02/kWh), reduced spoilage ($0.01/kWh), and improved indoor air quality ($0.004/kWh).

This participant feedback proved similar to NEBs that contractors reported their customers might have experienced due to participation in the Retrofit Program. Among contractors reporting NEBs, nearly all (eleven out of twelve) indicated that their customers experienced

[13] Dunsky. (July 2021). *Non-Energy Benefits: Phase II; Quantified Benefits and Qualitative Insights*. https://www.ieso.ca/-/media/Files/IESO/Document-Library/conservation-reports/Non-Energy-Benefits-Study-Phase-II.ashx

reduced time and costs for building and equipment O&M. One-half (six of twelve) indicated that their customers experienced improved thermal comfort through reduced cold/heat-related stress. When asked to rank the importance of various NEBs to their customers, one-half of responding contractors (three of six) rated the time and costs for operations and maintenance as the most important elements. Figure 9-79 in Appendix H.2 provides all contractor feedback associated with the NEBs.

The Phase II study found that program participants placed significant value on NEBs. In many cases, NEBs' value exceeded the value of participants' energy savings. This also took place in PY2024, with most respondents reporting NEBs having an equal or higher value on an annual basis than their electricity bill or savings. Furthermore, when asked if they would be willing to pay for a certain benefit independently from the energy savings, nearly one-half (48%) were prepared to pay an equal or higher value per year than the amount of their electricity bill or savings. This highlights that factors beyond energy savings may motivate energy-efficiency participation or contribute to customers' positive experiences with such programs.

Table 7-2: Quantified NEBs ($/kWh), Phase II, PY2021, PY2022, PY2023, PY2024

NEB	PY2024 (Retrofit Only)	PY2023 (Retrofit Only)	PY2022 (Retrofit Only)	PY2021 (Retrofit Only)	Phase II (Retrofit & SBL)
Reduced building and equipment O&M	$0.03	$0.04	$0.05	$0.20	$0.08
Thermal comfort	$0.02	$0.02	$0.02	$0.07	$0.05
Improved indoor air quality	$0.01	$0.001	$0.01	$0.02	$0.007
Reduced spoilage	$0.005	$0.004	$0.0005	-	$0.0002

Table 7-3 presents combined NEB values for PY2021 through PY2024, based on the hybrid, minimum ($/kWh) valuation, as well as relative precision values at both 90% confidence and 85% confidence. Most NEBs achieved or exceeded 90% confidence at 10% relative precision or 85% confidence at 15% relative precision. However, reduced spoilage did not achieve either 90% confidence at 10% relative precision or 85% confidence at 15% relative precision given the small number of respondents associated with this NEB.

Table 7-3: Quantified NEBs ($/kWh) and Relative Precision, Combined PY2021-PY2024

NEB	PY2021-PY2024 NEBs ($/kWh) (Retrofit Only)	Relative Precision at 90% confidence	Relative Precision at 85% confidence
Reduced building and equipment O&M	$0.04	3.9%	3.4%
Thermal comfort	$0.02	7.6%	6.6%
Improved indoor air quality	$0.01	11.1%	9.8%
Reduced spoilage	$0.00	25.2%	22.0%

7.3 Job Impacts

7.3.1 Key Findings

The PY24 Jobs Impacts approach included the following key findings:

- The analysis used an input-output model, which estimated that the CF Retrofit will create 5,088 total jobs in Canada, 4,690 of which will be in Ontario.
- $1M in program investments resulted in the creation of 62.7 jobs, compared to 60.1 jobs in PY23.
- 3,170 out of 5,088 (62.3%) of jobs impacts were realized in the first year – 141 of the 3,170 first year jobs impacts were due to first year savings, while the remainder were due to demand for equipment and services.

7.3.2 Input Values

The evaluation team used the model to estimate the impacts from three economic shocks:

- Demand shock, representing the demand for energy-efficient products and services from the Retrofit program.
- Business reinvestment shock, representing increased business reinvestment due to bill savings (and net of project funding).
- Household expenditure shock, representing decreases in household spending on goods and services due to increased program funding for the Residential function.

Table 7-4 displays input values for the demand shock, representing products and services related to the Retrofit program. The team categorized each measure installed through the program to the StatCan IO Supply and Use Product Classifications (SUPCs).

Table 7-4: Summary of Input Values for Demand Shock

Category Description	Non-Labour *($ Thousands)*	Labour *($ Thousands)*	Total Demand Shock *($ Thousands)*
Lighting fixtures	79,600	44,653	124,253
Switchgear, switchboards, relays and industrial control apparatus	26,214	14,443	40,656
Electric light bulbs and tubes	18,827	10,792	29,618
Heating and cooling equipment (except household refrigerators and freezers)	16,668	8,975	25,644
Metalworking machinery and industrial moulds	8,399	4,522	12,921
Pumps and compressors (except fluid power)	6,909	3,724	10,633
Industrial and commercial fans, blowers and air purification equipment	3,805	2,049	5,854
Other miscellaneous manufactured products	329	177	507
Boilers, tanks and heavy gauge metal containers	183	99	282
Fabricated metal products, n.e.c.	27	15	42
Turbines, turbine generators, and turbine generator sets	18	10	28
Agricultural, lawn and garden machinery and equipment	3	2	5
Electric motors and generators	1	1	2
Subtotal	**160,984**	**89,461**	**250,445**
Office Administrative Services	-	-	13,813
Total			**264,257**

The business reinvestment shock was the second shock modelled using the IO Model. This shock represented the amount that businesses would reinvest and thus inject back into the economy. The amount was split over various industries to properly model the demand shock. Business reinvestment shock totaled $371.8 million over 23 different industries. Appendix F provides more detail on the business reinvestment shock, along with reinvestment values by industry.

The household expenditure shock provided the third model input.[14] This shock represented incremental increases in electricity bills to the residential sector due from funding the program. The approach assumed that IESO programs were funded by all customers in proportion to the overall consumption of electricity. Thus, the residential funding portion was 35% of the $81.1M program budget or $28.4M.

7.3.3 Model Results

Generally, StatCan I-O model impacts were generated separately for each shock and added together to calculate overall program job impacts. In the case of Retrofit, this meant three different sets of job impacts were combined into the overall job impacts. Table 7-5 shows total estimated job impacts by type, combining impacts from the demand, business reinvestment, and household expenditure shocks.

Table 7-5: Total Job Impacts by Type

Job Impact Type	FTE *(in person-years)* Ontario	FTE *(in person-years)* Total	Total Jobs *(in person-years)* Ontario	Total Jobs *(in person-years)* Total	Total Jobs per $1M Investment *(in person-years)*
Direct	2,658	2,713	3,042	3,100	38.2
Indirect	540	668	644	790	9.7
Induced	755	902	1,005	1,197	14.8
Total*	**3,952**	**4,283**	**4,690**	**5,088**	**62.7**

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

[14] Actually, the model was run with a normalized value of $1 million in extra household expenditures, and job results can be scaled by actual demand shock.

The majority of estimated total jobs (4,690 out of the 5,088) occurred in Ontario, with 3,042 of 3,100 direct jobs created across Canada created in Ontario. A slightly smaller proportion of indirect and induced jobs occurred in Ontario, with 644 of 790 indirect jobs and 1,005 of 1,197 induced jobs estimated to be created within the province. FTE estimates were slightly lower overall than total jobs, with a total of 3,952 FTEs (of all types) created in Ontario and 4,283 FTEs added nationwide. Similar to the total jobs estimates, most of the direct FTEs (2,658 of 2,713) were added in Ontario, with this number representing approximately 67% of the total FTEs added in Ontario and 62% of all FTEs created across Canada. In 2024, each $1M of program spending resulted in creating 62.7 total jobs, compared to 60.1 jobs per $1M in 2023.

Table 7-6 presents the jobs impacts realized over the 2021-2024 framework. Like with the individual years, impacts do not exist in perpetuity and are presented in person-years. Over the course of the four-year framework, the CDM Retrofit program created 12,580 total jobs, 11,349 of which were in Ontario. The program was responsible for the creation of 64.9 jobs per $1M of investment.

Table 7-6: PY2021-PY2024 Framework Total Job Impacts By Type

Job Impact Type	FTE *(in person-years)* Ontario	FTE *(in person-years)* Total	Total Jobs *(in person-years)* Ontario	Total Jobs *(in person-years)* Total	Total Jobs per $1M Investment *(in person-years)*
Direct	5,856	6,026	6,666	6,848	35.4
Indirect	1,840	2,291	2,1852	2,696	13.9
Induced	1,869	2,277	2.501	3,035	15.7
Total*	**9,566**	**10,594**	**11,349**	**12,580**	**64.9**

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

Table 7-7 contains the individual jobs per $1M investment estimates for each year within the framework. There were no discernible trends in the jobs created per $1M of investment over the four years of the CDM framework, although there may be some indication of stabilization in the last two years. The reasons behind the fluctuations from one year to the next were varied but generally were related to differences in the magnitude of a specific shock. For example, the large increase from 2021 to 2022 was due to an almost 4x increase in the overall amounts reinjected into the economy via the demand and reinvestment shocks; conversely, the decrease from 2022 to 2023 was potentially related to decreases in the amount of money that is circulated back into the economy through the reinvestment shock.

Table 7-7: 2021-2024 Jobs per $1M Investment

Job Impact Type	2021	2022	2023	2024
Direct	25.6	39.7	30.9	38.2
Indirect	12.4	20.9	15.3	9.7
Induced	13.0	21.1	13.9	14.8
Total	**51.0**	**81.6**	**60.1**	**62.7**

Appendix F provides a more detailed write up of model impacts, including a breakout of impacts by industry, impacts due to first-year savings, and verbatim responses from program contractors.

8 Key Findings and Recommendations

IESO responses to PY2024 EM&V Key Findings and Recommendations can be found in Appendix B.

Finding 1: Behavioral Energy Management Systems. Several projects in PY2023-24 reported energy savings for IoT-based behavioral energy management systems designed to provide building operators with operational insights to optimize buildings' performance. During the evaluation site visits, building managers reported that the service has been canceled due to perceived redundancy with existing Building Automation Systems (BAS). As a result, these systems were no longer in use, and the associated projects achieved no measurable savings.

Recommendation 1: Consider updating custom measure eligibility requirements to explicitly address behavioral or operational measures – such as IoT-based analytics platforms – by requiring evidence of continued use and integration into building management practices. Consider incorporating post-installation verification protocols to ensure the upgrades remain active and deliver actionable value to building operators, thereby supporting persistence of claimed savings. Additionally, explore a tiered or performance-based payment structure tied to verified annual savings over a defined post-installation period, to help ensure sustained savings and better alignment with actual performance.

Finding 2: Advanced Lighting Controls. Advanced lighting controls were found to be installed in hybrid lighting systems, where reported kW-controlled included a mix of pre-existing inefficient fixtures and LED fixtures. However, some of the legacy technologies, such as HPS, have limited or no dimming capability and cannot be controlled by advanced systems. Including these fixtures in the claimed controlled load overstates potential savings. During the evaluation, lighting systems that do not have dimming/control capabilities were excluded from savings calculations, resulting in lower realization rates for those projects.

Recommendation 2: Consider revising measure eligibility and savings calculations to ensure that only lighting systems capable of meaningful control (e.g. dimming, scheduling) are eligible for Advanced Lighting Controls incentives. Require documentation verifying that the controlled fixtures are compatible with advanced control strategies.

Finding 3: LED-to-LED Retrofits

Several projects in the PY2024 sample involved retrofits from existing LED lighting to more advanced LED systems that offer enhanced control capabilities, such as local dimming and scheduling. While these upgrades can offer incremental savings and operational flexibility, the Retrofit program Prescriptive stream does not include LED-to-LED measures or account for their control-based savings. As a result, savings assumptions are often misaligned with verified operations/savings, contributing to lower realization rates for these projects.

Recommendation 3: For future lighting programs, consider developing a dedicated track for LED-to-LED retrofits that incorporates control-based functionality as a key savings factor. This track can include updated baseline assumptions, revised savings algorithms, and potentially control-specific eligibility criteria or documentation requirements. By aligning measure design with evolving lighting retrofit market, the program can improve accuracy of savings estimates, while supporting customer needs.

Finding 4: Non-lighting equipment is typically, though not always, replaced pre-emptively. Delivery vendors reported that most of the non-lighting equipment installed through the program does not replace equipment that has already failed. Delivery vendors reported that some of the replaced equipment is nearing the end of its useful life while other equipment is replaced as part of preventative maintenance. Delivery vendors indicated that the desire to reduce carbon emissions and take advantage of program incentives also drives some customers to replace their equipment before failure. On average, participants indicated that their non-lighting upgrades most often replace inefficient but still functioning equipment (76%). Less often they replace nearly failed equipment (18%) or failed equipment (6%). Just over one-fourth (26%) of applicant representatives and contractors indicated that their clients' non-lighting upgrades were sometimes replaced on failure. When non-lighting equipment was upgraded for a reason other than failure, most applicant representatives and contractors said their clients completed those upgrades because they either wanted to avoid the need for replacement on failure (five respondents) or it was new equipment (four respondents). The benefits of early replacement to customers may include reduced downtime and unplanned disruptions, a higher variety of available equipment, more time to consider replacement options, and avoidance of expensive emergency repairs or replacements of older equipment. The primary benefits to the IESO include driving additional participation and reducing the potential for free-ridership associated with emergency replacements.

- **Recommendation 4:** Because some non-lighting equipment is not replaced pre-emptively, it is recommended that the program and its partners (e.g., delivery vendors, application representatives, and contractors) provide further education to customers about the benefits of early replacement and about the program incentives and services available to assist them in doing so. For example, this could include applicant representatives, contractors, and delivery vendors taking additional time to explain to participants the benefits of early replacement and including these explanations in various marketing materials. *Please refer to Progress Update 3 for related marketing and outreach suggestions.*

Finding 5: While prescriptive equipment typically takes less than one year to purchase and install, some opportunities exist to shorten the installation timeline. When asked to indicate how long prescriptive equipment typically takes to purchase and install through the program, delivery vendors reported that it can take anywhere from three months to one year; they noted that it can be equipment dependent, with options like chillers and motors sometimes taking longer. Nearly one-half (44%) of applicant representatives and contractors said it took two to six months, while close to one-fourth (24%) said it took one month or less. Others felt it could take longer, ranging from seven to nine months (10%), 10 to 12 months (12%), or more than 12 months (2%). When asked which, if any, types of prescriptive equipment take longer than 12 months to purchase and install, a small number of applicant representatives and contractors indicated that lighting could take 12-18 months to install (mentioned by 5% of respondents) and VFDs could take 12-24 months to install (mentioned by 3% of respondents). Nearly one-fifth of participants (17%) stated that waiting for the incentive was the most time intensive project component for their company to complete.

- **Recommendation 5:** While prescriptive equipment typically takes less than one year to purchase and install, it is recommended that the program and its partners identify opportunities to assist customers to more quickly complete the administrative aspects of their prescriptive projects that have historically taken longer (especially those associated with chillers, motors, lighting, and VFDs). Doing so may involve 1) IESO and delivery vendors ensuring that there are no common application-related roadblocks by reviewing the information requirements specific to these prescriptive equipment types and 2) delivery vendors, and applicant representatives providing additional application support especially for customers with larger prescriptive projects.

Finding 6: Responses were mixed about what the most time-intensive aspect of a project was to complete. IESO staff and delivery vendors reported that, beyond the application process, the most time-intensive aspects of a project can be post-project approval activities like recontacting customers for additional information, determining custom project eligibility because of the supplemental information and metering data required, developing the business case, and the delivery time for equipment. According to participants, installing equipment (21%) followed by waiting for the incentive (17%), scheduling installation (11%), and understanding what equipment was included in the program (8%) were the most time-intensive aspects. Close to one-third (30%) of participants said that the most time-intensive aspect of their project took them 1-5 months to complete. These participants mentioned LED fixtures (17%) and HVAC/compressors (10%) as equipment types that made their project time intensive. Obtaining buy-in from decision makers (32%) followed by installing the equipment (14%) and waiting for the incentive (14%) were the most time-intensive aspects according to application representatives and contractors.

Recommendation 6: Given that responses were mixed about what the most time-tensive aspect of the project typically is to complete, it is recommended that the program and its partners focus on the aspects that it can most directly control. This may include ensuring that:

- Customers have a thorough understanding of which measures are eligible for the program (either through IESO marketing or from discussions with contractors that IESO and its delivery vendors can encourage contractors to have with their customers),
- The steps required by the IESO for participants to develop business cases are as straightforward as possible,
- Contractors are encouraged by the delivery vendor or IESO's program guidance to schedule installations as quickly as possible,
- IESO optimizes the Retrofit portal so that the post-project approval process is as streamlined as possible (e.g. simplify and display the next steps, clearly identify the status of submissions, and update website security certificates to improve access to information), and
- The delivery vendors and IESO help ensure that incentives are distributed quickly so they reach participants promptly.

Finding 7: The Enhanced Local Initiatives Program may have helped some participants complete projects with larger scopes. Customers who participated in the Enhanced Local Initiatives Program (ELIP) indicated that if the incentive were reduced by one-third, one-half, or two-thirds they would have been increasingly less likely to complete their project with the same scope, timeline, and level of energy efficiency as they did with the full incentive. Two surveyed applicant representatives and contractors who had supported clients participating in the Enhanced Local Initiatives Program both indicated that their clients would have been unlikely to proceed with their projects if the incentive was reduced by any amount. IESO staff and delivery vendors were split on whether the Enhanced Local Initiatives Program led to increases in the scope, size, timing, or approval of projects. A review of the program data shows that the average per project savings between the Retrofit Program and the ELIP were relatively similar: 47,000 kWh/ Retrofit Non-Lighting project vs. 41,000 kWh/ ELIP Non-Lighting project. However, these similarities do not speak to whether the ELIP participants would have completed smaller projects in the absence of the larger incentive.

- **Recommendation 7:** While participant feedback suggests that ELIP may have helped some participants complete projects with larger scopes, it is recommended that the program more closely track whether it is influencing participants to complete projects, or larger projects, than they would have otherwise. For example, this could include 1) the IESO and/or evaluators conducting further analysis to more closely compare whether ELIP provided incremental benefits beyond the Retrofit Program and 2) evaluators expanding on relevant survey questions to draw further comparisons between ELIP and the Retrofit program.

9 Progress Updates on Previous Recommendations

This section provides progress updates on common process evaluation research topics. These topics have typically been included as Key Findings and Recommendations in previous year's evaluation reports. As monitoring these topics may be of continued interest, they are included here for additional consideration.

Impact Progress Update 1: Deemed Conservation Case Wattages 1' x 4' LED. Key Finding 2 in the PY2023 report reviewed deemed conservation-case wattage values for all sampled 1' x 4' LED troffer/4' LED linear ambient fixture (>= 1500 Lumens) where deemed conservation case wattages were 0.0386 kW and verified conservation case wattages were 0.035 kW. This was reviewed again with PY2024 data with similar results. Table 9-1 below presents the average deemed and verified values for conservation case wattages for the "1' x 4' LED troffer/4' LED linear ambient fixture (>= 1500 Lumens)" in the PY2024 and PY2021-PY2024 rolling population.

Table 9-1: Comparison of Conservation Case Wattages for 1' x 4' LED Troffer

Conservation Measure	PY24 Avg Deemed Conservation kW	PY24 Avg Verified Conservation kW	PY23 Sample Precision	PY21 to 24 Avg Verified Conservation kW	PY21 to 24 Sample Precision
1' x 4' LED troffer / 4' LED linear ambient fixture (>=1500 Lumens)	0.0386	0.0352	7.71%	0.0356	4.95%

Impact Progress Update 2: Deemed Baseline Wattages 750-watt HID lamp/T8 HO. The prescriptive lighting stratum contributes 47% (154,968 MWh) and 54% (24,472 kW) of the gross reported energy and demand savings for the entire PY2024 Retrofit program. Out of the 154,968 MWh gross reported population energy savings, 86,621 MWh (56%) consisted of projects that had a reported base-case measure of "Average 750-watt HID lamp/T8 HO". During the evaluation, 66 Prescriptive Lighting projects were randomly sampled, which contributed to 50,215 MWh of gross sample reported energy savings. Of these 66 projects, 38 consisted of the reported "Average 750-watt HID lamp/T8 HO" base-case measure. These 38 projects contributed to 16,549 MWh (32.9%) of sampled Prescriptive Lighting reported energy savings. Through site visits and desk reviews, the evaluation team determined that most of these projects consisted of a mixture of lower HID lamp wattages or T5 High Output (HO) lamps instead of the reported "Average 750-watt HID lamp/T8 HO."

Similar to PY2023 results, the average verified base case wattage was lower than the reported base case wattage, resulting in a PY2024 measure realization rate of 76% (12,580

MWh gross verified savings) for this base-case measure. There was an improvement in measure realization rate in PY2024 compared to PY2023, however, due to the prescriptive lighting stratum's significant contribution to the overall program's reported energy and demand savings, this strongly impacted the overall Retrofit program's realization rate.

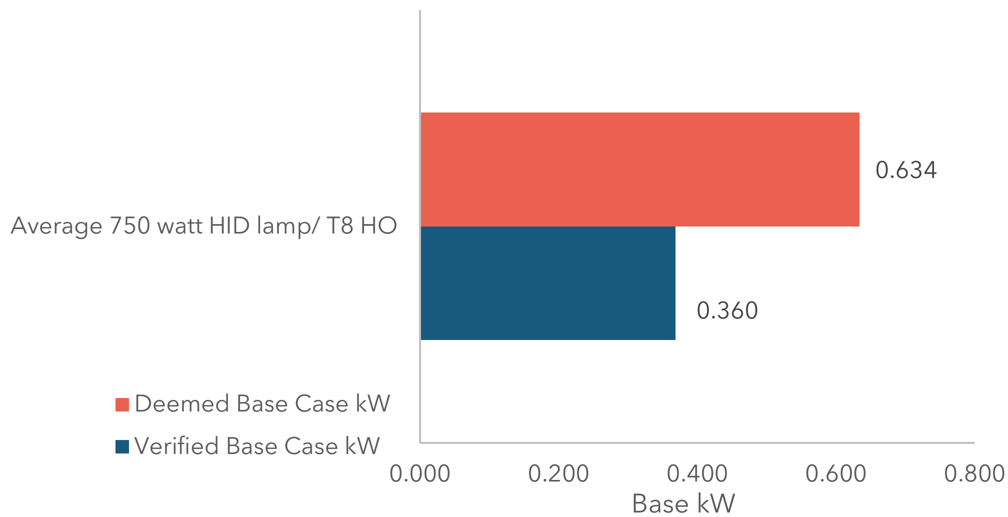
Table 9-2 shows the year-over-year 750-watt HID lamp/ T8 HO base case measure contributions. In PY2022, prescriptive lighting sampled projects which consisted of the reported "Average 750-watt HID lamp/T8 HO" base-case measure contributed to 12,316 MWh and resulted in a measure realization rate of 83.38% (10,269 MWh gross verified savings). It was determined that a higher average verified HOU of nearly 20% for PY2022 compared to PY2023 offset the more significant negative impact on the prescriptive lighting stratum and overall program realization rate in that program year.

Table 9-2: 750-watt HID lamp/ T8 HO Base Case Measure Contributions

Average 750 watt HID lamp/ T8 HO	Sample Reported Savings (MWh)	Sample Verified Savings (MWh)	Measure Realization Rate	Percentage Measure Contribution – Sample	Percentage Measure Contribution – Population
PY2021	187	302	161.5%	1.0%	2.9%
PY2022	12,316	10,269	83.4%	59.5%	44.1%
PY2023	22,134	11,175	50.5%	62.3%	54.9%
PY2024	16,549	12,580	76.0%	32.9%	55.8%

In PY2023, the evaluation team compared average verified base case wattage estimates from the PY2023 impact sample projects to Measure and Assumptions List (MAL) deemed values for the "Average 750-watt HID lamp/ T8 HO" measure and determined that the average verified base case wattage was found to be 0.348 kW compared to the MAL deemed values of 0.634 kW and resulted in a low precision. In PY2024, a similar exercise was completed, and results were nearly identical with an average verified base case wattage of 0.360 kW compared to the MAL deemed values of 0.634 kW (Figure 9-1):

Figure 9-1: Deemed vs Verified Base Case kW



Note that IESO has updated base case deemed wattages to address this discrepancy which were implemented for the 2025 program. The evaluation team will continue to monitor and gather additional data over the coming years and provide a recommendation if future results vary from the deemed values.

Impact Progress Update 3: Deemed Conservation Case Wattages 8' LED

The evaluation team reviewed deemed conservation-case wattage values for all sampled lighting measures, comparing average verified conservation-case wattage estimates from impact sample projects to MAL-deemed values. Two conservation cases that provided samples and low precision sufficient to support a finding:

- 8' LED linear ambient fixture (>= 9000 Lumens)
- '1x 4' LED troffer/4' LED linear ambient fixture (>= 1500 Lumens)

This finding below highlights the 8' LED linear ambient fixture (>= 9000 Lumens) as the findings related to the 1' x 4' LED troffer/4' LED linear ambient fixture (>= 1500 Lumens) were addressed in the PY2023 evaluation cycle and discussed in the Progress Updates section below. Additionally, the evaluation team compared average verified conservation case wattage estimates incorporating a rolling population of PY2021-PY2024 projects for the 8' LED linear ambient fixture (>= 9000 Lumens).

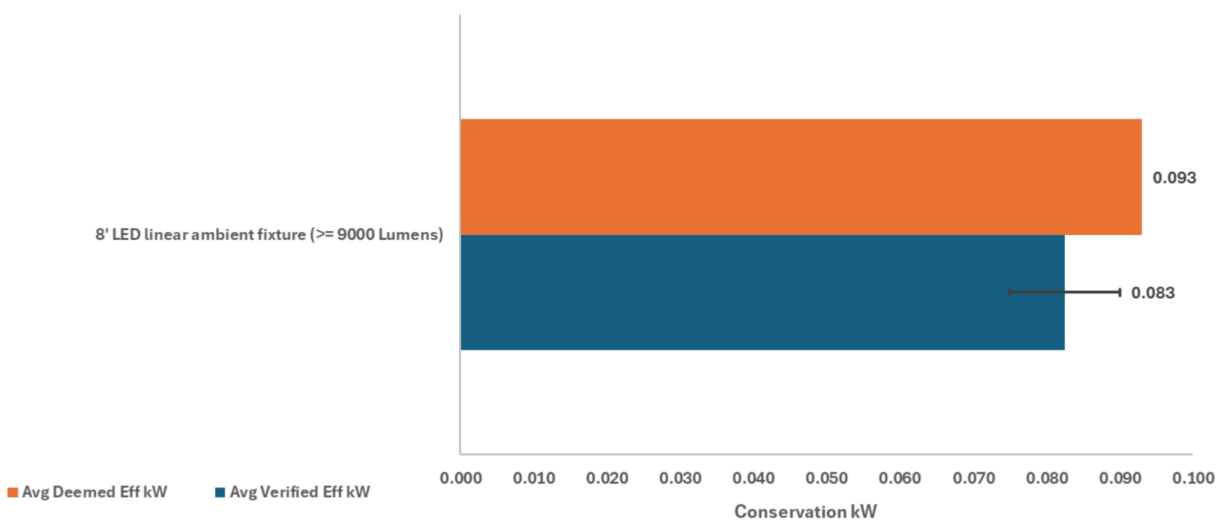
Table 9-3 presents the average deemed and verified values for conservation case wattages for the 8' LED linear ambient fixture (>= 9000 Lumens) in PY2024 and PY2021-PY2024 rolling population.

Table 9-3: Comparison of Conservation Case Wattages by Measure Type

Conservation Measure	PY24 Avg Deemed Conservation kW	PY24 Avg Verified Conservation kW	PY24 Sample Precision	PY21 to 24 Avg Verified Conservation kW	PY21 to 24 Sample Precision
8' LED linear ambient fixture (>= 9000 Lumens)	0.093	0.083	9.15%	0.083	7.14%

Figure 9-2 displays the error bounds of average verified wattage estimates for the rolling population of PY2021 to PY2024 projects for 8' LED linear ambient fixture (>= 9000 Lumens).

Figure 9-2: Deemed vs. Verified Conservation Case kW



While the evaluation results presented in the table above present verified parameters with strong precision, they are very close to the deemed conservation case value and fell just outside the error bounds. Note that IESO has updated conservation case deemed wattages to address this discrepancy which were implemented for the 2025 program. As such, the evaluation team will continue to monitor and gather additional data over the coming years for the 8' LED linear ambient fixture (>= 9000 Lumens) and provide a recommendation if future results vary from the deemed values.

Progress Update 4: While most participants report being able to install all the equipment of interest to them, incentives levels limit the scope of upgrades completed for some customers. One-fifth (20%) of participants decided not to install all the energy-efficient equipment that was initially of interest to them. This was a slight improvement compared to PY2023 where over one-fourth (27%) of participants said the same. These participants most frequently decided not to install lighting (18%), lighting controls (11%), and building automation systems and energy management systems (9%). Lack of resources or budget (38%) and insufficient program incentives (21%) were some of the main reasons why participants did not install this equipment. Similar to PY2023, over one-tenth (16%) of applicant representatives and contractors indicated there were equipment, such as lighting and fans, that customers were initially interested in but often did not install. They most frequently reported the decision not to install this equipment was due to the incentive levels being too low (42%). IESO staff and delivery vendor estimates of what percentage of project costs are covered by program incentives ranged between 10-40%. They noted that projects rarely reach the 50% maximum project cost cap. Most believed the incentives were generally adequate to drive participation, though one delivery vendor reported that they were not keeping up with the cost of doing business. On average, participants reported that one-fifth (20%) of their non-lighting project costs were covered by the Prescriptive stream incentives, about one-fifth (19%) were covered by the Custom stream incentives, and over two-fifths (43%) were covered by the Enhanced Local Initiatives Program incentives. Most applicant representatives and contractors reported that it was usual for ten percent or less of their non-lighting project costs to be covered by the program. When asked if these percentages were sufficient to encourage participation, responses varied. Cooling equipment, chillers, fan motors, and other motors were commonly mentioned by applicant representatives and contractors as having the lowest average program project cost coverage.

- **Improvement Opportunity 4:** Continue to monitor incentive levels, rising costs, and the average percentage of project costs covered by the program for key non-lighting equipment of interest to ensure they are not leading to significant constraints to the scope of customer projects.

Progress Update 5: Continued opportunities exist to expand program marketing and outreach. IESO staff indicated that there was more marketing done for the Retrofit Program in PY2024 than in previous years, with IESO primarily continuing to focus on its digital-first approach and delivery vendors assisting with material development (such as sell sheets), attending in-person events, and reaching out to their networks (e.g., to chambers of commerce, contractor networks, business associations, local distribution companies (LDCs). As in previous years, over one-half (56%) of applicant representatives and contractors said that the primary way their customers learned about the program was from their companies contacting them directly and they provided the lowest satisfaction rating to program marketing and outreach (34% with a rating of four or five on a scale of one to five, where one indicates “not satisfied at all” and five indicates “completely satisfied”). Close to one-third (30%) of application representatives and contractors recommended improving and increasing IESO’s marketing. Similarly, IESO staff and delivery vendors recommended increased marketing, especially in northern Ontario where customer awareness is especially low. Other marketing-related suggestions from IESO staff and delivery included increasing marketing budgets to allow delivery vendors to attend more conferences and trade shows, increasing usage of paid on-line advertising and of social media, offering additional IESO-led webinars to better communicate the program rules and processes, developing more province-wide sell sheets and case studies, collaborating with LDCs where feasible, and engaging in more cross-program promotions.

- **Improvement Opportunity 5a:** Consider increasing the variety and frequency of marketing efforts across different mediums. This could include paid digital advertisements, social media, conferences, trade shows, additional webinars, province-wide sell sheets, additional case studies, and collateral to support customers in their business case development (e.g. providing information on estimating payback periods, initial savings, lifetime savings, carbon reductions),.
- **Improvement Opportunity 5b:** Consider additional opportunities to collaborate with LDCs to promote the program where feasible, especially in Northern Ontario where awareness is lower.

Progress Update 6. Additional IESO-supported training and education could make applicant representatives and contractors even better resources for participants. Nearly one-fourth (24%) of applicant representatives and contractors reported not receiving any training or education to support their work with the Retrofit Program. Of those (76%) that received training and education, over three-fifths (68%) said they were “completely satisfied” or “somewhat satisfied” with the program training and education (which is an improvement from PY2023, where only 44% were satisfied with this aspect). They often suggested application process training or support (32%), training on the offerings associated with the program (32%), and training on the program rules (24%). One IESO staff member recommended providing heat pump installation training to contractors and another recommended offering additional informational webinars.

- **Improvement Opportunity 6**: Consider increasing the variety and frequency of application representative and contractor training and education. Focusing training and education primarily on the application process, on offerings associated with the program, and on the program, rules is recommended, though offering specific training on equipment installation procedures (e.g., heat pumps) is important to consider offering as well.

Progress Update 7. Additional equipment and services were suggested to help increase non-lighting applications. Applicant representatives and contractors provided numerous suggestions for additional equipment and services, most commonly mentioning exterior lighting (41%). They also mentioned building automation systems, fans, heat pumps, and the ability to install more than one smart thermostat (mentioned by 9% of responses each). One-fourth (25%) of participants provided suggestions for additional equipment and services, most commonly mentioning HVAC equipment (42%), expanded lighting offerings (11%), heat pumps (9%), and solar PV/wind (6%). IESO and vendor staff reported that the equipment and services offered generally met customer needs, especially given the flexibility offered by the custom stream. IESO and delivery vendor staff suggested including offerings for data centers; battery storage; larger sized variable frequency drives (VFDs) and booster pumps; coil cleaning for heat pumps; and lighting controls.

- **Improvement Opportunity 7:** Explore the feasibility of incentivizing additional equipment that align with program goals and cost-effectiveness targets (e.g., building automation systems, additional types of fans and heat pumps, the ability to install more than one smart thermostat, additional HVAC equipment, and solar PV/wind).

Progress Update 8: Greenhouse offerings are generally meeting customer needs, though some suggestions were provided for consideration. IESO staff and delivery vendors generally agreed that participants with greenhouse facilities were well-served by the program's related offerings. Suggestions for additional energy-efficient equipment to consider for participants with greenhouse facilities varied and included strip curtains (mentioned by one contractor and one participant), fans (mentioned by one participant), and power storage equipment (mentioned by one participant). Surveyed customers with greenhouse projects (n=14) identified several barriers that may be preventing horticultural businesses like theirs from participating in the program. Responses were mixed, with the most commonly cited barriers including the large scale of horticulture projects (4 respondents), financial constraints (3 respondents), and the timing of when businesses make budgeting decisions (2 respondents).

- **Improvement Opportunity 8a:** Explore the feasibility of incentivizing additional equipment recommended by interviewees and survey respondents for customers with greenhouse projects that align with program goals and cost-effectiveness targets (e.g., strip curtains, fans, power storage equipment).
- **Improvement Opportunity 8b:** Consider opportunities to further address participation barriers to completing greenhouse projects through the program. This could be done through reassuring customers that the program is equipped to provide support regardless of the scale of their projects, through revisiting incentives

to ensure their continued relevance, and by better attuned to the timing of when horticultural businesses make budgeting decisions.

Appendix A 2021-2024 CDM Framework Summary

Evaluated Year	Verified Year	2026 Net Energy Savings (kWh)	2026 Net Peak Demand Savings (kW)
PY2021	PY2021	63,754,318	11,784
PY2022	PY2022	264,971,814	29,398
PY2023	PY2023	274,712,461	25,865
PY2024	PY2024	301,842,752	48,079
TOTAL		**905,281,345**	**115,126**

Appendix B PY2024 EM&V Key Findings and Recommendations with IESO Response

NO.	KEY FINDINGS	EM&V RECOMMENDATIONS	IMPACTS	IESO RESPONSES
1	**Several projects in PY2023-24 reported energy savings for IoT-based behavioral energy management systems designed to provide building operators with operational insights to optimize buildings' performance.** During the evaluation site visits, building managers reported that the service has been canceled due to perceived redundancy with existing Building Automation Systems (BAS). As a result, these systems were no longer in use, and the associated projects achieved no measurable savings.	Consider updating custom measure eligibility requirements to explicitly address behavioral or operational measures – such as IoT-based analytics platforms – by requiring evidence of continued use and integration into building management practices. Consider incorporating post-installation verification protocols to ensure the upgrades remain active and deliver actionable value to building operators, thereby supporting persistence of claimed savings. Additionally, explore a tiered or performance-based payment structure tied to verified annual savings over a defined post-installation period, to help ensure sustained savings and better alignment with actual performance.	Medium	The IESO will assess and consider opportunities to improve the persistence of claimed electricity savings for operational and behavioral measures, including updates to the custom measure eligibility requirements and additional post-installation verification protocols. The Retrofit program currently provides a one-time incentive for the installation of energy-efficiency upgrades projects that meet the program requirements. The IESO will explore other incentive structures and potential programs that improve the persistence and alignment of claimed electricity savings with actual performance for operational and behavioral measures.
2	**Network and advanced lighting controls were found to be installed in hybrid lighting systems, where reported kW-controlled included a mix of pre-existing inefficient fixtures and LED fixtures.** However, some of the legacy technologies, such as HPS, have limited or no dimming capability and cannot be controlled by advanced systems. Including these fixtures in the claimed controlled load overstates potential savings. During the evaluation, lighting systems that do not have dimming/control capabilities were excluded from savings calculations, resulting in lower realization rates for those projects.	Consider revising measure eligibility and savings calculations to ensure that only lighting systems capable of meaningful control (e.g. dimming, scheduling) are eligible for Advanced Lighting Controls incentives. Require documentation verifying that the controlled fixtures are compatible with advanced control strategies.	Low	The IESO will review and consider updates to the Prescriptive advanced horticultural lighting control and Prescriptive network lighting control measures, including requirements for additional documentation, to confirm that they are compatible with and control dimmable lighting fixtures such that upgrades align with the assumed electricity savings.

NO.	KEY FINDINGS	EM&V RECOMMENDATIONS	IMPACTS	IESO RESPONSES
3	**Several projects in the PY2024 sample involved retrofits from existing LED lighting to more advanced LED systems that offer enhanced control capabilities, such as local dimming and scheduling.** While these upgrades can offer incremental savings and operational flexibility, the Retrofit program Prescriptive track does not include LED-to-LED measures or account for their control-based savings. As a result, savings assumptions are often misaligned with verified operations/savings, contributing to lower realization rates for these projects.	For future lighting programs, consider developing a dedicated track for LED-to-LED retrofits that incorporates control-based functionality as a key savings factor. This track can include updated baseline assumptions, revised savings algorithms, and potentially control-specific eligibility criteria or documentation requirements. By aligning measure design with evolving lighting retrofit market, the program can improve accuracy of savings estimates, while supporting customer needs.	Medium	The IESO will review and consider program offerings for LED-to-LED replacement which include control capabilities that provide cost-effective electricity savings.
4	**Non-lighting equipment is typically, though not always, replaced pre-emptively.** Delivery vendors reported that most of the non-lighting equipment installed through the program does not replace equipment that has already failed. Delivery vendors reported that some of the replaced equipment is nearing the end of its useful life while other equipment is replaced as part of preventive maintenance. Delivery vendors indicated that the desire to reduce carbon emissions and take advantage of program incentives also drives some customers to replace their equipment before failure. The primary benefits of early replacement to the IESO include driving additional participation and reducing the potential for free-ridership associated with emergency replacements.	Because some non-lighting equipment is not replaced pre-emptively, it is recommended that the program and its partners (e.g., delivery vendors, application representatives, and contractors) provide further education to customers about the benefits of early replacement and about the program incentives and services available to them to assist them in doing so. For example, this could include applicant representatives, contractors, and delivery vendors taking additional time to explain to participants the benefits of early replacement and including these explanations in various marketing materials.	Medium	The IESO will work with its delivery partners to provide further education about the benefits of early replacements and consider opportunities to communicate these benefits in program materials.

NO.	KEY FINDINGS	EM&V RECOMMENDATIONS	IMPACTS	IESO RESPONSES
5	**While prescriptive equipment typically takes less than one year to purchase and install, some opportunities exist to shorten the installation timeline.** When asked to indicate how long prescriptive equipment typically takes to purchase and install through the program, delivery vendors reported that it can take anywhere from three months to one year; they noted that it can be equipment dependent, with options like chillers and motors sometimes taking longer.	While prescriptive equipment typically takes less than one year to purchase and install, it is recommended that the program and its partners identify opportunities to assist customers to more quickly complete the administrative aspects of their prescriptive projects that have historically taken longer (especially those associated with chillers, motors, lighting, and VFDs). Doing so may involve 1) IESO and delivery vendors ensuring that there are no common application-related roadblocks by reviewing the information requirements specific to these prescriptive equipment types, and 2) delivery vendors, and applicant representatives providing additional application support especially for customers with larger prescriptive projects.	Low	The IESO's delivery vendors offer application support, which include the option to prepare an application for applicants on their behalf as an applicant representative. The IESO publishes application resources, including tips for a smooth application and application checklists to support applicants on the Save on Energy website to support applicants with applying and receive approval for an incentive for their project. The IESO will continue to seek and implement opportunities to provide greater application support based on program feedback.

NO.	KEY FINDINGS	EM&V RECOMMENDATIONS	IMPACTS	IESO RESPONSES
6	**Responses were mixed about what the most time-intensive aspect of a project was to complete.** IESO staff and delivery vendors reported that, beyond the application process, the most time-intensive aspects of a project can be post-project approval activities like recontacting customers for additional information, determining custom project eligibility because of the supplemental information and metering data required, developing the business case, and the delivery time for equipment.	Given that responses were mixed about what the most time-tensive aspect of the project typically is to complete, it is recommended that the program and its partners focus on the aspects that it can most directly control. This may include ensuring that: • Customers have a thorough understanding of which measures are eligible for the program (either through IESO marketing or from discussions with contractors that IESO and its delivery vendors can encourage contractors to have with their customers), • That the steps required by the IESO for participants to develop business cases are as straightforward as possible , • That contractors are encouraged by the delivery vendor or IESO's program guidance to schedule installations as quickly as possible, • That IESO optimizes the Retrofit portal to ensure the post-project approval process is as streamlined as possible (e.g. simplify and display the next steps, clearly identify the status of submissions, and update website security certificates to improve access to information), and • The delivery vendors and IESO help ensure that incentives are distributed quickly so they reach participants promptly.	Low	The IESO will review and consider additional opportunities that are within its control to support applicants to reduce time-intensive aspects of applying to the program.

NO.	KEY FINDINGS	EM&V RECOMMENDATIONS	IMPACTS	IESO RESPONSES
7	**The Enhanced Local Initiatives Program may have helped some participants complete projects with larger scopes.** Customers who participated in the Enhanced Local Initiatives Program (ELIP) indicated that if the incentive were reduced by one-third, one-half, or two-thirds they would have been increasingly less likely to complete their project with the same scope, timeline, and level of energy efficiency as they did with the full incentive. Two surveyed applicant representatives and contractors who had supported clients participating in the Enhanced Local Initiatives Program both indicated that their clients would have been unlikely to proceed with their projects if the incentive was reduced by any amount. IESO staff and delivery vendors were split on whether the Enhanced Local Initiatives Program led to increases in the scope, size, timing, or approval of projects. A review of the program data shows that the average per project savings between the Retrofit Program and the ELIP were relatively similar: 47,000 kWh/ Retrofit Non-Lighting project vs. 41,000 kWh/ ELIP Non-Lighting project. However, these similarities do not speak to whether the ELIP participants would have completed smaller projects in the absence of the larger incentive.	While participant feedback suggests that ELIP may have led to some additional projects and helped some participants complete projects with larger scopes, it is recommended that the program more closely track whether it is influencing participants to complete projects, or larger projects, than they would have otherwise. For example, this could include 1) the IESO and/or evaluators conducting further analysis to more closely compare whether ELIP provided incremental benefits beyond the Retrofit Program and 2) evaluators expanding on relevant survey questions to draw further comparisons between ELIP and the Retrofit program	Medium	The IESO will work with its evaluators to consider opportunities to assess the incremental benefits of incentive adders in serving regionally constrained areas of Ontario.

Appendix C 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.

The evaluation team developed an effective questionnaire to assess FR and SO, an approach 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

$$\boldsymbol{NTG} = \mathbf{100}\% - \boldsymbol{FR} + \boldsymbol{SO}$$

Where FR is free-ridership and SO is spillover.

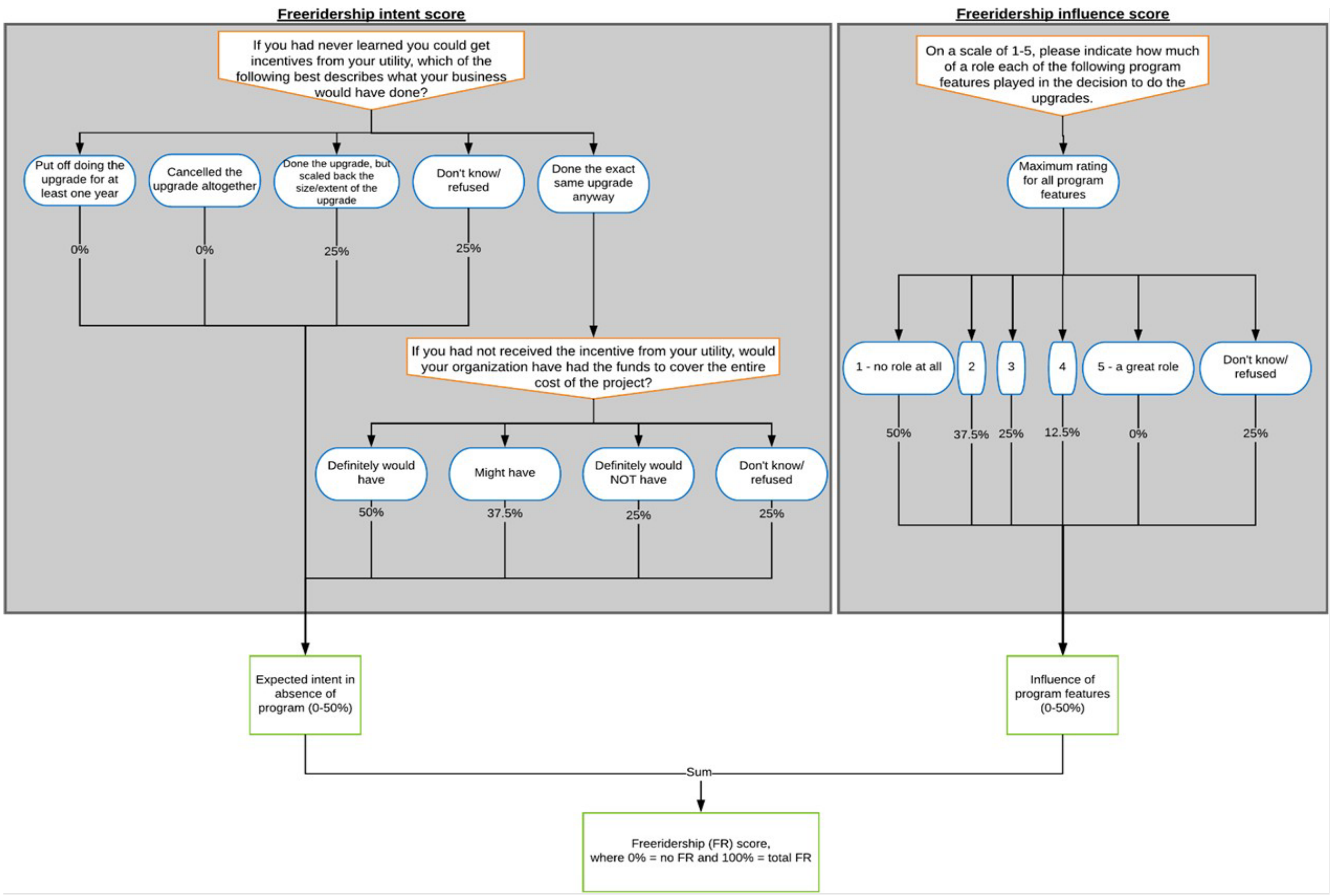
C.1 Free-Ridership Methodology

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 produced scores ranging from 0 to 50. The two components were summed to produce a total FR score ranging from 0 (not a free-rider) to 100 (complete free-rider). The total score was interpreted as a percentage (0% to 100%) to calculate the mean FR level for a given program. Figure 9-3 illustrates the FR methodology.

Figure 9-3: Free-Ridership Methodology



INTENTION COMPONENT

The FR score's intention component asked participants how the evaluated project would have differed in the program's absence. Two key questions determined the intention score:

> 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 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 received 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 the respondent answered 3 (would have done the project but scaled back the size or extent) or stated did not know or refused the question, the respondent received an FR intention score of 25% (associated with moderate FR). If the respondent answered 4 (would have done the exact same project anyway), they were asked the second question before an FR intention score could be assigned.

The second question asked participants whether 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 received a score of 50% (associated with high FR). If the respondent answered 2 (might have had the funds), they received 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 received an FR intention score of 25% (associated with moderate FR).

The bullet points below display the same FR intention scoring approach as a list. As noted, an intention score was calculated for each respondent, ranging from 0% to 50%, based on the respondent's report of how the project would have changed in the program's absence:

- 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 asked each respondent to rate how much of a role various potential program-related influence factors had on their decision to do the upgrades in question. Influence was reported using a scale from one to five, where one indicates it was "not at all influential" and five indicates it was "extremely influential." The potential influence included the following:

- Availability of the incentives
- Information or recommendations provided to you by a Save on Energy 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, 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 (e.g., email, direct mail)
- Information or resources from the IESO's 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 was set equal to the maximum influence rating a respondent reports across the various influence factors. For example, suppose the respondent provided a score of 5 (extremely influential) to at least one of the influence factors. In that case, the program was considered to have been extremely influential in their decisions to do upgrades, and the influence component of FR was 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 following bullet points display the same FR Influence scoring approach in a list form. As discussed, for each project, a program influence score was calculated, ranging from 0% to 50%, based on the highest influence rating given among potential influence factors:

- Maximum rating of 1 (no influencing factor was influential 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 was extremely influential) = 0%
- Respondent does not know how much influence any factor had = 25%

Intention and program influence scores were summed for each project to generate an FR score ranging from 0 to 100. The scores were 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.

C.2 Spillover Methodology

To assess the SO, respondents were asked about installing energy-efficient equipment or services performed without a program incentive following their participation in the program. Equipment-specific details assessed follow:

- ENERGY STAR Appliance: type and quantity
- Fan: type, size, quantity
- HVAC: air conditioner replacement, above code minimum: tonnage and quantity
- Lighting: type, quantity, and location
- Lighting–controls: type of control
- Motor/Pump Upgrade: end-use, horsepower, efficiency, and quantity
- Motor/Pump Drive Improvement (VSD and Sync Belt): type, horsepower, and quantity
- Others (identified by the respondent): description of upgrade, end use, size, efficiency, HOU, and quantity

For each equipment type the respondent reported installing without a program incentive, the survey instrument asked about the extent of influence that earlier involvement in the program had on their decisions to carry out upgrades. Influence was reported using a scale from one to five, where one indicated it was "not at all influential" and five indicated it was" extremely influential." If the influence score was between 3 and 5 for a particular equipment type, the survey instrument solicited details about 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:

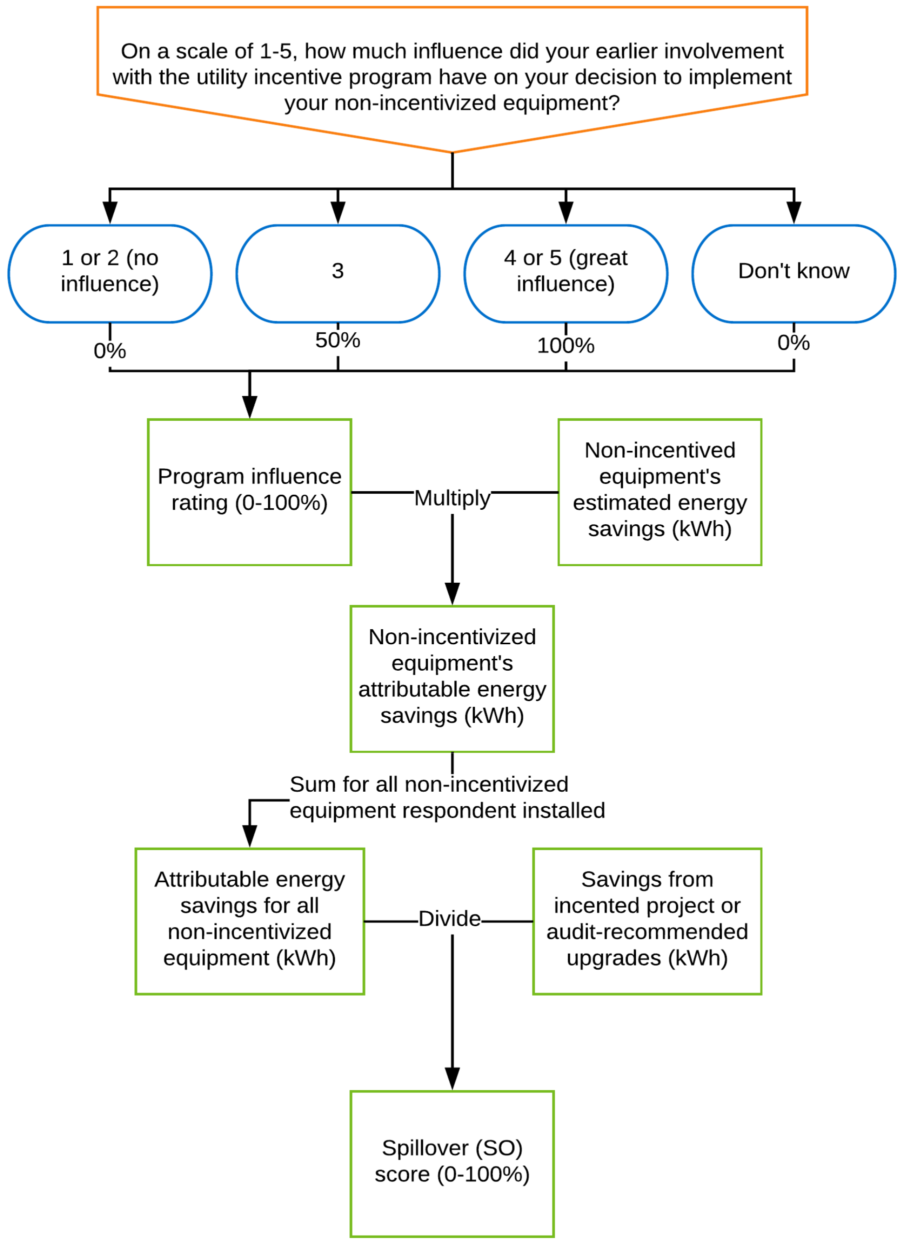
- Maximum rating of 1 or 2 (no influence) = 0%
- Maximum rating of 3 = 50%
- Maximum rating of 4 or 5 (great influence) = 100%
- Respondent does not know how much influence any factor had = 0%

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 9-4 illustrates the SO methodology.

Figure 9-4: Spillover Methodology



C.3 Identification of Project or Upgrade for NTG Assessment

Participants were asked to consider all their projects completed through the Retrofit Program during the program year. This approach allowed for applying the respondent's

NTG value across all the projects they completed during the program year rather than a single one.

C.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 was an employee of the company. If the person was not an employee of the company, they were asked to forward the survey web link to someone at the company who is able to respond.
- Whether the respondent had primary or shared responsibility for the budget or expenditure decisions for program-incentivized work completed at their company.
- The respondent's job title.
- When the respondent first learned about program incentives relative to the upgrade in question (i.e., 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 work was started or completed, if applicable.
- How the respondent learned about the program.

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

C.5 Net-to-Gross Survey Implementation

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

For each phone survey, 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 their organizations. If the contact was not involved in decisions about upgrading equipment, the interviewer asked to be transferred to or to receive 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 D Detailed Process Evaluation Methodology

This appendix provides additional details about the process evaluation methodology. Section 3.2 summarizes the methodology.

D.1 Research Question Development

Table C-1 provides a list of key research questions and data sources used to investigate each of these. The research questions were developed at the beginning of the PY2024 evaluation period, between September and October 2024. They were written in consultation with the IESO program and the IESO EM&V staff and were finalized after reviewing the timing of related survey instruments to ensure respondent fatigue would be minimized. After the research questions were finalized, they were adapted for inclusion in the interview guides and survey instruments, which were, in turn, reviewed and approved by the IESO EM&V and program staff (refer to Appendix D.1 for more information on the interview and survey methodology).

Table C-1: Retrofit Program Process Evaluation Research Questions and Data Sources

Research Questions	Document and Program Records Review	IESO & Delivery Vendor Staff Interviews	Participant Surveys	Applicant Representative & Contractor Surveys
Is sufficient data being captured to effectively verify recommendations and savings?	✓	✓		
What are the goals and objectives of the program, and how well is the program doing in terms of meeting them?	✓	✓		
What program processes are followed by the IESO and program vendors? What areas of process improvement may exist?		✓		
What strategies implemented by the IESO were effective in terms of driving participation, increasing program awareness, and avoiding free-ridership?		✓	✓	✓
What program marketing and outreach occurred in support of the program? How did participants become aware of the program? What specific marketing or outreach activities show the most opportunity?		✓	✓	✓

Research Questions	Document and Program Records Review	IESO & Delivery Vendor Staff Interviews	Participant Surveys	Applicant Representative & Contractor Surveys
What were the experiences of applicant representatives and contractors in participating in the program?				✓
What are the program strengths, barriers, and areas of improvement?		✓	✓	✓
Do the current range of program equipment/services meet customer needs? Were participants able to install all equipment models of interest to them? What suggestions exist for additional equipment/services?		✓	✓	✓
What percentage of non-lighting project costs were covered by the incentive? Does this percentage seem sufficient to encourage participation?		✓	✓	✓
If customers were initially interested in energy-efficient equipment but ultimately decided NOT to install it at the time they completed their Save on Energy Retrofit project, what were their reasons for not doing so?			✓	✓
Which additional non-DER horticultural measures and incentives could be added to the program in the future?		✓	✓	✓
How many non-lighting measures are preemptive? Is it based on when things breakdown or based on budgets?		✓	✓	✓
Is consumer-to-consumer outreach and marketing an effective strategy used by other programs?			✓	
What impact did the adder have on the project? Scope, size, timing, approval, all of the above, none of the above?		✓	✓	
To what extent did the top-up incentive motivate customers to participate in other IESO energy efficiency programs?		✓	✓	✓
How long do Prescriptive measures offered through the program take to purchase and install? Are there measures offered through the program that typically take longer than 1-year to purchase and install, and if so, how long do they take (assuming no supply chain delays)? Are there any measures where there are enduring supply chain delays impacting project completion timelines?		✓		✓
Outside of the application process, which part of implementing a project is the most time intensive for businesses, starting from building a business case to project completion? How much time does that take? Does this vary by which measure types are installed?		✓	✓	✓

D.2 In-Depth Interview and Survey Methodology

The process evaluation collected primary data from key program actors, including IESO staff, program delivery vendor staff, applicant representatives, contractors, and participants, as shown in Table C-2. Data were collected using different methods, including web surveys, telephone surveys, or telephone based IDIs, depending on what was most suitable for a particular respondent group. When collected and synthesized, these data provide a comprehensive understanding of the program processes.

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

Table C-2: Process Evaluation Primary Data Sources

Respondent Type	Methodology	Population	Completed	Response Rate	90% CI Error Margin
IESO Staff	Phone IDIs	4	4	100%	0%
Program Delivery Vendor Staff	Phone IDIs	3	3	100%	0%
Applicant Representatives and Contractors	Web Survey	300	50	17%	10.7%
Participants[15]	Web and Phone Survey	1,516	255[16]	17%	10.4%

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

[15] This includes participants from the Prescriptive stream (n=139), Custom stream (n=106), Greenhouse stream (n=14), and the Local Initiative (n=14). Note that the total number of participants by stream is greater than the total number of participants overall since some participants completed projects in multiple streams.

[16] The NTG evaluation included more respondents (n=312) than the process evaluation (n=255) as 57 respondents did not fully answer the process evaluation survey questions.

IESO STAFF AND PROGRAM DELIVERY VENDOR STAFF INTERVIEWS

IDIs were completed with four members of IESO's staff and three staff from the program delivery vendor, as shown in Table C-3. The interviews sought to better understand the perspectives of the IESO program and of program delivery vendor staff related to the program design and delivery.

Table C-3: IESO Program Staff and Program Delivery Vendor Staff IDI Disposition

Disposition Report	IESO Staff	Program Delivery Vendor Staff	Total
Completes	4	3	7
Total Invited to Participate	4	3	7

Interview topics included program roles and responsibilities, program design and delivery, applicant representative and contractor engagement, marketing and outreach, customer participation, horticultural measures, market impact, program strengths and weaknesses, and improvement suggestions.

The appropriate staff to interview were identified in consultation with IESO EM&V staff. Telephone IDIs were conducted with IESO staff and program delivery vendor staff using in-house staff (rather than a survey lab). The interviews were completed between April 11 to May 14, 2025. Each interview took approximately one hour to complete.

APPLICANT REPRESENTATIVE AND CONTRACTOR SURVEY

A total of 50 application representatives and contractors were surveyed from a sample of 303 unique applicant representatives and contractors, as shown in Table C-4. The survey's purpose was to better understand the applicant representatives' and contractors' perspectives on program delivery.

Table C-4: Applicant Representative and Contractor Survey Disposition

Disposition Report	Total
Completes	48
Emails bounced	16
Partial Complete	2
Screened Out	3
No Response	226
Total Invited to Participate	303

Survey topics included firmographics, program roles and responsibilities, how customers learned about the program, training and education, overall program experience, equipment delays and installation timelines, percent of non-lighting costs covered by the program, participation barriers, opportunities for the program, satisfaction with various program aspects, program improvement suggestions, job impacts, and NEBs perspectives.

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.

NMR staff delivered the survey over the web, using Qualtrics survey software. Survey implementation was conducted between March 10 and April 7, 2025. The survey took an average of 16 minutes to complete after removing outliers.[17] Weekly e-mail reminders were sent to non-responsive contacts through web survey fielding.

PARTICIPANT SURVEY

A total of 255 participants were surveyed from a sample of 1,516 unique contacts, as shown in Table C-5. The survey's purpose was to better understand the participants' perspectives related to the program experience.

Table C-5: Participant Survey Disposition

Disposition Report	Web	Phone
Completes	248	7
Emails bounced	159	-
Screened out	23	-
Unsubscribed	68	-
Voicemail	-	92
Callback	-	6
Agreed to complete online	-	10
Hard refusal	-	3
No answer	-	25
Non-working number	-	2
No eligible respondent	-	4

[17] The survey was designed to allow a respondent to complete at a later time 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.

Disposition Report	Web	Phone
Wrong number	-	1
Other	-	13
No response	1,018	-
Total invited to participate	1,516	80

Survey topics included firmographics, how customers heard about the program, ease of participation, percent of non-lighting project costs covered by the program, which part of the project or equipment type was the most time intensive, equipment customers expressed interest in but decided not to install and reasons for not installing, the impact of the Enhanced Local Initiatives Program incentives, equipment recommendations, program improvement recommendations, FR and SO, and NEBs perspectives.

The sample was developed from program records provided by 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 phone and the web in partnership with Resource Innovations' survey lab, using Qualtrics survey software. NMR staff worked closely with Resource Innovations' survey lab to test the survey's programming and to perform quality checks on all data collected.

Survey implementation was conducted between February 10 and April 2, 2025. The survey took an average of 17 minutes to complete after removing outliers.[18] Weekly e-mail reminders were sent to non-responsive contacts through web survey fielding.

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

Appendix E Additional Net-to-Gross and Process Evaluation Results

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

E.1 Additional Applicant Representative and Contractor Process Results

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

FIRMOGRAPHICS

Figure 9-5 displays the breakdown of respondents' roles in the program in 2024. Nearly all (94%) respondents served as applicant representatives providing application support for clients who received an incentive through the program in 2024. Of these 47 applicant representatives, 32% were also contractors for clients who received their incentive in 2024. A small number (6%) were contractors only for clients who received their incentive in 2024.

Figure 9-5: Applicant Representatives and Contractors (n=50)

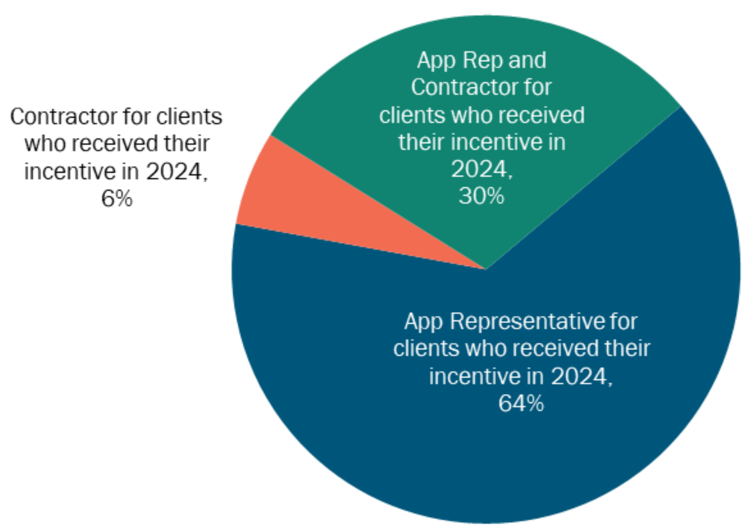


Table 9-4 displays the number of full- and part-time employees at the respondents' companies. More than one-fourth (27%) were affiliated with companies with between one and five full-time positions, and nearly one-fifth (15%) were affiliated with companies that had 21 to 50 full-time positions. Over one-third of respondents (38%) reported that their company had part-time positions. Close to one-third of respondents (31%) were affiliated with companies with one to five part-time positions.

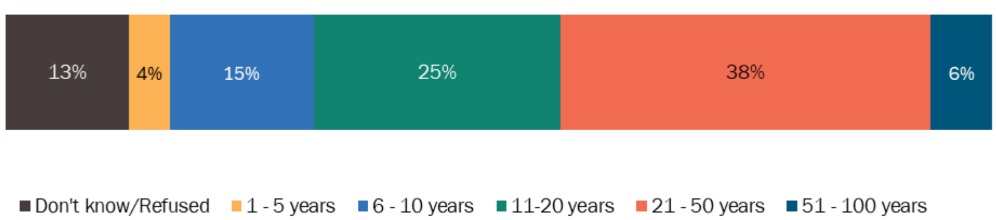
Table 9-4: Respondents' Full- and Part-time Employees (n=48)

Number of Employees	Full-Time	Part-Time*
1-5	25%	31%
6-10	17%	2%
11-20	10%	0%
21-50	15%	2%
51-500	4%	0%
501-1000	4%	0%
10000+	6%	2%
Don't know/Refused	17%	27%
None	2%	35%

*Does not sum to 100% due to rounding.

The breakdown of the respondents' company age is presented in Figure 9-6. Fewer than one-fifth of respondents (19%) were affiliated with companies that have been in business for ten or fewer years and close to three-fourths (69%) were affiliated with companies that have been in business for 11 years or more.

Figure 9-6: Respondents' Company Age (n=48)*

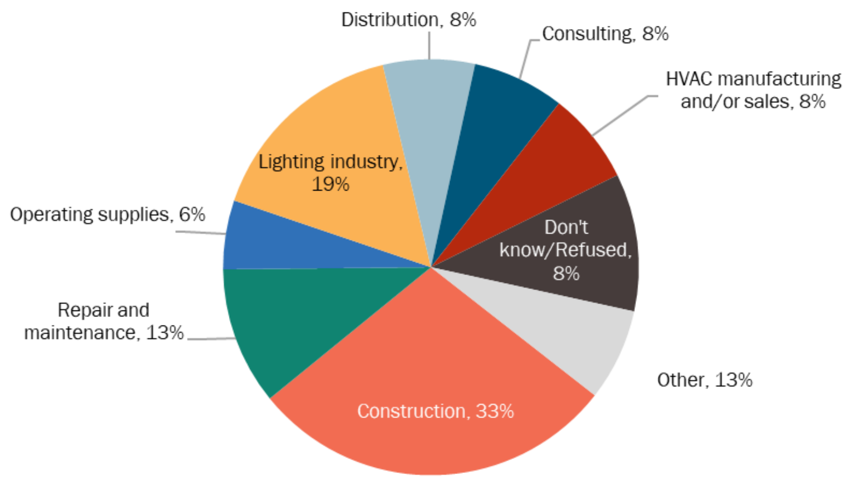


*Does not sum to 100% due to rounding.

Respondent business categories varied, as presented in Figure 9-7. One-third (33%) work in construction, close to one-fifth (19%) work in the lighting industry, and less than one-fifth (13%) work in repair and maintenance. Less than one-fifth (13%) of respondents indicated that their company was better represented by "other" business categories, including government, project management, and the water industry.

Figure 9-7: Respondents' Business Category

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



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

PROJECT BACKGROUND

Applicant representatives and contractors were asked to provide background information about the projects they completed through the Retrofit Program.

Applicant Representatives

Of 47 responding applicant representatives, 40 provided estimates on the number of clients they assisted with applications. In total, applicant representatives reported representing 511 clients, with an average of 13 clients per respondent.

Contractors

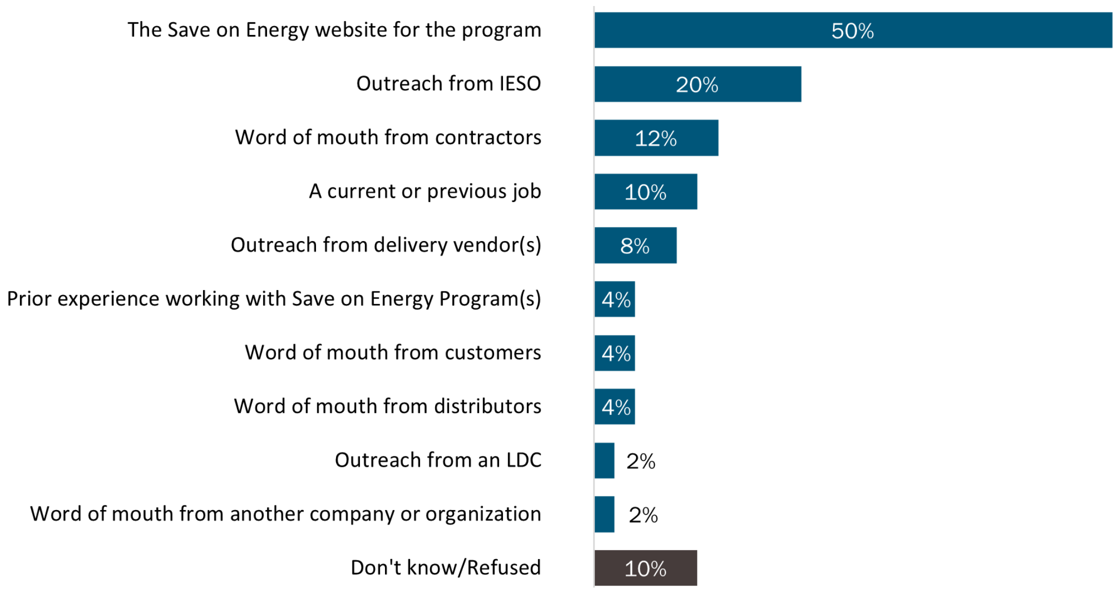
Eighteen responding contractors completed a total of 382 retrofit projects in 2024. Of these projects, nearly one-half (47%) were completed through the Retrofit Program. On average, over one-third (36%) of their total sales went through the Retrofit Program and over one-third (35%) of their invoiced project costs were for labor.

PROGRAM AWARENESS

Applicant representatives and contractors reported how they first became aware of the Retrofit Program (Figure 9-8). Respondents most commonly reported first learning about the program from the Save on Energy website (50%) or outreach from IESO (20%). About one-tenth of respondents first learned about the program through contractors (12%) or from a current or previous job (10%). Less commonly, respondents first learned about the Retrofit Program from delivery vendor outreach (8%). Section 6.2.2 includes an additional discussion regarding applicant representative and contractor program awareness.

Figure 9-8: How Applicant Representative and Contractors First Became Aware of the Program

(Open-ended and multiple responses allowed; n=50)*

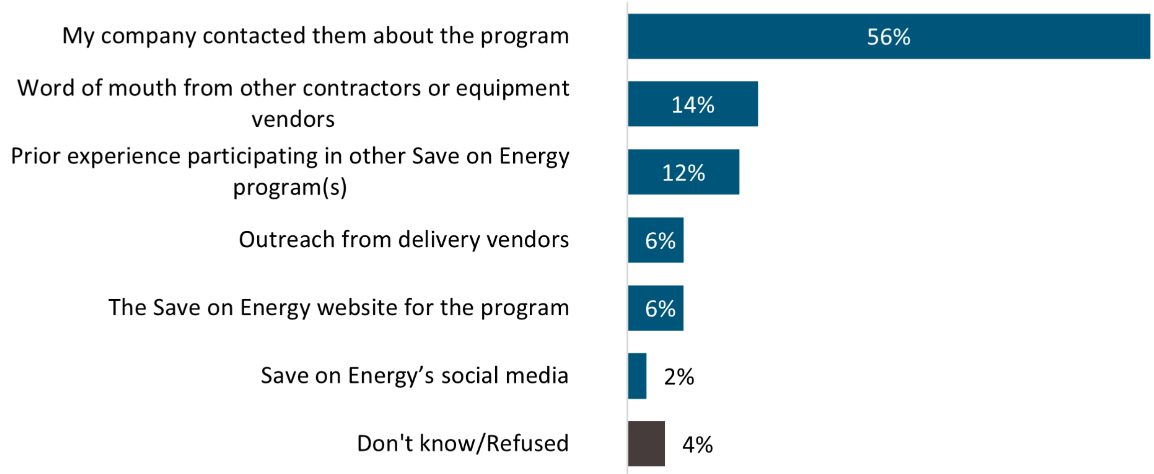


*Does not sum to 100% due to multiple responses.

Respondents reported the *primary way* that their customers became aware of the Retrofit Program (Figure 9-9). Over one-half (56%) of respondents reported their company contacted customers about the program. Less than one-fifth of respondents said customers became aware of the program through word of mouth from other contractors or equipment vendors (14%) or from prior experience participating in other Save on Energy programs (12%). Other responses included outreach from delivery vendors (6%), the Save on Energy website for the program (6%), and Save on Energy social media (2%).

Figure 9-9: Primary Way Customers Became Aware of the Program

(Open-ended and multiple responses allowed; n=50)

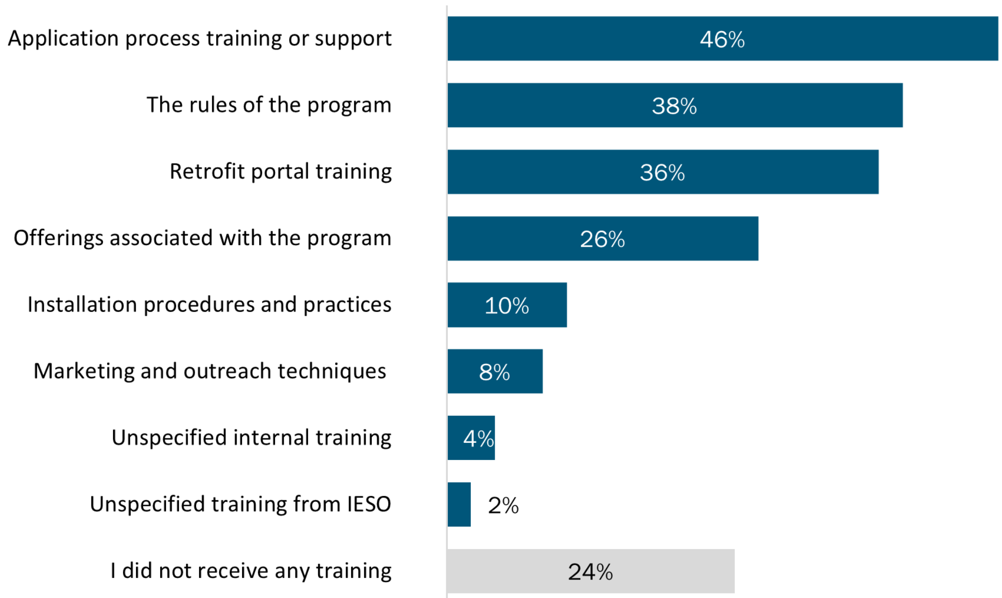


TRAINING AND EDUCATION

Most respondents (76%) reported receiving some type of training and education in support of the Retrofit Program (Figure 9-10). Nearly one-half (46%) of respondents received training or support on the application process and over one-third on the rules of the program (38%) and the Retrofit portal (36%). Nearly one-fourth (24%) of respondents indicated they had not received any training at all. Section 6.2.3 includes an additional discussion regarding training and education.

Figure 9-10: Types of Training Received

(Open-ended and multiple responses allowed; n= 50)*

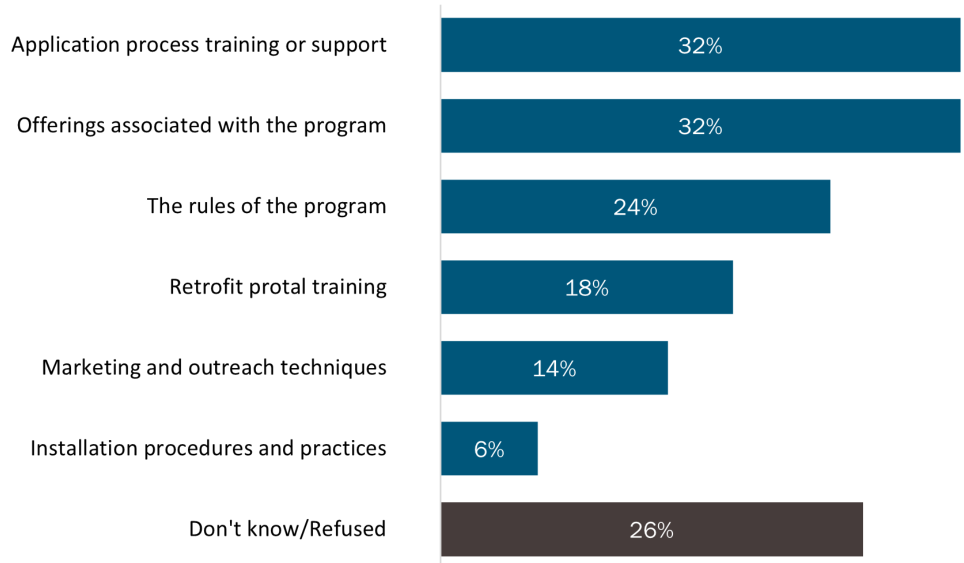


*Does not sum to 100% due to multiple responses.

When asked about what type of additional training or education would help support their future work with the Retrofit Program, over three-fourths (74%) of applicant representatives and contractors provided suggestions other than "don't know", as shown in Figure 9-11. Respondents suggested that training and education include the application process (32%), the offerings associated with the program (32%), and the rules of the program (24%). Section 6.2.3 includes an additional discussion regarding training and education.

Figure 9-11: Recommended Training and Education Topics

(Open-ended and multiple responses allowed; n=50)*



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

PROGRAM EXPERIENCE

Respondents were asked if participants typically could install all equipment that interested them through the program. Just over one-tenth (16%) of respondents indicated that customers were *not* able to do so. These respondents were asked what types of energy-efficient equipment or models that participants expressed interest in but could not install through the program. They mentioned LED fixtures (two respondents), as well as fans, monitoring equipment, and RTUs of a certain size (one response each), as shown in Table 9-5. Section 6.2.4 includes an additional discussion regarding equipment of interest to participants that they were unable to install.

Table 9-5: Equipment of Interest to Participants that They Were Unable to Install (n=7)*

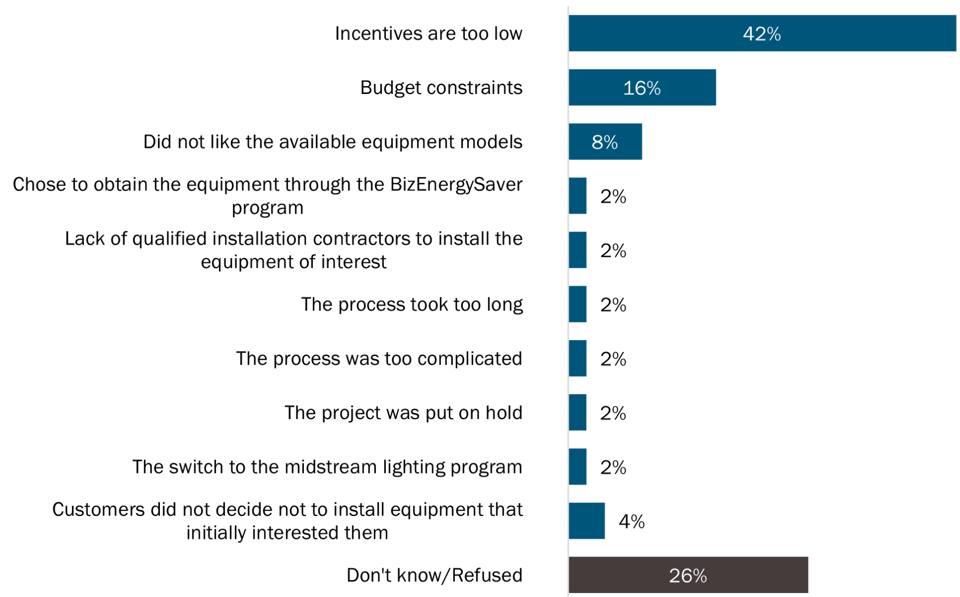
Ineligible Equipment	Respondents
LED fixtures	2
Fans	1
Monitoring equipment	1
RTUs of a certain size	1
Don't know	2

* Counts are displayed rather than percentages due to small n.

Figure 9-12 provides a full list of reasons why customers decided not to install energy-efficient equipment through their Retrofit project, as reported by applicant representatives and contractors. Most commonly, respondents indicated that the incentives were too low (42%) and the customer's company had budget constraints (16%).

Figure 9-12: Reasons why Customers Decided Not to Install Energy-Efficient Equipment

(Open-ended and multiple responses allowed; n=50)*

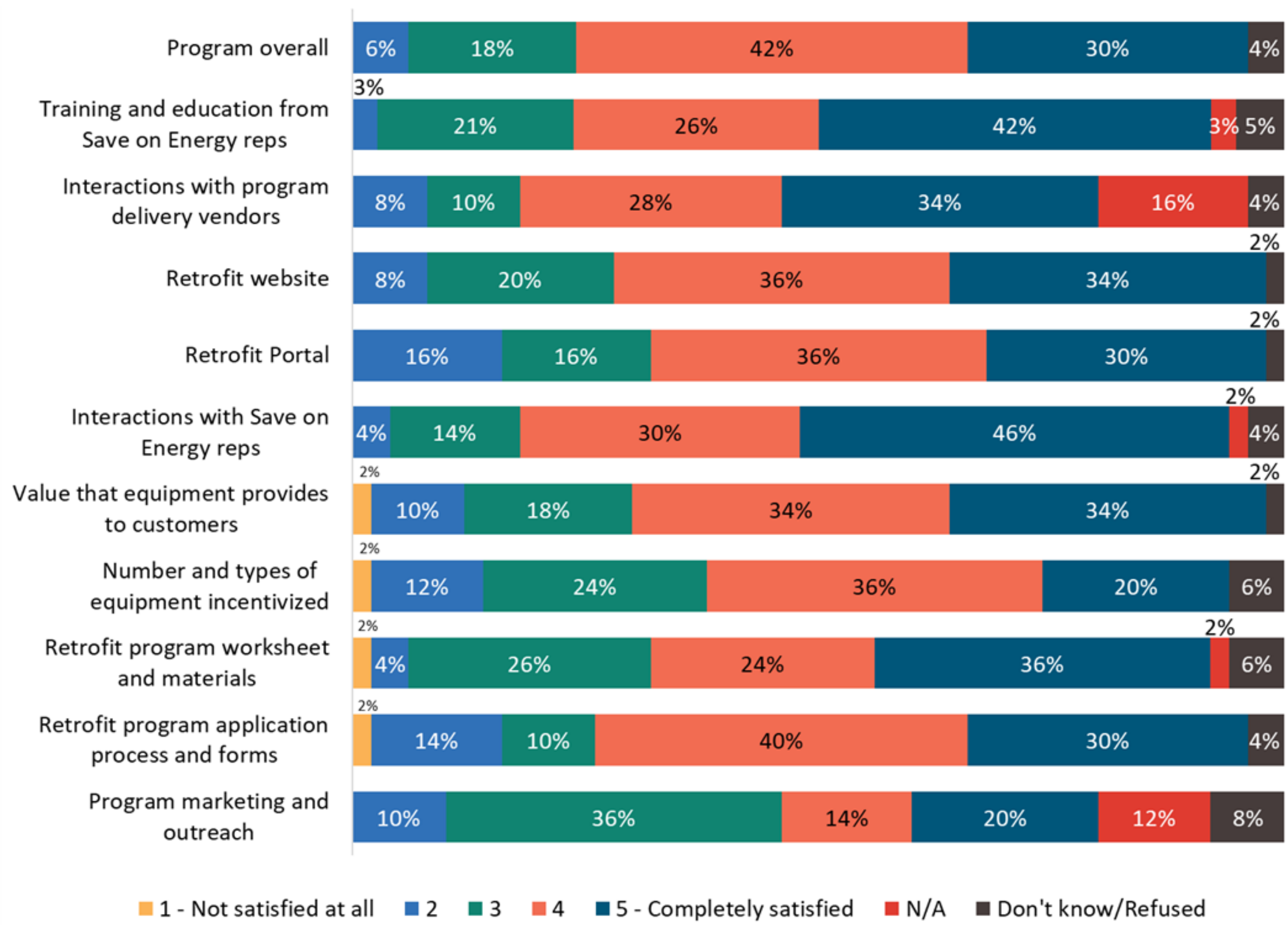


*Does not sum to 100% due to multiple responses.

As seen in Figure 9-13 respondents were asked to rate their satisfaction with different aspects of the Retrofit Program on a scale of one to five, where one indicates "not satisfied at all" and five indicates "completely satisfied." Close to two-thirds (72%) of respondents provided a rating of four or five for the program overall. Section 6.2.4 includes an additional discussion regarding satisfaction.

Figure 9-13: Satisfaction with Aspects of the Retrofit Program (n=50)*

(Rating on a scale from 1 to 5)



* May not sum to 100% due to multiple response. For "Training and education from Save on Energy representatives", the n=38 as this was only asked of respondents indicating they had received training.

EQUIPMENT PURCHASE AND INSTALLATION TIMELINE

Respondents who completed prescriptive projects were asked to identify any types of prescriptive equipment that experienced supply chain delays that impacted project completion timelines, as shown in Table 9-6. The greatest number of respondents mentioned lighting fixtures (17%). Other responses included chillers, compressors, and HVAC equipment (mentioned by 5% of respondents each).

Table 9-6: Prescriptive Equipment with Supply Chain Delays

(Multiple responses allowed; n=41)*

Equipment Type	Respondents
Lighting fixtures	17%
Chillers	5%
Compressors	5%
HVAC equipment	5%
Booster packages	2%
Power monitoring devices	2%
Pumps	2%
RTUs	2%
VFDs	2%
None	29%
Don't know	34%

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

Respondents who completed prescriptive projects were then asked to estimate how long it takes to purchase and install prescriptive equipment through the program (Table 9-7). Nearly one-half (44%) of these respondents said it took two to six months, while close to one-fourth (24%) said it took one month or less. Others felt it could take longer, ranging from seven to nine months (10%), 10 to 12 months (12%), or more than 12 months (2%). Section 6.2.5 includes additional discussion regarding equipment installation timelines.

Table 9-7: Time to Purchase and Install Prescriptive Equipment (n=41)*

Number of Months	Respondents
One month or less	24%
2 to 6 months	44%
7 to 9 months	10%
10 to 12 months	12%
More than 12 months	2%
Don't know	7%

* Does not sum to 100% due to rounding.

The survey then asked respondents who completed prescriptive projects if any types of prescriptive equipment take over 12 months to purchase and install, and if so, which equipment. As shown in Table 9-8 exactly one-half (50%) of respondents do not think any prescriptive equipment takes over 12 months to purchase and install. Section 6.2.5 includes an additional discussion around the equipment purchases and installation timelines.

Table 9-8: Prescriptive Equipment That Took Over 12 Months to Install

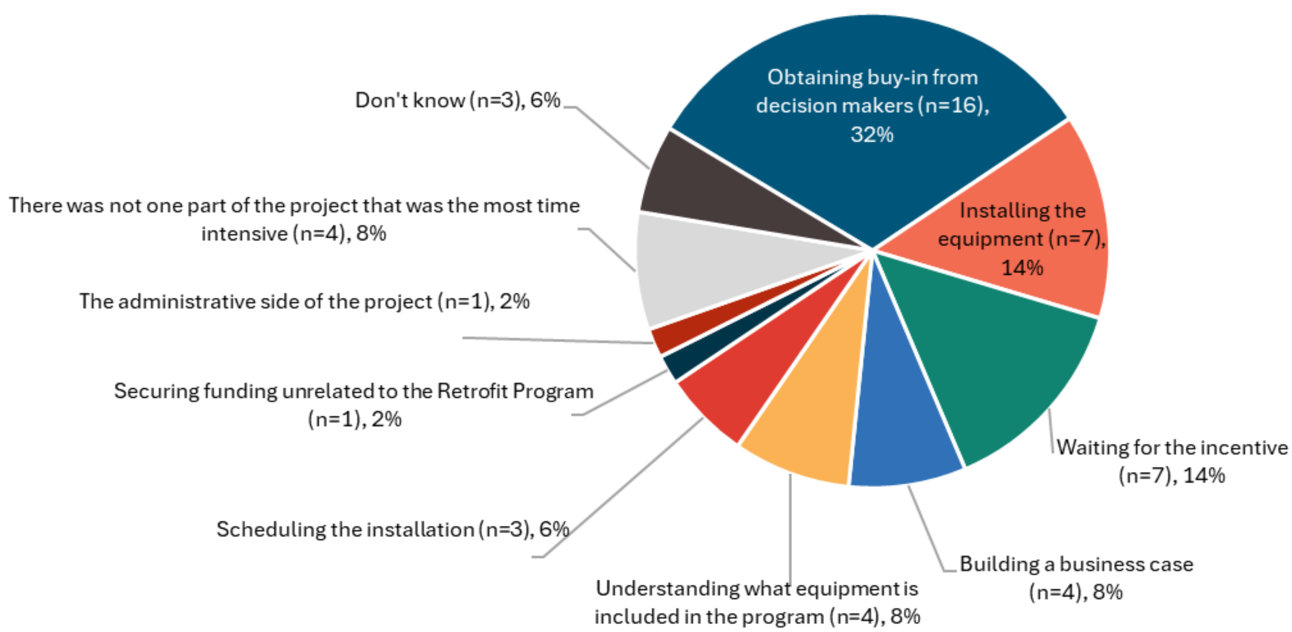
(Open-end and multiple responses allowed; n=40)*

Equipment Type	Respondents	Time to Purchase and Install
Lighting	5%	12-18 months
VFDs	3%	12-24 months
None	50%	-
Don't know	43%	-

*Does not sum to 100% due to rounding. One respondent was dropped due to an unclear response.

Respondents were asked to identify the most time intensive part of implementing a project, as shown in Figure 9-14. Nearly one-third (32%) of respondents indicated that obtaining buy-in from decision makers was the most time-consuming part of a project, followed by installing the equipment and waiting for the incentive (each 14%). Others somewhat frequently mentioned building a business case (8%), understanding what equipment is included in the program (8%), and scheduling the installation (6%).

Figure 9-14: Most Time Intensive Part of the Project (n=50)



The 86% of respondents who did not provide a "don't know" response to the prior question were then asked to estimate how much time the most time intensive parts of the project took to complete (Table D-6). The longest time mentioned was over 2 years for obtaining buy-in from decision makers (1 respondent) , followed by 13 months to 2 years for installing the equipment (1 respondent) and for understanding what equipment is included in the program (1 respondent). These same respondents were then asked if there was a particular equipment type that made completing this part of the project time intensive and only one respondent provided a response. This respondent specified that scheduling the installation for high bay lighting could take 1 to 5 months. Additional information on the amount of time it took to complete the most time intensive parts of the project can be found in Table 9-9 below, as well as in Section 6.2.5.

Table 9-9: Amount of Time to Complete Time Intensive Part of the Project

(Open-end and multiple responses allowed)*

Amount of Time to Complete	n
Obtaining buy-in from decision makers (n=16)	
1 to 5 months	8
6 months to 1 year	2
More than 2 years	1
Don't know/Refused	7
Installing the equipment (n=7)	
6 months to 1 year	1
13 months to 2 years	1
Don't know/Refused	5
Waiting for the incentive (n=7)	
1 to 3 hours	1
Less than one month	3
1 to 5 months	1
Don't know/Refused	4
Building a business case (n=4)	
Don't know/Refused	4
Understanding what equipment is included in the program (n=4)	
13 months to 2 years	1
Don't know/Refused	3
Scheduling the installation (n=3)	
Less than one month	1
1 to 5 months	1
Don't know/Refused	2
Securing funding unrelated to the Retrofit Program (n=1)	
Don't know/Refused	1
The administrative side of the project (n=1)	
Less than one month	1

* Counts are displayed rather than percentages due to small n.

NON-LIGHTING EQUIPMENT

Applicant representatives and contractors were asked to determine the percentage of their clients' non-lighting upgrades that were due to replacement on failure. The breakdown of responses for percentage of upgrades is shown below in Table 9-10. Most commonly (16%), respondents indicated that equipment was not replaced on failure.

Table 9-10: Percentage of Non-Lighting Upgrades Due to Replacement on Failure (n=50)

Percentage	Respondents
0	16%
1 - 25	8%
26 - 50	4%
51 - 75	2%
76 - 99	4%
100	8%
Don't know/Refused	58%

The 34% of respondents who indicated that less than 100% of their non-lighting upgrades were due to failure were then asked about their upgrades that were completed for a reason *other than* failure. They were asked to indicate why their customers completed those improvements at the time that they did (Table 9-11). Five respondents said their customers wanted to avoid replacing failed equipment, while four respondents said their customers were installing new equipment (i.e. not a replacement). Section 6.2.6 includes an additional discussion on non-lighting equipment.

Table 9-11: Reasons for Upgrades Not Due to Failure (n=17)*

Reason for Upgrade	Respondents
Wanted to avoid the need for replacement on failure	5
It was new equipment (i.e., not a replacement)	4
To make energy efficiency improvements	3
Part of annual capital expenditures	2
Budget became available	1
Don't know	2

* Counts are displayed rather than percentages due to small n.

Respondents were asked what percentage of various non-lighting equipment costs were covered by the program. As shown in Table 9-12, the 62% of respondents who provided a valid response to this question often reported that ten percent or less of their non-lighting project costs were covered by the program, regardless of equipment type. The only equipment categories with nearly 100% of project costs covered were mentioned by only one respondent and included agribusiness, compressed air, and voltage optimizers.

Table 9-12: Percent of Non-lighting Project Costs Covered by the Program*

(Open-end and multiple response)

Equipment Category	0-10%	11-89%	90-100%
Chillers (n=17)	10	7	-
Cooling equipment (n=15)	11	4	-
Fan motors (n=15)	10	5	-
HVAC controls (n=13)	6	7	-
Refrigeration (n=11)	7	4	-
Agribusiness (n=12)	8	3	1
Compressed air (n=15)	9	5	1
Motors (n=14)	10	4	-
Variable frequency drives (VFDs) (n=17)	9	8	-
Industrial machine (n=10)	9	1	-
Air flow management (n=1)	1	-	-
Heat pumps (n=1)	1	-	-
Booster packages (n=1)	1	-	-
Voltage optimizers (n=1)	-	-	1

* Counts are displayed rather than percentages due to small n.

Additionally, the 54% of respondents who provided a valid response to the prior question were then asked to share whether the percentages they estimated for each equipment category were sufficient to encourage participation in the program. Responses varied and are displayed in Table 9-13 below.

Table 9-13: Percent of Non-Lighting Costs Covered and Sufficiency for Encouraging Participation*

Equipment Category	0-10% Sufficient	0-10% Insufficient	11-89% Sufficient	11-89% Insufficient	90-100% Sufficient	90-100% Insufficient
Chillers (n=12)	3	3	5	1		-
Cooling equipment (n=10)	3	3	3	1	-	-
Fan motors (n=10)	2	4	3	1	-	-
HVAC controls (n=9)	1	3	4	1	-	-
Refrigeration (n=6)	1	2	2	1	-	-
Agribusiness (n=5)	1	2	1	1	-	-
Compressed air (n=10)	2	2	4	1	1	-
Motors (n=8)	3	1	4	0	-	-
Variable frequency drives (VFDs) (n=11)	2	2	6	1	-	-
Industrial machine (n=4)	1	2	1	-	-	-

Equipment Category	0-10% Sufficient	0-10% Insufficient	11-89% Sufficient	11-89% Insufficient	90-100% Sufficient	90-100% Insufficient
Air flow management (n=1)	-	1	-	-	-	-
Heat pumps (n=1)	-	1	-	-	-	-
Booster packages (n=1)	-	-	1	-	-	-
Voltage optimizers (n=1)	-	-	-	1	-	-

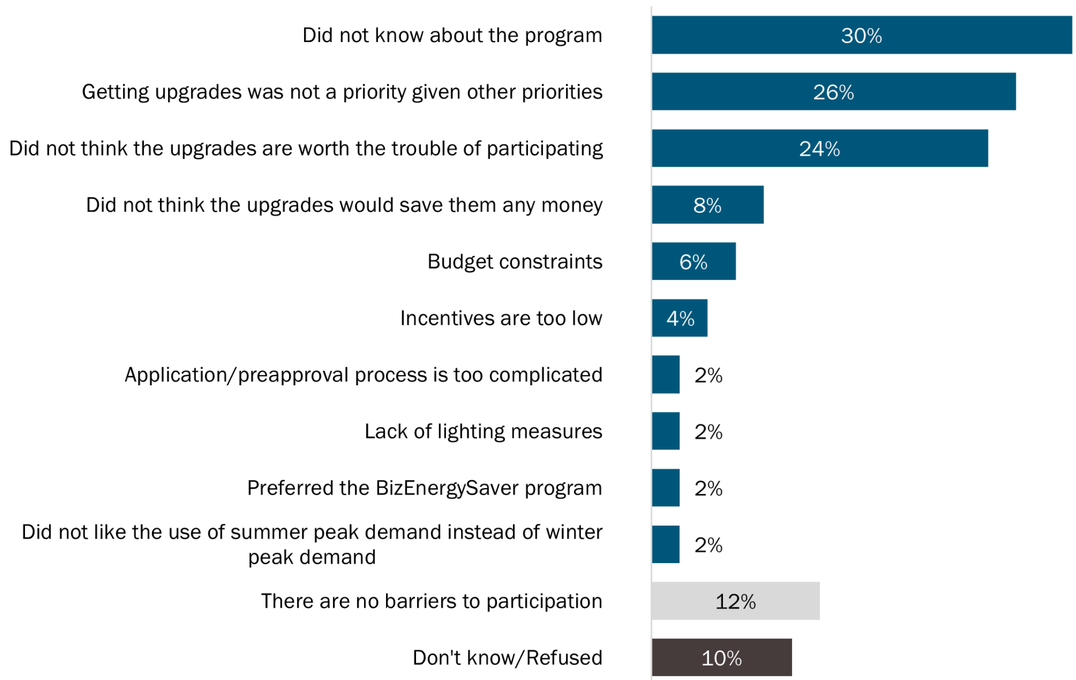
* Counts are displayed rather than percentages due to small n.

BARRIERS AND OPPORTUNITIES

Figure 9-15 provides a full list of customer participation barriers, as reported by applicant representatives and contractors. Respondents most commonly said that customers did not know about the program (30%), did not view upgrades as a priority (26%), and did not perceive the upgrades to be worth the trouble of participation (24%). Over one-tenth (12%) of respondents reported that there are no barriers to participation. Section 6.2.7 includes an additional discussion regarding program barriers.

Figure 9-15: Barriers to Customer Participation

(Open-ended and multiple responses allowed; n=50)*

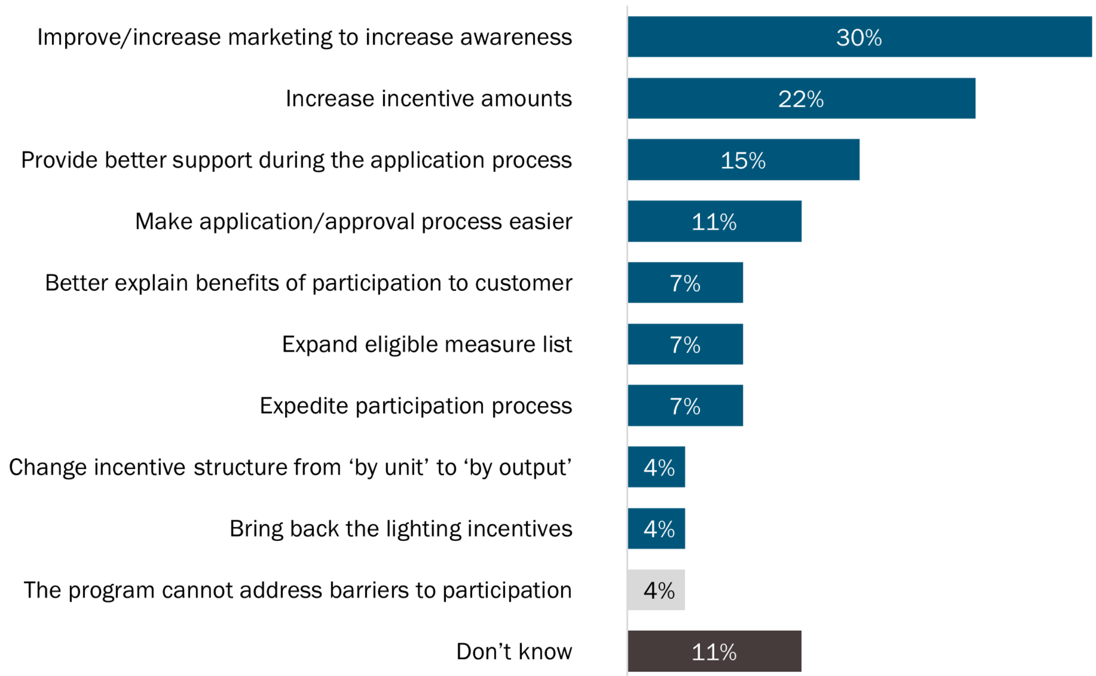


*Does not sum to 100% due to multiple responses.

As shown in Figure 9-16, over one-half (54%) of applicant representatives and contractors provided suggestions to overcome participation barriers. These respondents most often suggested improving and increasing marketing to increase awareness (30%), increasing incentive amounts (22%), and providing better support during the application process (15%). Section 6.2.7 includes an additional discussion around overcoming customer barriers.

Figure 9-16: Suggestions to Overcome Participation Barriers

(Open-ended and multiple responses allowed; n=27)*



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

RECOMMENDATIONS FOR PROGRAM IMPROVEMENT

The survey asked respondents for suggestions on how to improve the program going forward, as shown by the varied responses in Table 9-14. Over one-fifth (22% of respondents) provided suggestions which most commonly included making the portal more user friendly (three respondents) and streamlining the overall process (two respondents). Section 6.2.8 includes an additional discussion around program improvement suggestions.

Table 9-14: Suggested Improvements for Retrofit Program Overall

(Open-ended and multiple responses allowed; n=11)*

Retrofit Program Overall Improvements	Respondents
Make the portal more user friendly	3
Streamline the overall process	2
Allow applicant representatives to receive incentive checks on behalf *of* the applicant	1
Expand offerings for smaller facilities	1
Increase incentive amounts	1
Increase program marketing	1
Make process faster	1
Minimize paperwork	1
Pay incentive directly to manufacturers or upstream vendors	1
Provide more education on the program	1
Reinstate custom incentives	1
Shorten program staff response times	1
Simplify the calculations needed for the application	1

*Does not sum to 11 due to multiple response. Counts are displayed rather than percentages due to small n.

Respondents were asked what additional energy-efficient equipment or services they would recommend for inclusion in the Retrofit Program. Table 9-15 includes the full list of equipment recommended for inclusion in the Retrofit Program, as reported by over two-fifths (44%) of applicant representatives and contractors. Over two-fifths of these respondents mentioned exterior lighting (41%). Other common responses included building automation system, fans, heat pumps, and allowing for more than one smart thermostat. Section 6.2.8 includes an additional discussion regarding recommendations for program improvement.

Table 9-15: Suggestions of Equipment or Services to Consider Adding to Program

(Open-ended and multiple responses allowed; n=22)*

Equipment Recommendation	Respondents
Exterior lighting	41%
Building automation system	9%
Fans	9%
Heat pumps	9%
More than one smart thermostat	9%
Air compressor monitoring	5%
Curtains for greenhouses	5%
Customized wastewater treatment equipment	5%
Efficient pump controls	5%
Hot water tanks	5%
Motors	5%

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

ENHANCED LOCAL INITIATIVES PROGRAM

Respondents who had completed projects for customers through the Location Initiative Program were asked on a scale of one to five, where one indicates "not at all likely" and five indicates "extremely likely," how likely their clients would have been to complete their project with the same scope, timeline, and level of energy-efficiency if the incentive amount had been reduced by one-third, one-half, or two-thirds. While only two respondents provided usable responses to these questions, they both indicated that their clients would have been unlikely to proceed with their projects if the incentive was reduced by any amount.

When asked if the availability of the higher incentive impacted how long it took for their company to complete the approval process, two respondents provided usable responses. One respondent said the incentive had no impact on the approval process and the other said it reduced the time needed to complete the approval process. One respondent indicated that their clients applied to other energy-efficiency programs after participating in the Enhanced Local Initiatives Program. Section 6.2.9 provides additional discussion around the Enhanced Local Initiatives Program.

E.2 Additional Participant Net-to-Gross Results

This section includes detailed FR and SO results associated with the NTG for CDM Retrofit Program participants, stratified by program stream.

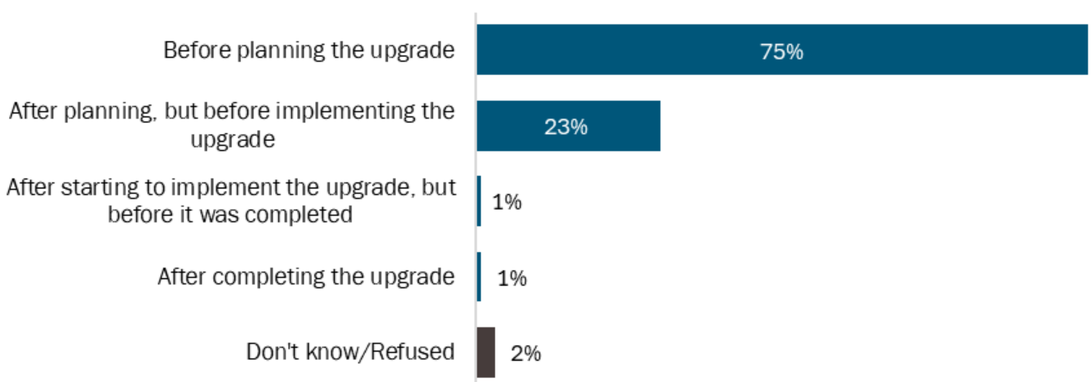
E.2.1 Prescriptive Stream

FREE-RIDERSHIP

The extent of FR within the program was assessed by surveying Retrofit Program participants to understand their experiences and plans before they learned of 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.

Three-fourths of respondents (75%) reported learning they could receive energy-efficiency incentives through the Retrofit Program before starting to plan upgrades, as shown in Figure 9-17. This may suggest the program influenced many of these respondents' decisions to begin the project. Nearly one-fourth of respondents (23%) learned about the program after planning the upgrade, but before implementing it. The remainder reported learning about the program either after starting to implement the upgrade, but before it was completed (1%), or after having completed the upgrade (1%). Four respondents (2%) were unsure when they learned about the program or refused to answer. While responses did not directly impact the FR score, they provided additional context for understanding participants' decision-making processes.

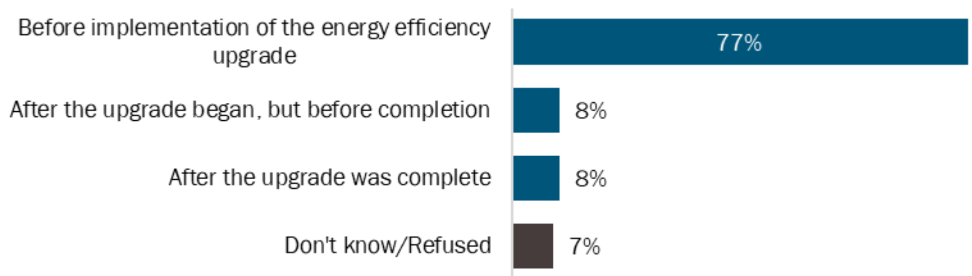
Figure 9-17: When Participants First Learned about the Program (n=173)*



*Does not sum to 100% due to rounding.

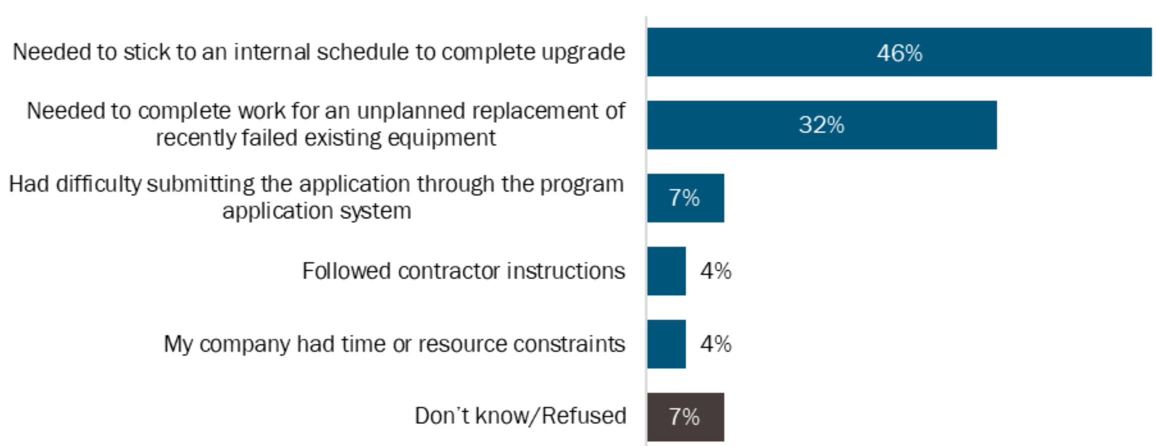
The survey asked participants about the timing of their program application in relation to the start of their energy-efficient upgrades, as shown in Figure 9-18. The majority of respondents (77%) indicated they applied before their company began implementing the upgrade, suggesting most participants applied to the program as intended. Almost one-tenth did so after their energy-efficiency upgrade began but before its completion (8%) or after the upgrade was complete (8%). The remainder did not know or refused to answer (7%). Much like the previous question, this question was not used to calculate the FR score yet provided additional context regarding participant intentions.

Figure 9-18: Timing of Program Application (n=173)



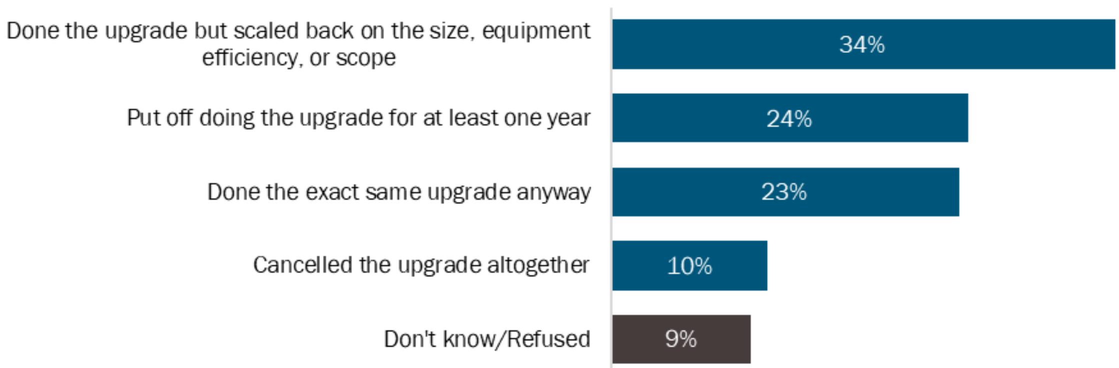
Respondents whose companies submitted a Retrofit Program application after starting an energy-efficiency upgrade were asked their reasons for doing so, as shown in Figure 9-19. The most common reasons provided were the need to stick to an internal schedule (46%) and the need to complete an unplanned replacement for failed equipment (32%). These responses suggest that some respondents would have applied earlier, had it been possible. Two respondents (7%) indicated that they experienced difficulty in submitting their application through the website. While responses to this question did not directly impact the FR score, they provided additional context for understanding the participants' decision-making processes.

Figure 9-19: Reason for Submitting After Starting Upgrade (n=28)



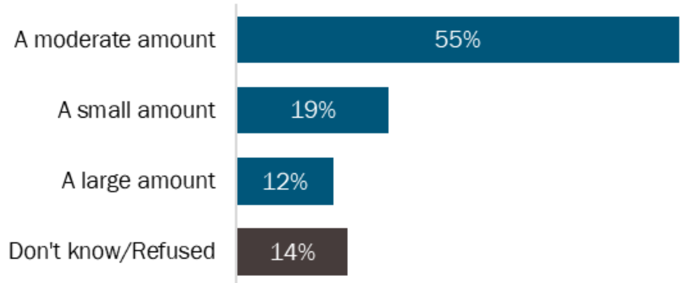
Respondents were asked what they would have done in the program's absence, as shown in Figure 9-20. Almost one-fourth of respondents (23%) would have done the "exact same upgrade" anyway, indicative of higher FR for these respondents. One-third of respondents (34%) showed no indication of FR as they stated they would have put off the upgrade for at least one year (24%) or cancelled their upgrade altogether (10%) had the program not been available to them. Other respondents were considered partial FRs if they reported they would have scaled back on the size, efficiency, or scope of their project (34%), if they did not know what they would have done in the program's absence, or if they declined to answer (9%). The evaluation team factored responses from this participant intent question into the FR analysis.

Figure 9-20: Actions in the Absence of Program (n=173)



Respondents who indicated that they would have scaled back on their project were asked to describe how much they would have reduced the project's size, scope, or efficiency, as shown in Figure 9-21. Over one-half of these respondents (55%) would have scaled it back by a moderate amount, almost one-fifth of respondents would have scaled it back by a small amount (19%), and over one-tenth would have scaled it back by a large amount (12%). These results indicated that the program allowed these participants to increase their project's size and/or extent beyond what they would have achieved on their own. This question was not used to calculate the FR score, though it provided additional context for participant intentions.

Figure 9-21: Scaled Back Size or Extent of Upgrade in Absence of Program Incentives (n=58)



Respondents who stated they would have done the "exact same upgrade" in the program's absence were asked if they would have had funds to cover the project's entire cost without program funding, as shown in Figure 9-22. Nearly three-fourths of respondents (70%) stated they definitely would have had funds to cover all project costs, indicating higher FR for these respondents. One-fourth of respondents (25%) indicated they might have had the funds to cover all project costs. Only 3% of respondents said they definitely would not have had funds to cover all project costs. 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 do independently. This participant intent question was factored into the FR analysis.

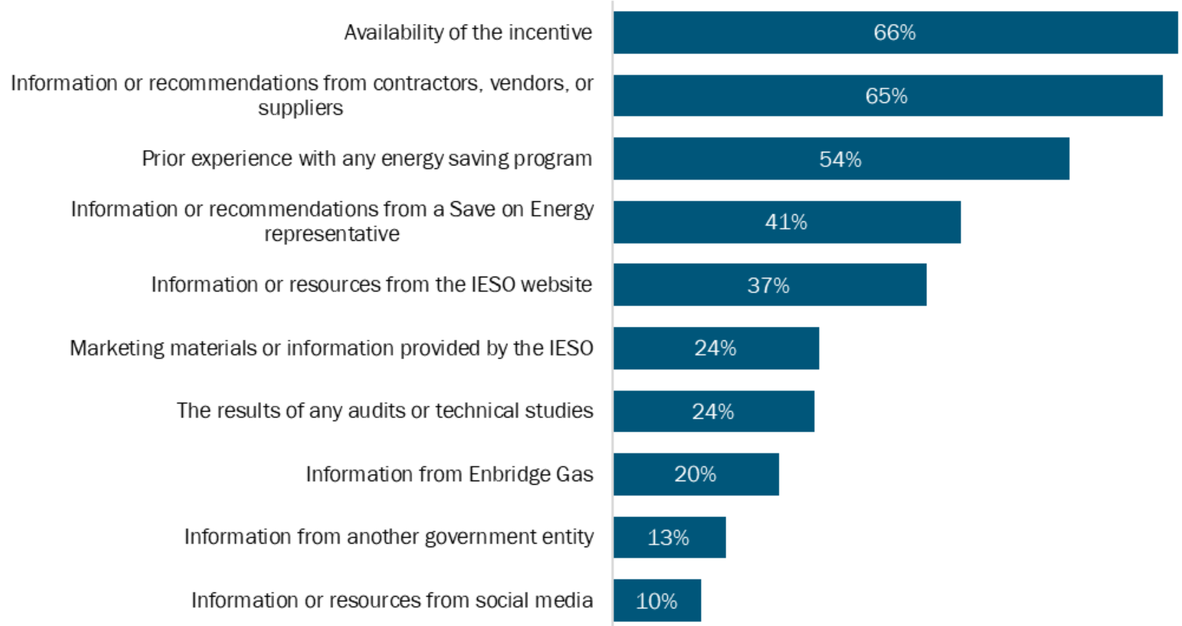
Figure 9-22: Availability of Funds in Absence of Program Incentives (n=40)*

*Does not sum to 100% due to rounding.

Respondents were asked how influential various program features were on their decisions to install energy-efficient equipment, as shown in Figure 9-23. They rated each feature's influence on a scale from one to five, where one indicates it was "not at all influential" and five indicates it was "extremely influential." The highest-rated program features were the availability of incentives (66% with a rating of four or five for each response) and information or recommendations from contractors, vendors, or suppliers (65% with a rating of four or five). The least influential program feature was information or resources from social media (10% with a rating of four or five). This question, which focused on the program's influence and on prior questions about customer intentions, was used to estimate the FR score.

Findings from this question emphasized the contractor, vendor, and supplier networks' strength in driving Retrofit Program engagement. Their interactions with customers were valuable on their own, but, more generally, they helped familiarize customers with energy-saving programs and could influence future participation beyond the Retrofit Program.

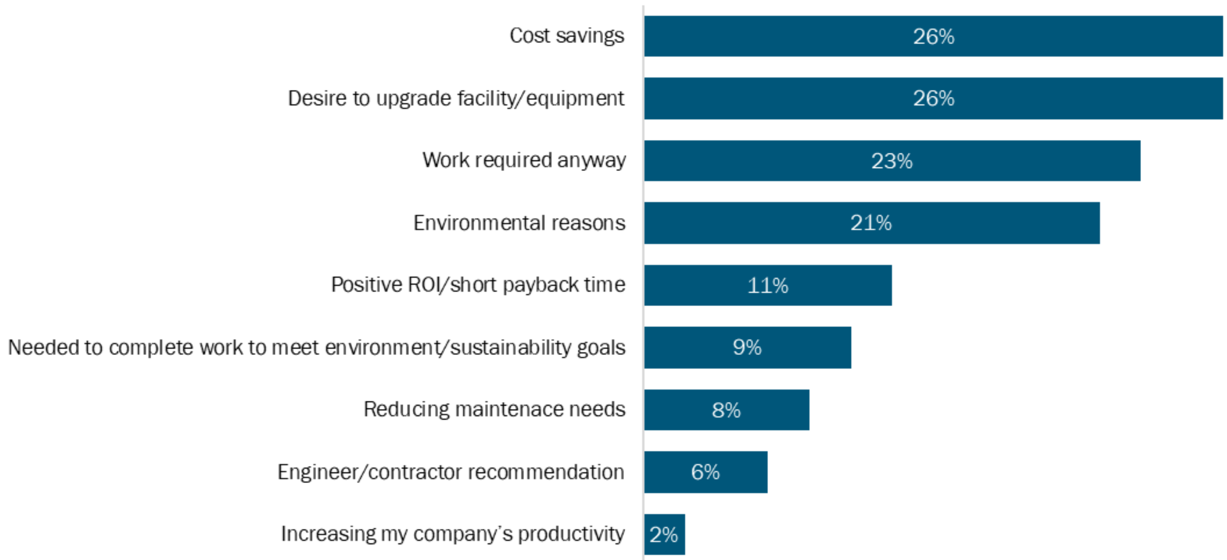
Figure 9-23: Influence of Program Features on Participation (n=173)*
(Rating of 4 or 5 on a scale from 1 to 5)



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

Respondents were asked whether other factors played "a great role" in influencing their organization to install energy-efficient equipment, as shown in Figure 9-24. More than one-fourth of respondents reported that the cost savings (26%) and a desire to upgrade their facility/equipment (26%) influenced their company to do the energy efficient equipment upgrades. Other common responses included that the work was required anyway (23%) and there was a desire to reduce environmental harm (21%).

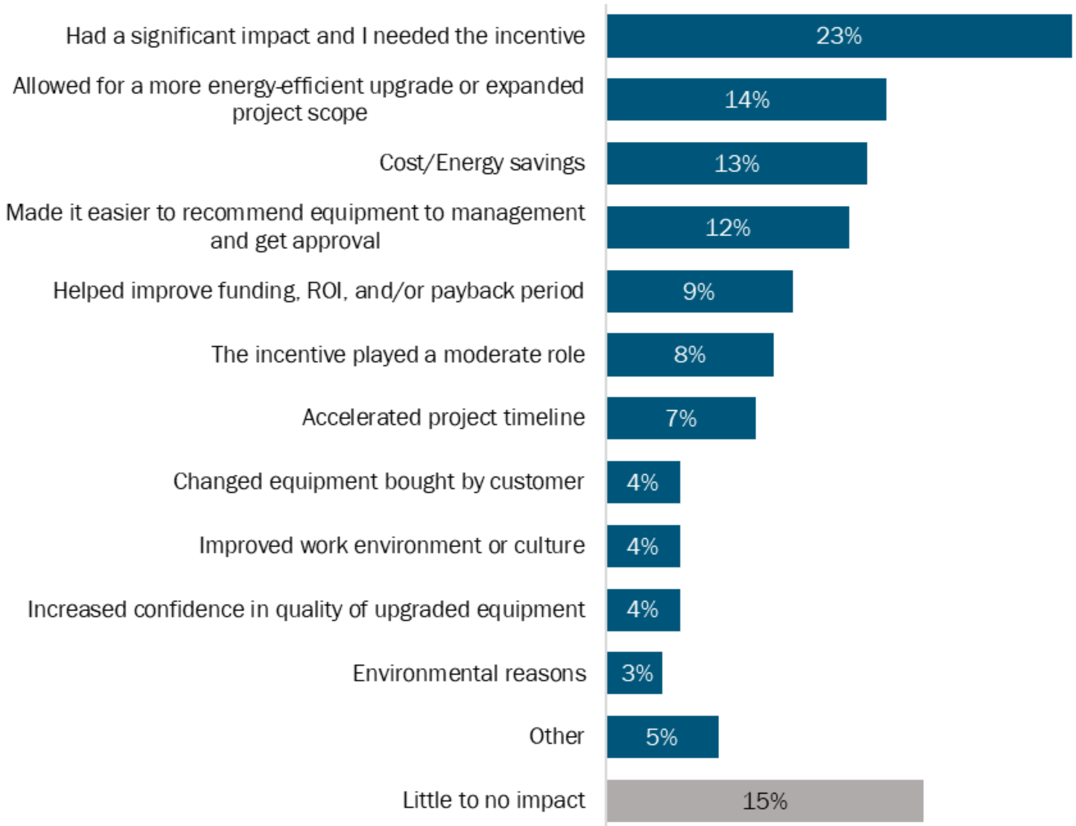
Figure 9-24: Other Influential Factors on Upgrade Decision (Open-ended and multiple responses allowed; n=53)*



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

The survey asked respondents to explain, in their own words, what impact (if any) the financial support or technical assistance they received from the program had on their decisions to install the program-incentivized equipment when they did, as shown Figure 9-25. The most common response was the program playing a great role and needing the incentive (23%). Other common responses mentioned included allowing for a more energy-efficient upgrade or expanded project scope (14%), the cost and/or energy savings (13%), and that it made it easier to recommend equipment to management and get approval (12%).

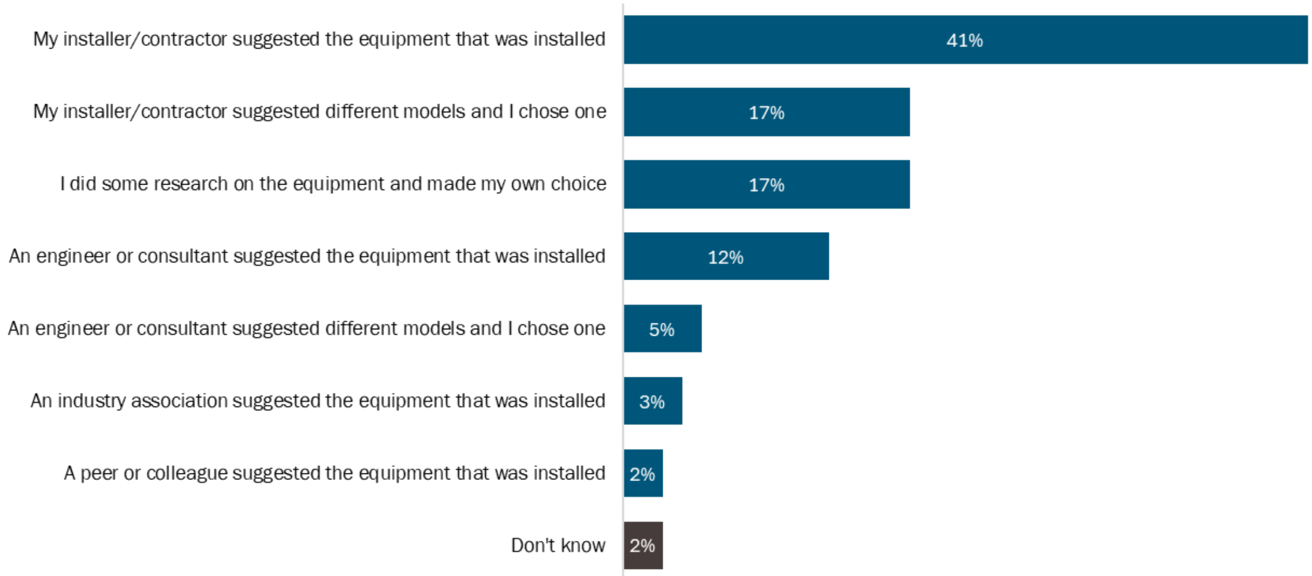
Figure 9-25: Program Impact on Decision to Install Equipment (Open-ended and multiple responses allowed; n=110)*



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

As shown in Figure 9-26, over two-fifths (41%) of respondents chose their equipment based on their installer's or contractor's suggestions, more than twice the number of respondents who chose from a shortlist of equipment models provided by their installer or contractor (17%). Almost one-fifth of respondents also did their own research (17%) and over one-tenth followed an engineer's or consultant's suggestion (12%). This reinforces the importance of contractors' role in helping drive customers to efficient equipment decisions.

Figure 9-26: Equipment Selection Process
(Open-ended and multiple responses allowed; n=172)*



*Does not sum to 100% due to rounding.

SPILLOVER

To estimate the SO rate, the survey asked participants if they installed any energy-efficient equipment in PY2024 for which they did not receive an incentive, following their Retrofit Program participation. One-tenth of respondents (10%) reported installing new equipment. Table 9-16 displays the types of non-incentivized equipment that companies installed after completing their Retrofit projects. Almost one-tenth of all respondents (9%) installed lighting, three times the number reported by any other equipment type.

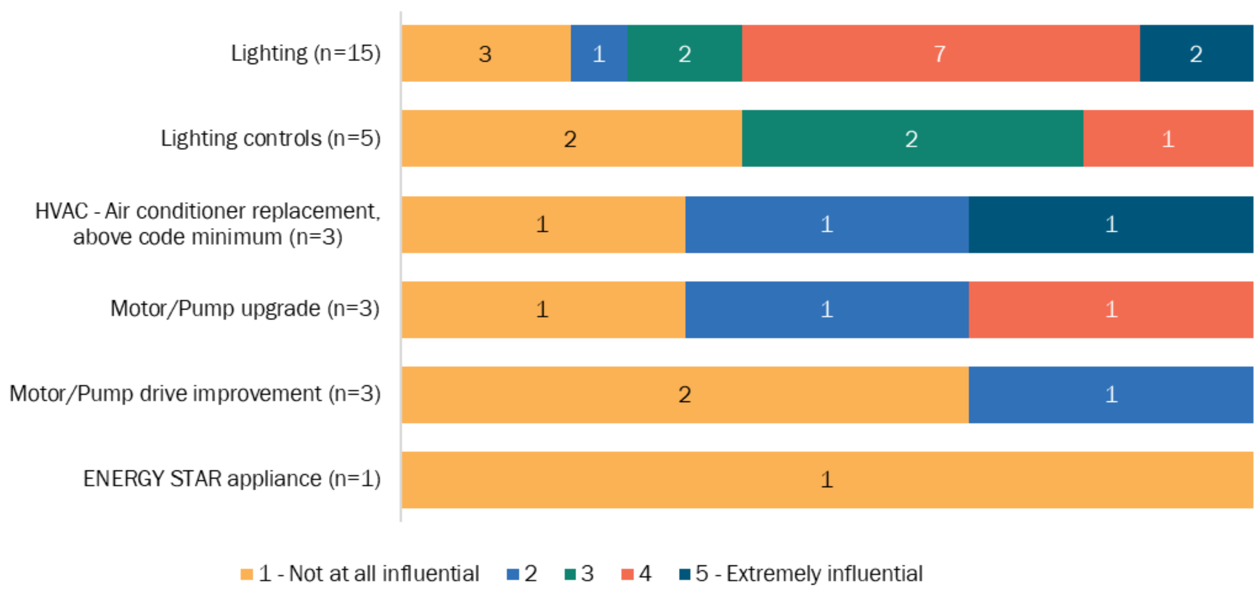
Table 9-16: Types of Upgrades Installed after Program Participation (Open-ended and multiple responses allowed; n=173)*

Spillover Equipment	Respondents
Lighting	9%
HVAC - Air conditioner replacement, above code minimum	2%
Lighting Controls	3%
Motor/Pump Upgrade	2%
Motor/Pump Drive Improvement	2%
ENERGY STAR Appliance	1%

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

The team then asked respondents what influence level their Retrofit Program participation had on their decision to install additional energy-efficient equipment. Participants rated the program's influence on a scale from one to five, where one indicates the program was "not at all influential" and five indicates the program was "extremely influential." Responses varied, with some respondents indicating the program was influential in their decision to install energy-efficient equipment (ratings of 3.0 and above), as shown in Figure 9-27.

Figure 9-27: Program Influence on Equipment Installed Outside the Program (n=17)*



*Counts displayed rather than percentage due to small n.

Participants who indicated that they installed program-influenced, non-incentivized equipment were then asked a series of follow-up questions addressing capacity, efficiency, and annual HOU. Table 9-17 through Table 9-23 present the results of these detailed questions, which were used within the NTG algorithm to attribute SO savings for each equipment installation. SO savings were primarily driven by installations of 495 new linear LEDs and 126 exterior LEDs.

Table 9-17: Air Conditioner Sizes (n=1)*

Air Conditioning size	Respondents	Quantity
11.41 - 20.00 Tons (137,100 - 240,000 Btuh)	1	8

*Counts displayed rather than percentage due to small n.

Table 9-18: Type of Lighting Installed (Multiple responses allowed; n=11)*

Spillover Lighting	Respondents
LED exterior	9
LED linear or troffer	6

*Does not sum to 11 due to multiple responses. Counts displayed rather than percentage due to small n.

Table 9-19: LED Exterior Lighting Mount (n=9)*

Location	Respondents	Quantity Installed
Against building	4	23
Pole Mount	3	27
Under Canopy	2	50

*Counts displayed rather than percentage due to small n.

Table 9-20: Quantity of Linear LED Lamps (n=6)*

Respondents	Fixture Quantity	Max Installed
6	495	400

*Counts displayed rather than percentage due to small n.

Table 9-21: Lighting Controls and Lighting Type (n=3)*

Location	Respondents
Occupancy Sensor	3

*Counts displayed rather than percentage due to small n.

Table 9-22: End Uses of Motor/Pump Upgrades (n=1)*

Motor/Pump End Use	Respondents	Motor Horsepower	Efficiency	Quantity Installed
HVAC Fan	1	<1 hp	Premium	300

*Counts displayed rather than percentage due to small n.

Table 9-23: Size of Motor/Pump Drive Improvements Installed (n=1)*

Type of Drive Improvement	Respondents	Equipment
Motor/Pump	1	30

*Counts displayed rather than percentage due to small n.

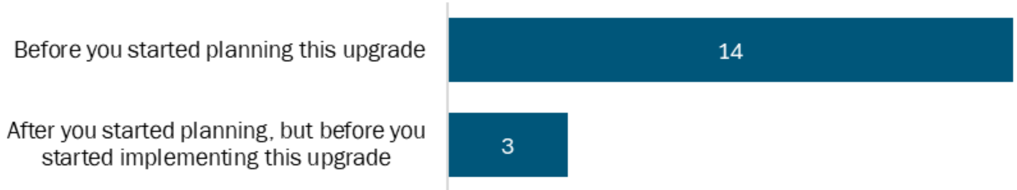
E.2.2 Greenhouse Stream

FREE-RIDERSHIP

The extent of FR within the program was assessed by surveying Retrofit Program participants to understand their experiences and plans before they learned of 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. Please note that Targeted Greenhouse Projects (TGP) are included along with the CDM Retrofit Program greenhouse projects for the NTG analysis.

Fourteen of 17 respondents reported learning they could receive energy-efficiency incentives through the Retrofit Program before starting to plan upgrades, as shown in Figure 9-28. This may suggest the program influenced many of these respondents' decisions to begin the project. Three respondents learned about the program after their planning started but before implementing the upgrade. While responses did not directly impact the FR score, they provided additional context for understanding participants' decision-making processes.

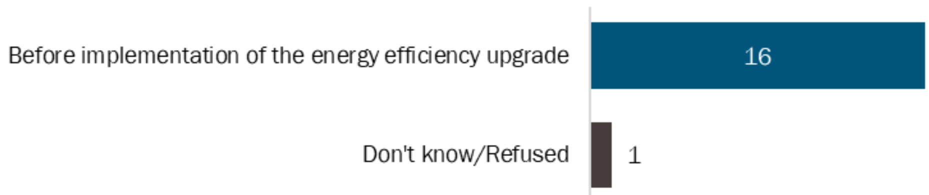
Figure 9-28: When Participants First Learned about the Program (n=17)*



*Counts displayed rather than percentage due to small n.

The survey then asked participants about the timing of their program application in relation to the start of their energy-efficient upgrades, as shown in Figure 9-29. Sixteen of 17 respondents indicated that they applied before their company began implementing the upgrade, suggesting participants applied to the program as intended. Much like the previous question, this question was not used to calculate the FR score, yet it provided additional context regarding participant intentions.

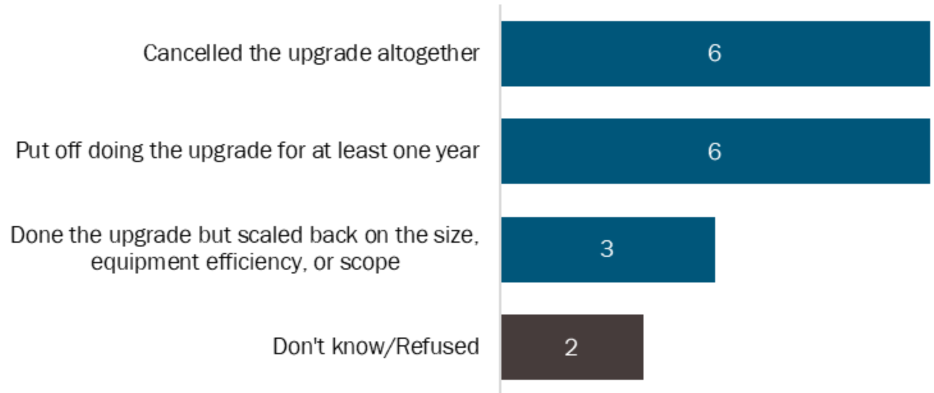
Figure 9-29: Timing of Program Application (n=17)*



*Counts displayed rather than percentage due to small n.

Respondents were asked what they would have done in the program's absence, as shown in Figure 9-30. Three of 17 respondents would have scaled back on the size, scope, or efficiency of their project in the absence of the program. These respondents, along with those who did not know what they would have done in the program's absence or declined to answer (two respondents), were considered partial free-riders. Twelve respondents showed no indication of FR as they stated they would have put off the upgrade for at least one year (six respondents) or cancelled their upgrade altogether (six respondents) had the program not been available to them. The evaluation team factored responses from this participant intent question into the FR analysis.

Figure 9-30: Actions in the Absence of Program(n=17)*



*Counts displayed rather than percentage due to small n.

Respondents who indicated that they would have scaled back on their project were asked to describe how much they would have reduced the project's size, scope, or efficiency, as shown in Figure 9-31. Two of these respondents would have scaled it back a moderate amount and one respondent would have scaled it back by a large 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. This question was not used to calculate the FR score, though it provided additional context for participant intentions.

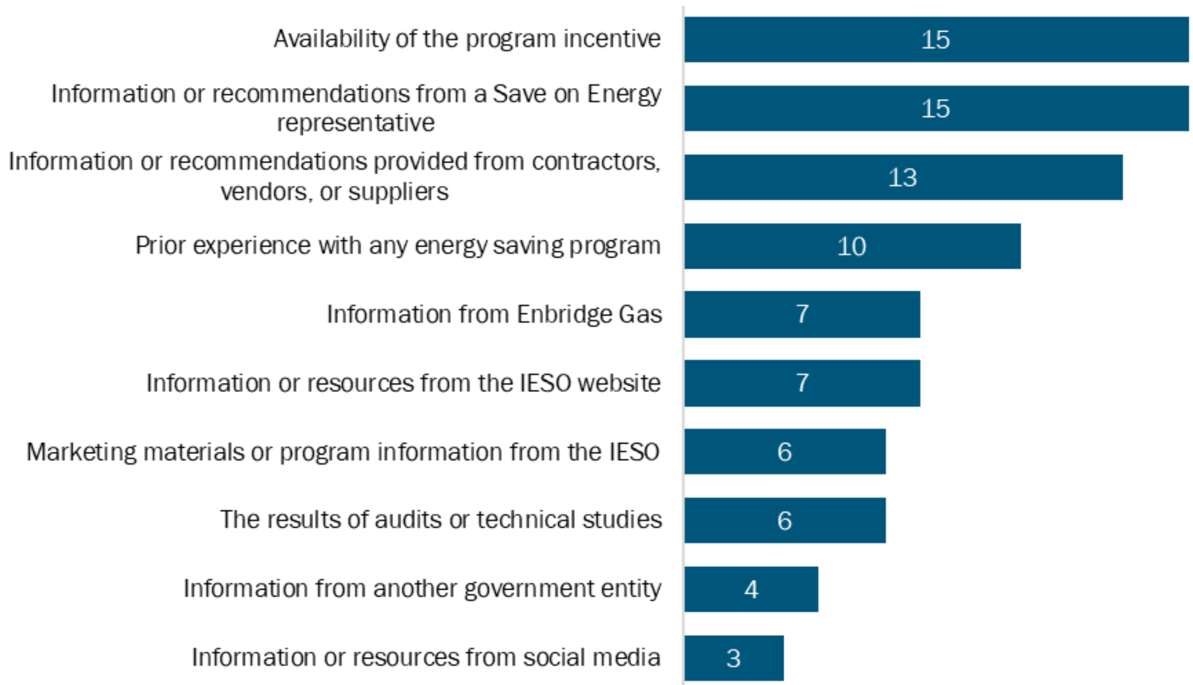
Figure 9-31: Scaled Back Size or Extent of Upgrade in Absence of Program Incentives (n=3)*

*Counts displayed rather than percentage due to small n.

Respondents were asked how influential various program features were on their decisions to install energy-efficient equipment, as shown in Figure 9-32. They rated each feature's influence on a scale from one to five, where one indicates it was "not at all influential" and five indicates it was "extremely influential." The highest-rated program features were the availability of incentives (15 with a rating of four or five for each response) and information or recommendations from a Save on Energy representative (15 with a rating of four or five). The least influential program features were information from another government entity (four with a rating of four or five) and information from social media (three with a rating of four or five). This question, which focused on the program's influence and prior questions about customer intentions, was used to estimate the FR score.

Findings from this question emphasized the Save on Energy representative's strength in driving Retrofit Program engagement. Their interactions with customers were valuable on their own, but, more generally, they helped familiarize customers with energy-saving programs and could influence future participation beyond the Retrofit Program.

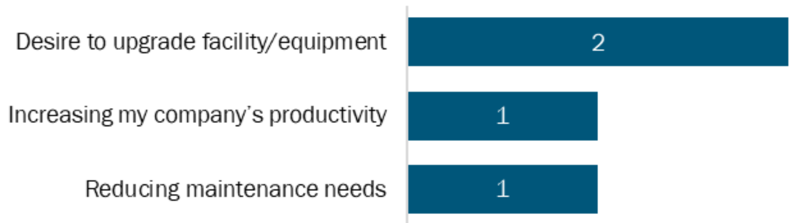
Figure 9-32: Influence of Program Features on Participation (n=17)*
(Rating of 4 or 5 on a scale from 1 to 5)



* Counts displayed rather than percentage due to small n. Does not sum to 17 due to multiple responses.

Respondents were asked whether any other factors played "a great role" in influencing their organization to install energy-efficient equipment, as shown in Figure 9-33. Two respondents reported that a desire to upgrade their facility or equipment influenced their company to do the energy-efficient equipment upgrades. Other responses included increasing the company's productivity (one respondent) and reducing maintenance needs (one respondent).

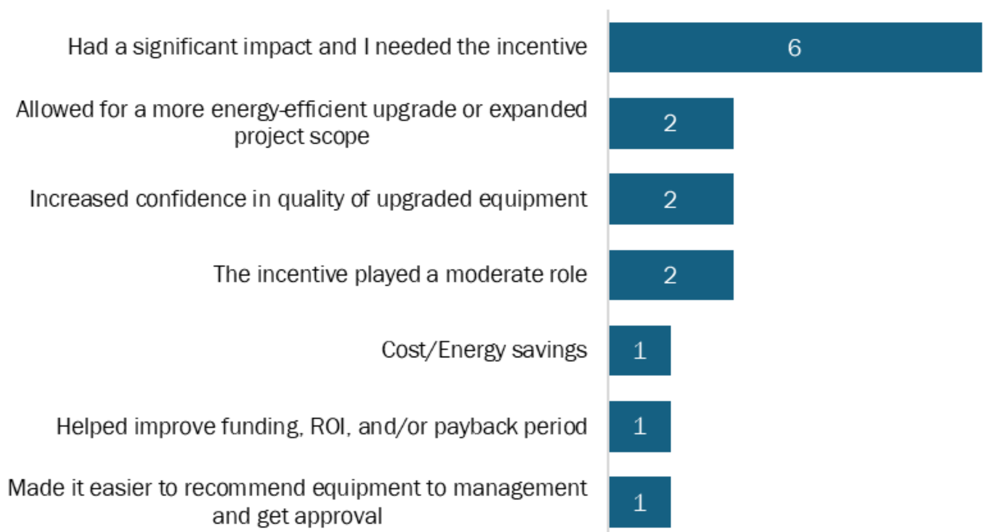
Figure 9-33: Other Influential Factors on Upgrade Decision (Open-ended and multiple responses allowed; n=2)*



* Counts displayed rather than percentage due to small n. Does not sum to 2 due to multiple responses.

The survey asked respondents to explain, in their own words, what impact (if any) the financial support or technical assistance they received from the program had on their decisions to install the program-incentivized equipment when they did, as shown in Figure 9-34. The most common responses included that the program had a significant impact and that they needed the incentive (six respondents). Other responses were that the program allowed for a more energy-efficient upgrade or expanded project scope (two respondents), increased confidence in quality of upgraded equipment (two respondents), and that the program played a moderate role (two respondents).

Figure 9-34: Program Impact on Decision to Install Equipment (Open-ended and multiple responses allowed; n=11)

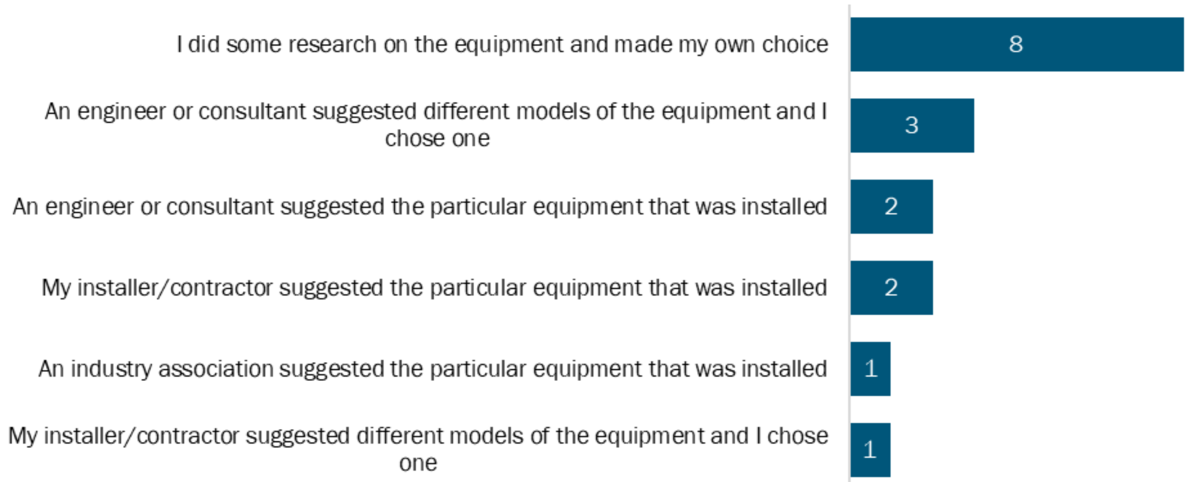


*Counts displayed rather than percentage due to small n. Does not sum to 11 due to multiple response.

As shown in Figure 9-35, eight respondents chose their equipment based on their own research, which was more than twice the number of participants who chose based on suggested equipment models provided by an engineer or consultant (three respondents).

Respondents also commonly chose equipment from a shortlist of equipment models provided by an engineer or consultant (two respondents), or a suggestion from an installer/contractor (two respondents).

Figure 9-35: Equipment Selection Process
(Open-ended and multiple responses allowed; n=17)*



*Counts displayed rather than percentage due to small n. Does not sum to 17 because multiple responses were allowed.

SPILLOVER

To estimate the SO rate, the survey asked participants if they installed any energy-efficient equipment in PY2024 for which they did not receive an incentive following their Retrofit Program participation. Respondents did not install any spillover measures in the Greenhouse stream.

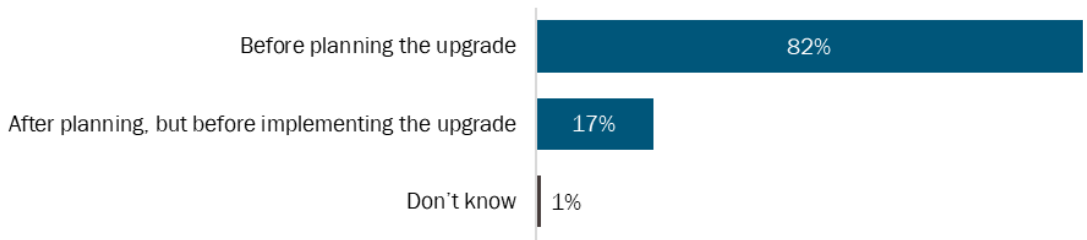
E.2.3 Custom Stream

FREE-RIDERSHIP

The extent of FR within the program was assessed by surveying Retrofit Program participants to understand their experiences and plans before they learned of 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.

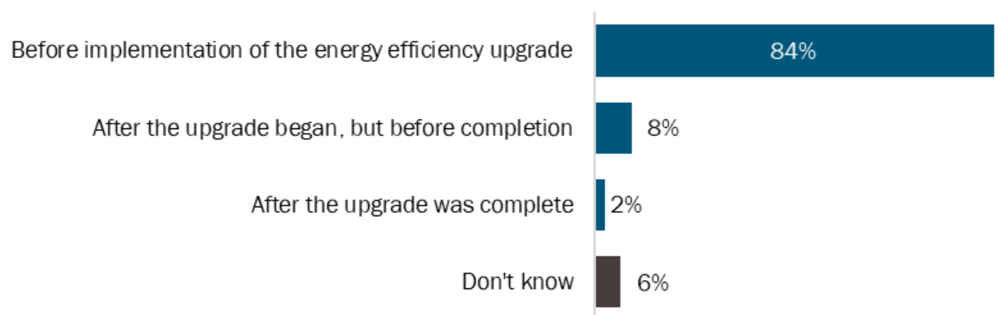
Over four-fifths of respondents (82%) reported learning that they could receive energy-efficiency incentives through the Retrofit Program before starting to plan upgrades, as shown in Figure 9-36. This may suggest the program influenced many of these respondents' decisions to begin their projects. Nearly one-fifth of respondents (17%) learned about the program after their planning started but before implementing the upgrade. While these responses did not directly impact the FR score, they provided additional context for understanding participants' decision-making processes.

Figure 9-36: When Participants First Learned about the Program (n=126)



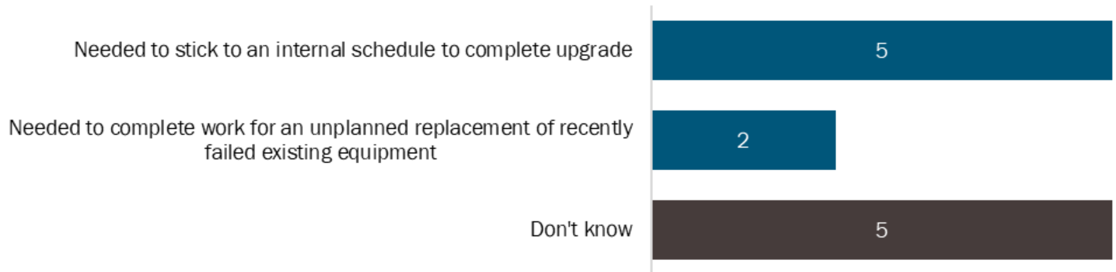
The survey then asked participants about the timing of their program application in relation to the start of their energy-efficient upgrades, as shown in Figure 9-37. The majority of respondents (84%) indicated they applied before their company began implementing the upgrade, suggesting most participants applied to the program as intended. Less than one-tenth (8%) did so after their energy-efficiency upgrade began but before its completion. The remainder did so after completing the upgrade (2%) or responded that they did not know (6%). Much like the previous question, this question was not used to calculate the FR score yet provided additional context regarding participant intentions.

Figure 9-37: Timing of Program Application (n=126)



Respondents whose companies submitted a Retrofit Program application after starting an energy-efficiency upgrade were asked their reasons for doing so, as shown in Figure 9-38. The most common reason was a need to stick to an internal schedule (five respondents) and the remainder answered they needed to complete work for an unplanned replacement of failed equipment (two respondents). Five respondents answered that they did not know.

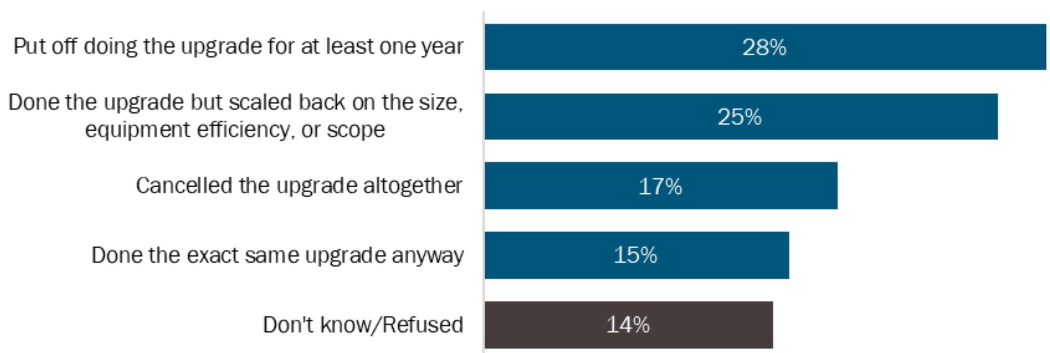
Figure 9-38: Reason for Submitting After Starting Upgrade (n=12)*



*Counts displayed rather than percentage due to small n.

Respondents were asked what they would have done in the program's absence, as shown in Figure 9-39. Almost one-fifth of respondents (15%) would have done the "exact same upgrade," indicative of higher FR for these respondents. Nearly one-half of respondents (45%) showed no indication of FR as they stated they would have put off the upgrade for at least one year (28%) or cancelled their upgrade altogether (17%) had the program not been available to them. Other respondents were considered partial free-riders if they would have scaled back on the size, efficiency, or scope of their project (25%), they did not know what they would have done in the program's absence, or declined to answer (14%). The evaluation team factored responses from this participant intent question into the FR analysis.

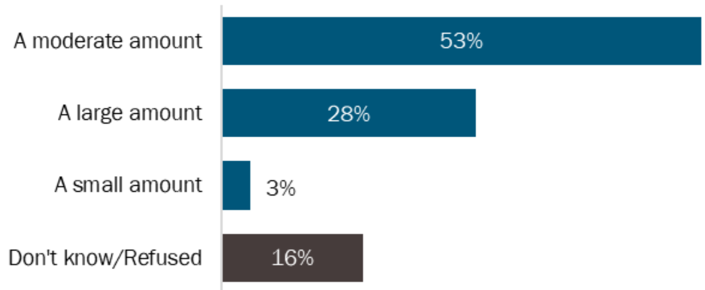
Figure 9-39: Actions in the Absence of Program (n=126)*



*Does not sum to 100% due to rounding.

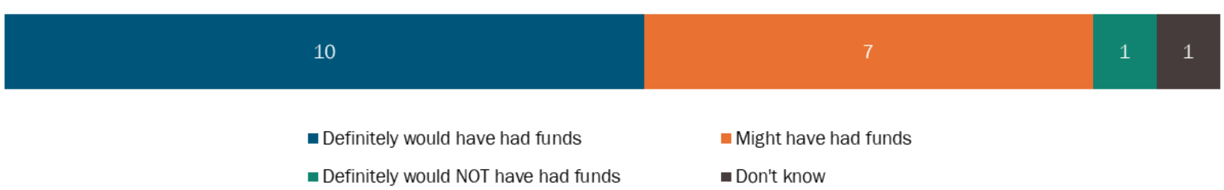
Respondents who indicated that they would have scaled back on their project were asked to describe how much they would have reduced the project's size, scope, or efficiency, as shown in Figure 9-40. Over one-half of respondents (53%) would have scaled it back a moderate amount and over one-fourth (28%) would have scaled it back a large 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. This question was not used to calculate the FR score, though it provided additional context for participant intentions.

Figure 9-40: Scaled Back Size or Extent of Upgrade in the Absence of Program Incentives (n=32)



Respondents who stated that they would have done the "exact same upgrade" in the program's absence were asked to confirm that they would have had funds to cover the project's entire cost without program funding, as shown in Figure 9-41. Ten out of 19 respondents stated they definitely would have had the funds to cover all project costs. Seven respondents might have had the funds, and one respondent definitely would not have had funds to cover all project costs. 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 do independently. This participant intent question was factored into the FR analysis.

Figure 9-41: Availability of Funds in the Absence of Program Incentives (n=19)*

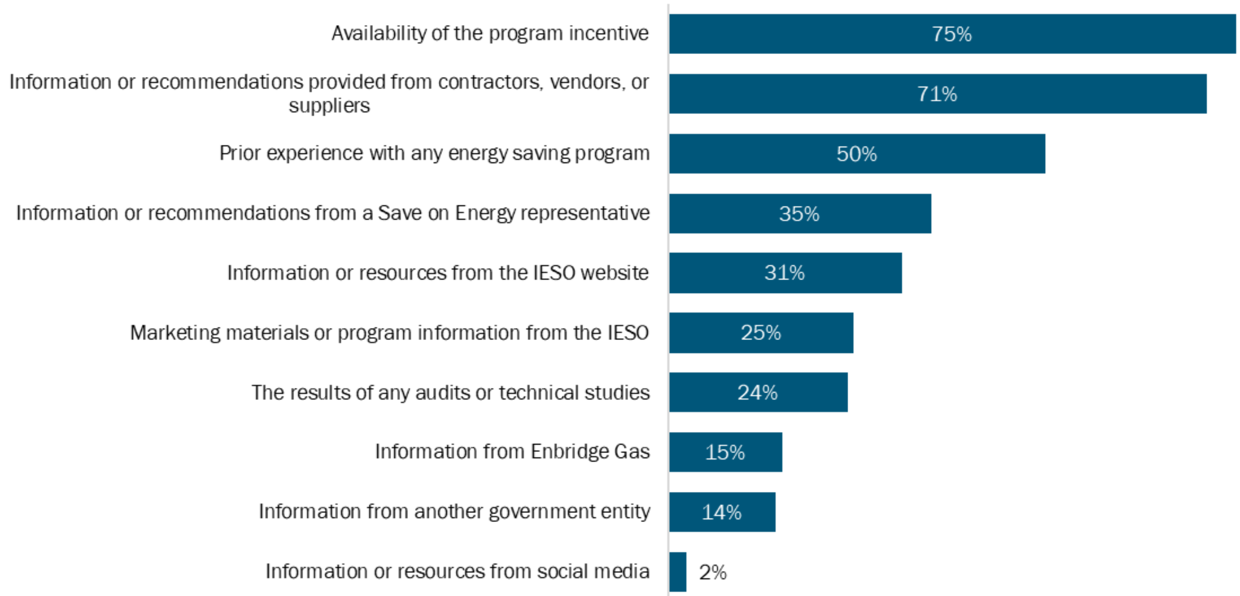


*Counts displayed rather than percentage due to small n.

Respondents were asked how influential various program features were on their decisions to install energy-efficient equipment, as shown in Figure 9-42. They rated each feature's influence on a scale from one to five, where one indicates it was "not at all influential" and five indicates it was "extremely influential." The highest-rated program features were the availability of the program incentive (75% with a rating of four or five) and recommendations from contractors, vendors, or suppliers (71% with a rating of four or five for each response). The least influential program feature was information or resources from social media (2% with a rating of four or five). This question, which focused on the program's influence and prior questions about customer intentions, was used to estimate the FR score.

Further, findings from this question emphasized the contractor, vendor, and supplier networks' strength in driving Retrofit Program engagement. Their interactions with customers were valuable on their own, but, more generally, they helped familiarize customers with energy-saving programs and could influence future participation beyond the Retrofit Program.

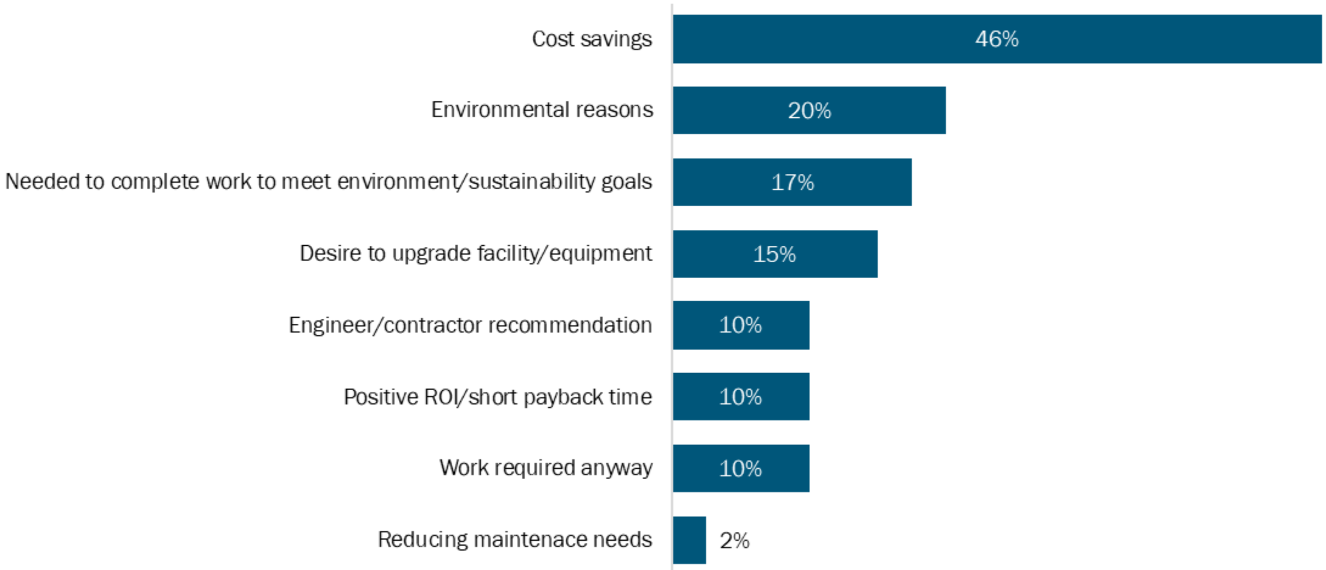
Figure 9-42: Influence of Program Features on Participation (n=126)*
(Rating of 4 or 5 on a scale from 1 to 5)



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

Respondents were asked whether any other factors played “a great role” in influencing their organization to install energy-efficient equipment, as shown in Figure 9-43. Nearly one-half of respondents (46%) reported the cost savings influenced their company to do the energy efficient equipment upgrades. Other common responses included a desire to reduce environmental harm (20%) and the need to complete work to meet environmental/sustainability goals (17%).

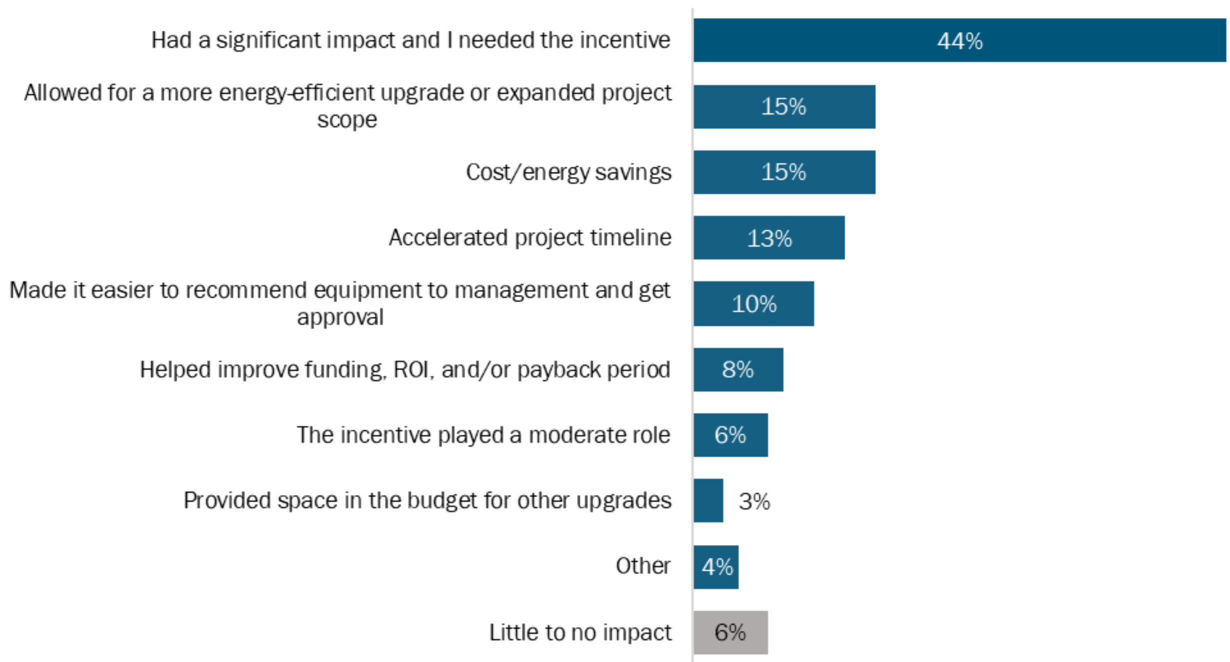
Figure 9-43: Other Influential Factors on Upgrade Decision
(Open-ended and multiple responses allowed; n=41)*



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

The survey asked respondents to explain, in their own words, what impact (if any) the financial support or technical assistance they received from the program had on their decisions to install the program-incentivized equipment when they did, as shown in Figure 9-44. The most common response was that the program played a significant role and that they needed the incentive (44%). Other common responses related to the program allowing for a more energy-efficient upgrade or expanded project scope (15%) and achieving cost/energy savings (15%). Responses categorized under "Other" included that it changed the equipment bought by the customer (1%), reducing environmental harm (1%), and increased confidence in quality of upgraded equipment (1%).

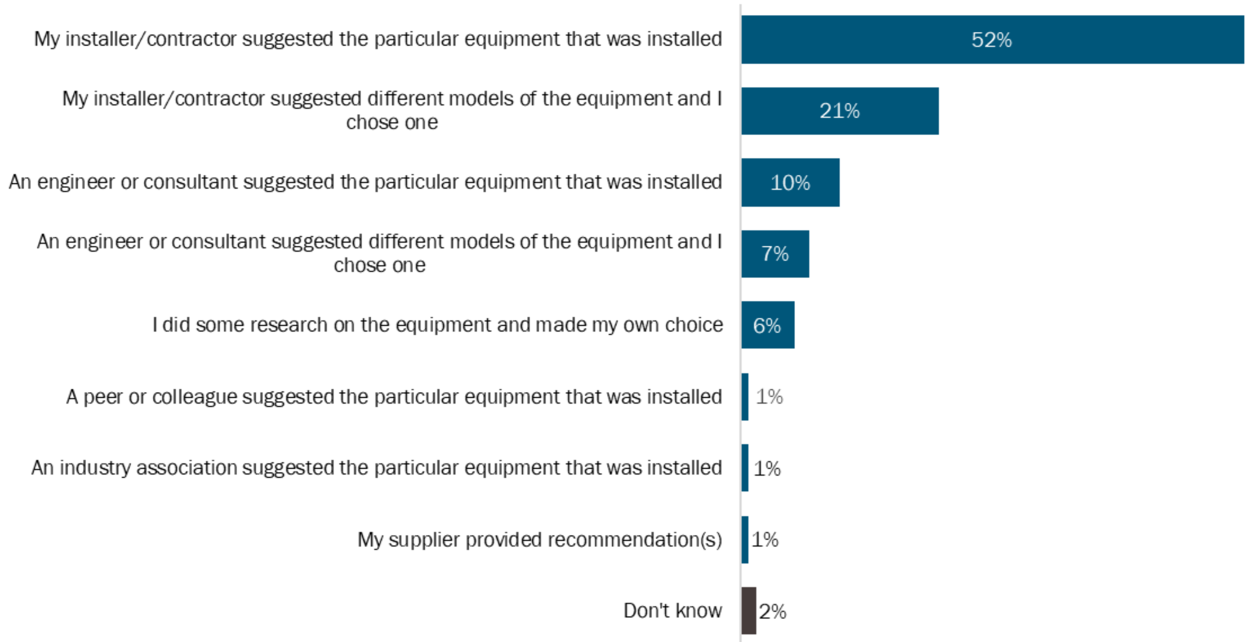
Figure 9-44: Program Impact on Decision to Install Equipment (Open-ended and multiple responses allowed; n=80)*



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

As shown in Figure 9-45, over one-half (52%) of surveyed participants selected equipment based on their installer's or contractor's suggestions, which was more than twice the number of participants who chose from a shortlist of equipment models provided by their installer or contractor (21%) or followed an engineer's or consultant's suggestions (10%). This reinforces the importance of the contractors' role in helping drive customers to efficient equipment decisions.

Figure 9-45: Equipment Selection Process
(Open-ended and multiple responses allowed; n=126)*



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

SPILLOVER

To estimate the SO rate, the survey asked participants if they installed any energy-efficient equipment in PY2024 for which they did not receive an incentive following their Retrofit Program participation. Over one-tenth of respondents (14%) reported installing new equipment. Table 9-24 displays the types of non-incentivized equipment installed by companies after their Retrofit projects were completed. Some survey respondents installed multiple equipment types, with non-incentivized lighting the most common equipment installed. One-tenth (10%) of all survey respondents installed non-incentivized lighting, double any other equipment type.

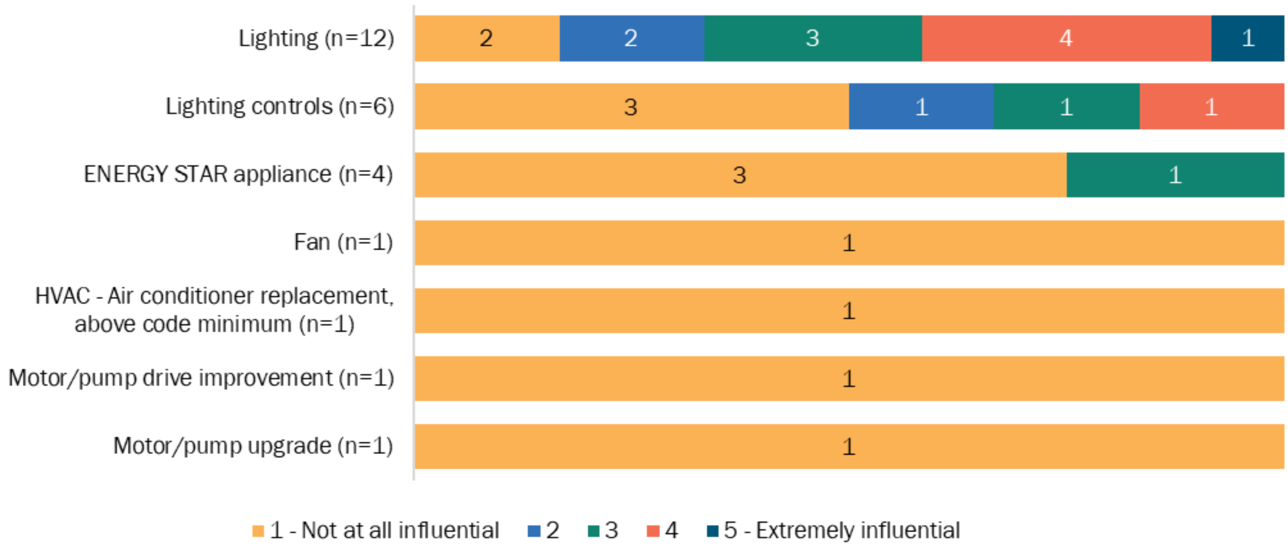
Table 9-24: Types of Upgrades Installed after Program Participation (Open-ended and multiple responses allowed; n=18)*

Spillover Equipment	Respondents
Lighting	12
Lighting Controls	6
ENERGY STAR Appliance	4
Fan	1
HVAC—Air conditioner replacement, above code minimum	1
Motor/Pump Improvement	1
Motor/Pump Upgrade	1

*Does not sum to 18 due to multiple responses.

The team then asked respondents what influence level their Retrofit Program participation had on their decision to install additional energy-efficient equipment. Participants rated the program's influence on a scale from one to five, where one indicates the program was "not at all influential" and five indicates the program was "extremely influential." Responses varied, with some respondents indicating the program was influential in their decision to install energy-efficient equipment (ratings of 3.0 and above), as shown in Figure 9-46.

Figure 9-46: Program Influence on Equipment Installed Outside the Program (n=18)*



*Counts displayed rather than percentage due to small n.

Participants who indicated that they installed program-influenced, non-incentivized equipment were then asked a series of follow-up questions addressing capacity, efficiency, and annual HOU. Table 9-25 through Table 9-29 present the results of these detailed questions, which were used within the NTG algorithm to attribute SO savings for each equipment installation. SO savings were primarily driven by installations of 1,426 new linear LEDs.

Table 9-25: Air Conditioner Sizes (n=1)*

Spillover Appliance	Respondents	Quantity
Refrigerator	1	5

*Counts displayed rather than percentage due to small n.

Table 9-26: Type of Lighting Installed (Multiple responses allowed; n=8)*

Lighting Type	Respondents
LED linear or troffer	6
LED exterior	4

Table 9-27: LED Exterior Lighting Mount (n=4)*

Location	Respondents	Quantity Installed	Max Installed
Against building	3	36	14
Under canopy	1	20	20

*Counts displayed rather than percentage due to small n.

Table 9-28: Quantity of Linear LED Fixtures (Multiple responses allowed; n=6)*

Respondents	Fixture Quantity	Max Installed
6	1,426	910

*Counts displayed rather than percentage due to small n.

Table 9-29: Lighting Controls (Multiple responses allowed; n=2)*

Lighting Control Type	Respondents	Max Installed
Occupancy Sensor	2	2

*Counts displayed rather than percentage due to small n.

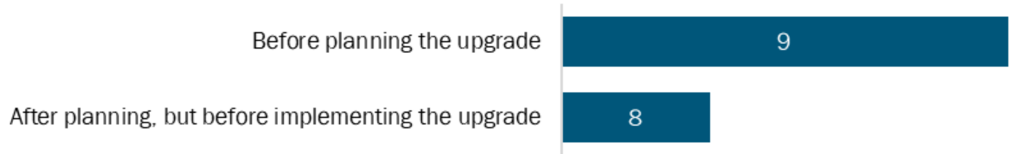
E.2.4 Enhanced Local Initiatives Program

FREE-RIDERSHIP

The extent of FR within the program was assessed by surveying Retrofit Program participants to understand their experiences and plans before they learned of 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.

Nine of 17 respondents reported learning they could receive energy-efficiency incentives through the Retrofit Program before starting to plan upgrades, as shown in Figure 9-47. This may suggest the program influenced many of these respondents' decisions to begin their projects. However, eight respondents learned about the program after their planning started but before implementing the upgrade. While these responses did not directly impact the FR score, they provided additional context for understanding participants' decision-making processes.

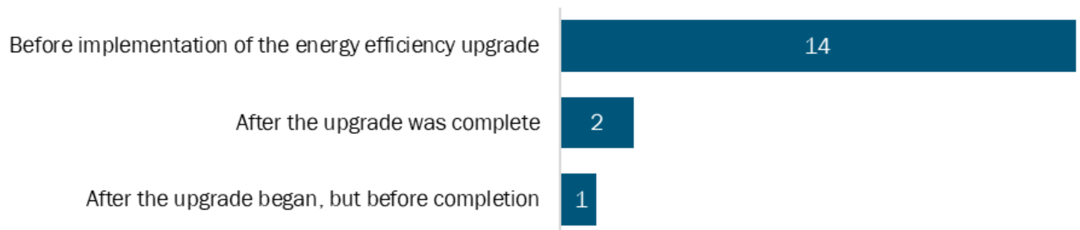
Figure 9-47: When Participants First Learned about the Program (n=17)*



*Counts displayed rather than percentage due to small n.

The survey then asked participants about the timing of their program application in relation to the start of their energy-efficient upgrades, as shown in Figure 9-48. The majority of respondents, 14 of 17, indicated they applied before their company began implementing the upgrade, suggesting most participants applied to the program as intended. Only two respondents did so after completing the upgrade. The remainder, one participant, did so after their energy-efficiency upgrade began but before its completion. Much like the previous question, this question was not used to calculate the FR score yet provided additional context regarding participant intentions.

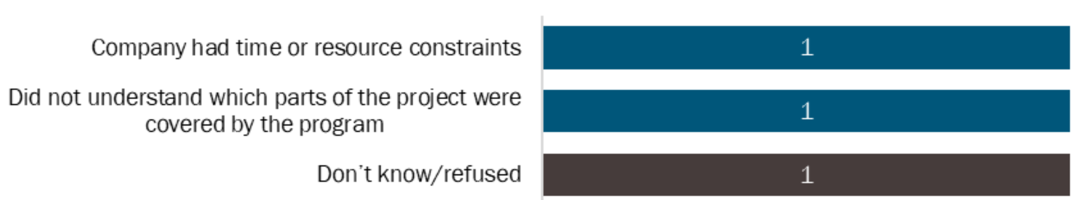
Figure 9-48: Timing of Program Application (n=17)*



*Counts displayed rather than percentage due to small n.

Respondents whose companies submitted a Retrofit Program application after starting an energy-efficiency upgrade were asked their reasons for doing so, as shown in Figure 9-49. One respondent had company time or resource constraints, one did not understand which parts of the project were covered by the program, and one did not know.

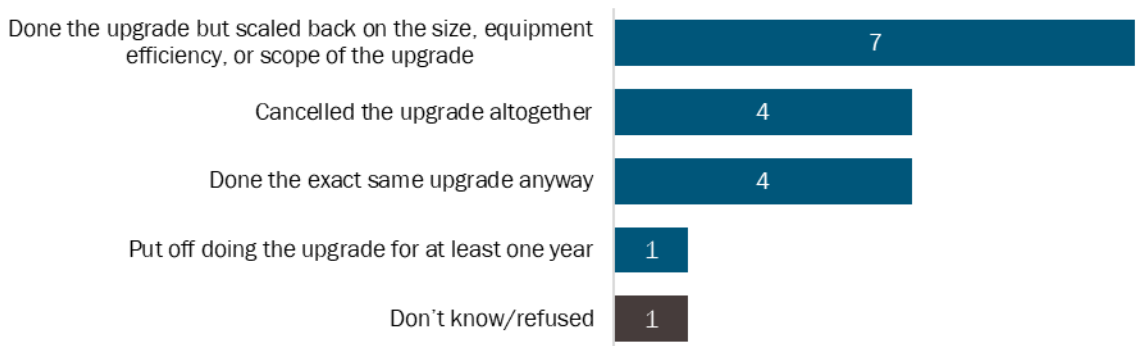
Figure 9-49: Reason for Submitting After Starting Upgrade (n=3)*



*Counts displayed rather than percentage due to small n.

Respondents were asked what they would have done in the program's absence, as shown in Figure 9-50. Four participants stated they would have done the "exact same upgrade" in the program's absence, indicative of higher FR for these respondents. Five respondents showed no indication of FR as they stated they would have put off the upgrade for at least one year (one respondent) or would have cancelled their upgrade altogether (four respondents) had the program not been available to them. Other respondents were considered partial free riders if they reported that they would have scaled back on their project's size, efficiency, or scope (seven respondents) or if they did not know what they would have done in the program's absence or declined to answer (one respondent). The evaluation team factored responses from this participant intent question into the FR analysis.

Figure 9-50: Actions in the Absence of Program (n=17)*



* Counts displayed rather than percentage due to small n.

Respondents who indicated that they would have scaled back on their project were asked to describe how much they would have reduced the project's size, scope, or efficiency, as shown in Figure 9-51. Five of seven respondents would have scaled it back a moderate amount and two of seven would have scaled it back by a small 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. This question was not used to calculate the FR score, though it provided additional context for participant intentions.

Figure 9-51: Scaled Back Size or Extent of Upgrade in the Absence of Program Incentives (n=7)*

*Counts displayed rather than percentage due to small n.

Respondents who stated that they would have done the "exact same upgrade" in the program's absence were asked to confirm that they would have had funds to cover the project's entire cost without program funding, as shown in Figure 9-52. One of four respondents stated they definitely would have had the funds to cover all project costs. Two respondents might have had the funds, and one respondent definitely would not have had funds to cover all project costs. 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 do independently. This participant intent question was factored into the FR analysis.

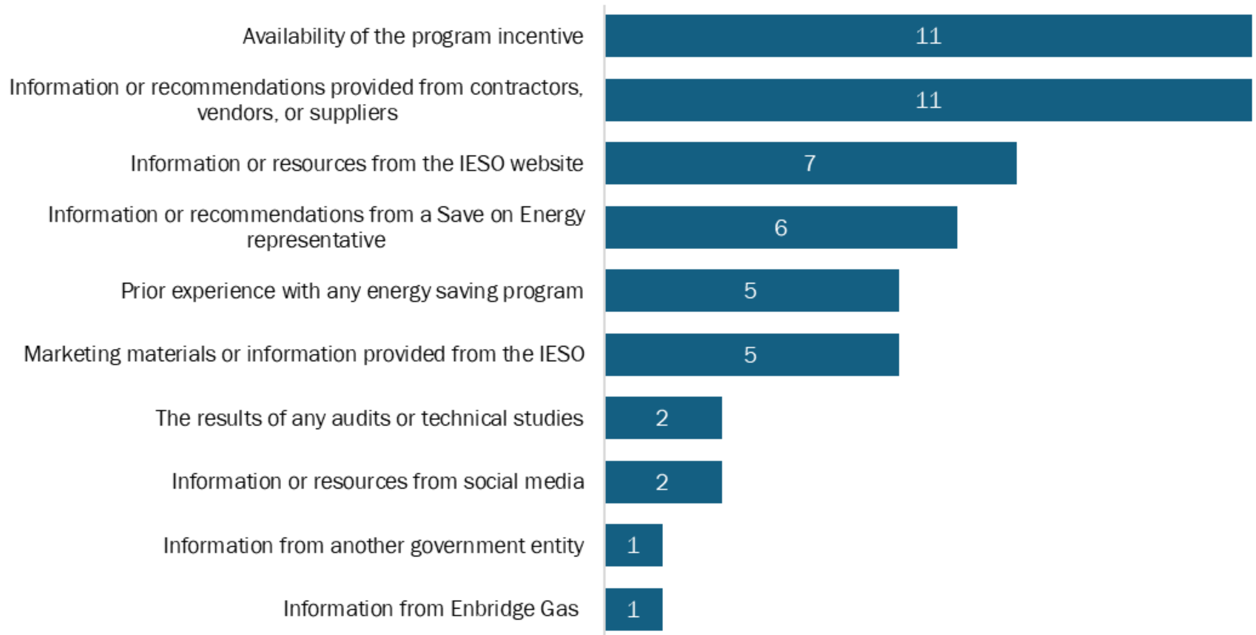
Figure 9-52: Availability of Funds in the Absence of Program Incentives (n=4)*

*Counts displayed rather than percentage due to small n.

Respondents were asked how influential various program features were on their decisions to install energy-efficient equipment, as shown in Figure 9-53. They rated each feature's influence on a scale from one to five, where one indicates it was "not at all influential" and five indicates it was "extremely influential." The highest-rated program features were the availability of the incentive (11 responses with a rating of four or five) and recommendations from contractors, vendors, or suppliers (11 responses). The least influential program feature was information from Enbridge Gas (one respondent with a rating of four or five) and information from another government entity (one respondent). This question, which focused on the program's influence and prior questions about customer intentions, was used to estimate the FR score.

Further, findings from this question emphasized the contractor, vendor, and supplier networks' strength in driving Retrofit Program engagement. Their interactions with customers were valuable on their own, but, more generally, they helped familiarize customers with energy-saving programs and could influence future participation beyond the Retrofit Program.

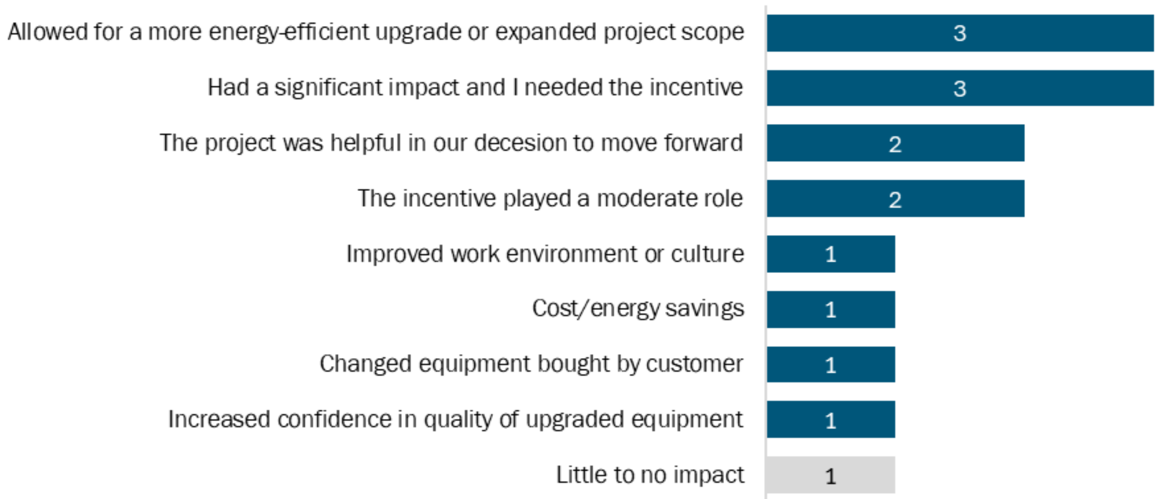
Figure 9-53: Influence of Program Features on Participation (n=17)*
(Rating of 4 or 5 on a scale from 1 to 5)



*Counts displayed rather than percentage due to small n. Does not sum to 17 due to multiple responses.

The survey asked respondents to explain, in their own words, what impact (if any) the financial support or technical assistance they received from the program had on their decisions to install the program-incentivized equipment when they did, as shown in Figure 9-54. The most common responses were that the program allowed for a more energy-efficient upgrade or expended project scope (3 of 13 respondents) and that the program played a great role and that they needed the incentive (3 respondents). Other responses related to the project being helpful in the decision to move forward (2 respondents) and the incentive playing a moderate role (2 respondents).

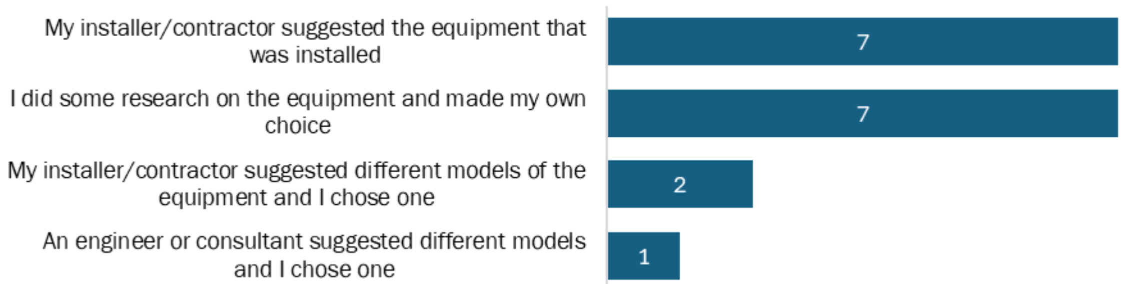
Figure 9-54: Program Impact on Decision to Install Equipment (Open-ended and multiple responses allowed; n=13)*



*Counts displayed rather than percentage due to small n. Does not sum to 13 due to multiple responses.

As shown in Figure 9-55, seven of the 17 surveyed participants selected equipment based on their installer's or contractor's suggestion and seven participants did their own research. Two participants chose from a shortlist of equipment models provided by their installer or contractor and one respondent took their engineer's or consultant's suggestions. This reinforces the importance of the installer or contractors' role in helping drive many customers to efficient equipment decisions, even if some participants also selected their own equipment.

Figure 9-55: Equipment Selection Process (Open-ended and multiple responses allowed; n=17)*



* Counts displayed rather than percentage due to small n.

SPILLOVER

To estimate the SO rate, the survey asked participants if they installed any energy-efficient equipment in PY2024 for which they did not receive an incentive following their Retrofit

Program participation. Respondents did not install any spillover measures in the Enhanced Local Initiatives Program.

E.3 Additional Participant Process Results

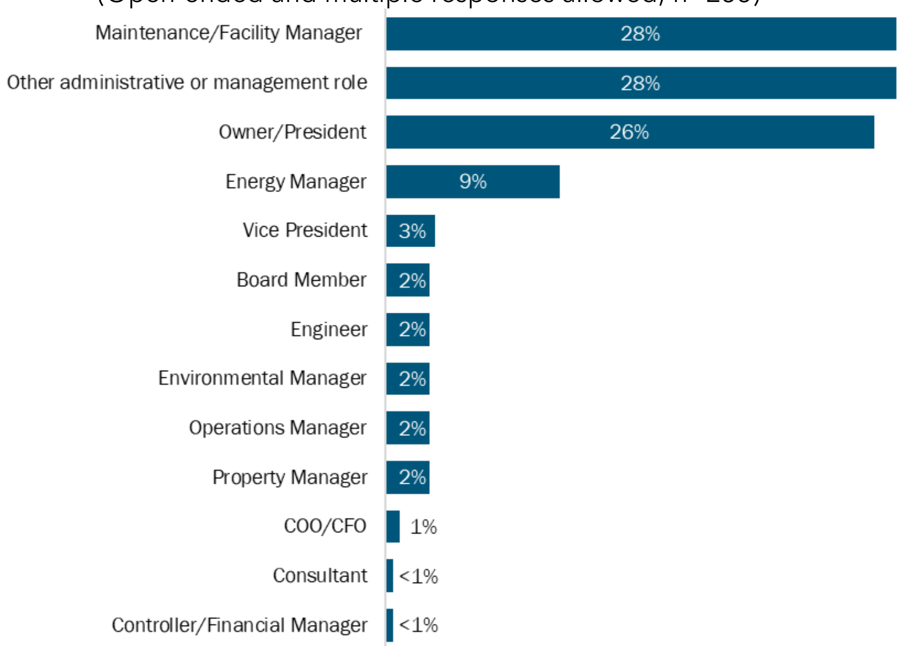
FIRMOGRAPHICS

Respondents were asked various questions to collect information such as job titles, ownership status, responsibilities in relation to the program, and training received. Details on respondents' companies were also gathered during the survey.

As presented in Figure 9-56, nearly all titles that respondents shared indicated they held either an administrative or managerial role. Close to one-third of respondents were maintenance/facility managers (28%) or they specified an administrative or management role other than those listed in the survey (28%). Over one-fourth of respondents (26%) were the company's owner and/or president.

Figure 9-56: Titles of Respondent

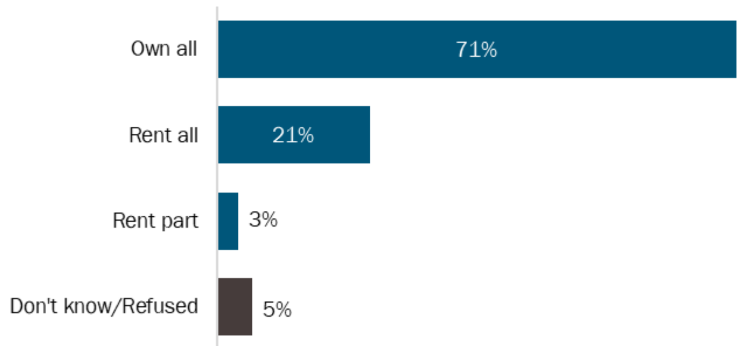
(Open-ended and multiple responses allowed; n=255)*



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

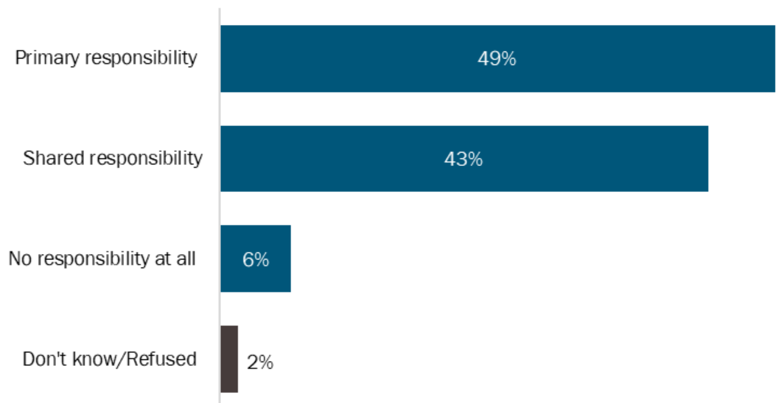
As shown in Figure 9-57, close to three-fourths of respondents (71%) owned all the facilities where the program upgrades were made, more than one-fifth (21%) rented all the facilities, and 3% rented part of the facilities.

Figure 9-57: Ownership Status (n=255)



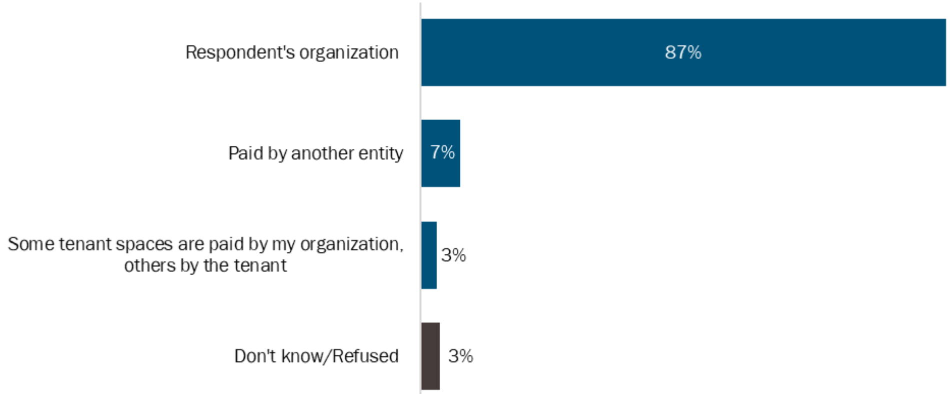
Respondents specified whether they held primary or shared responsibility for the budget and/or expenditure decisions related to the Retrofit Program project. Close to one-half of respondents (49%) had primary responsibility and over two-fifths (43%) shared such responsibilities, as shown in Figure 9-58. Relatively few (6%) respondents stated they did not have responsibilities for budget and/or expenditure decisions.

Figure 9-58: Responsibility for Budget and Expenditures (n=255)



Most respondents (87%) indicated that their organization paid the electricity bills for the facilities where the program updates were made, as shown in Figure 9-59. Less than one-tenth of respondents each reported another entity (7%) or a mix of their organization and the tenant (3%) paid the electricity bills.

Figure 9-59: Entity that Pays the Facility's Electricity Bills (n=255)*

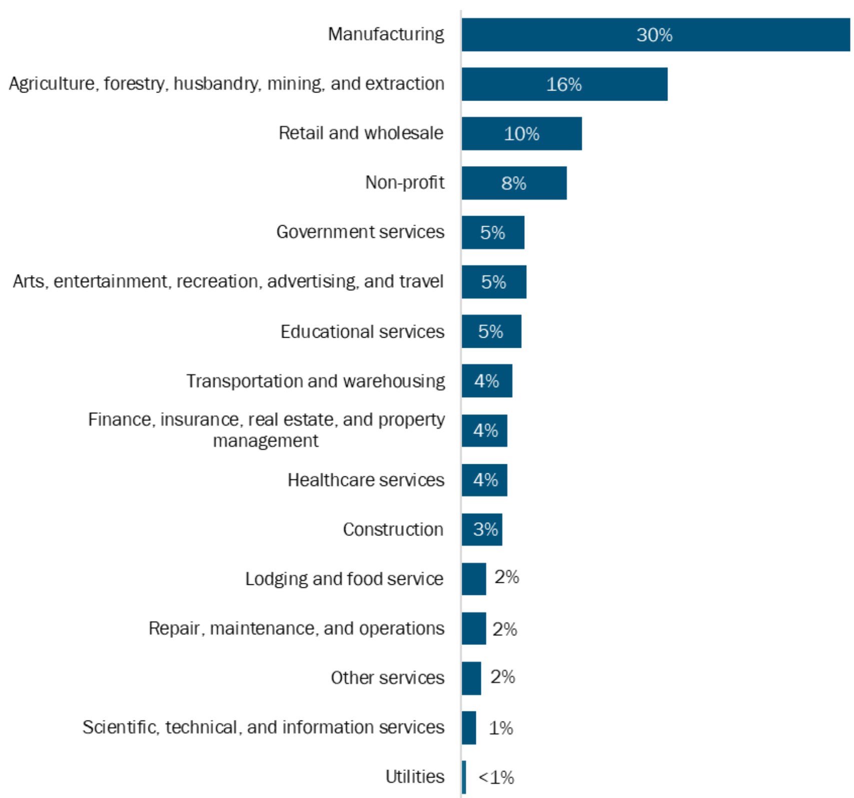


*Does not sum to 100% due to rounding.

Respondent business categories varied, as presented in Figure 9-60. Almost one-third (30%) of respondents work in manufacturing, close to one-fifth (16%) work in agriculture, forestry, husbandry, mining, or extraction, and one-tenth (10%) work in retail and wholesale.

Figure 9-60: Respondents' Business Category

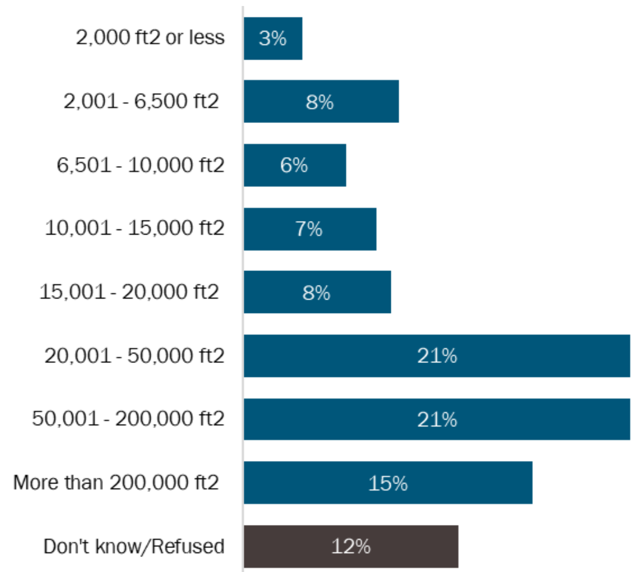
(Open-ended and multiple responses allowed; n=253)*



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

Participants were asked to provide their facilities' total area. Most frequently, facility sizes ranged from 20,001 to 50,000 sq. ft. (21%), and more than 200,000 sq. ft. (15%) as shown in Figure 9-61.

Figure 9-61: Total Square Footage for All Buildings (n=253)*



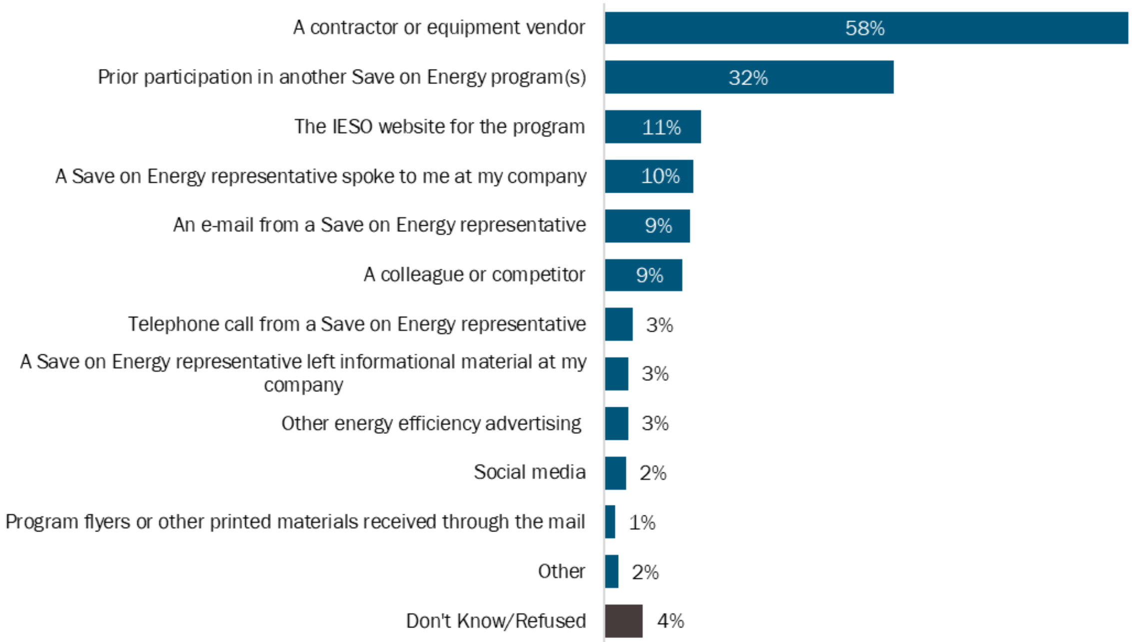
*Does not sum to 100% due to rounding.

PROGRAM AWARENESS

Figure 9-62 lists ways that respondents heard about the program. Most commonly, respondents heard about the program through a contractor or equipment vendor (58%) or from prior participation in another Save on Energy program (32%). Section 6.3.2 includes additional discussion about program awareness.

Figure 9-62: Sources of Program Awareness

(Open-ended and multiple responses allowed; n=255)*

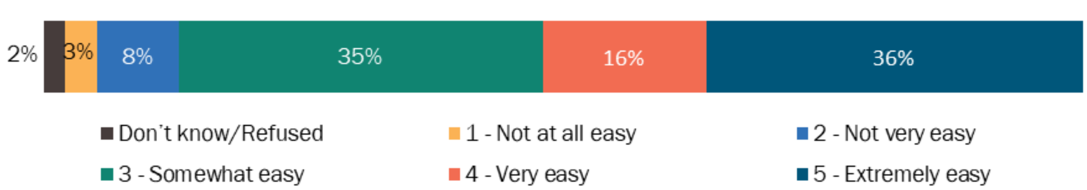


* Does not add to 100% due to multiple responses.

PROGRAM EXPERIENCE

When asked about the ease of participating in the Save on Energy Retrofit Program (shown in Figure 9-63), respondents used a scale of one to five, where one means "not at all easy" and five means "extremely easy." More than one-half (52%) of respondents rated their program participation as a four or five. More than one-third (35%) of respondents rated their program participation as a three, and just over one-tenth (11%) rated their program participation as a one or two. Section 6.3.2 includes additional discussion about program awareness.

Figure 9-63: Ease of Program Participation (n=255)

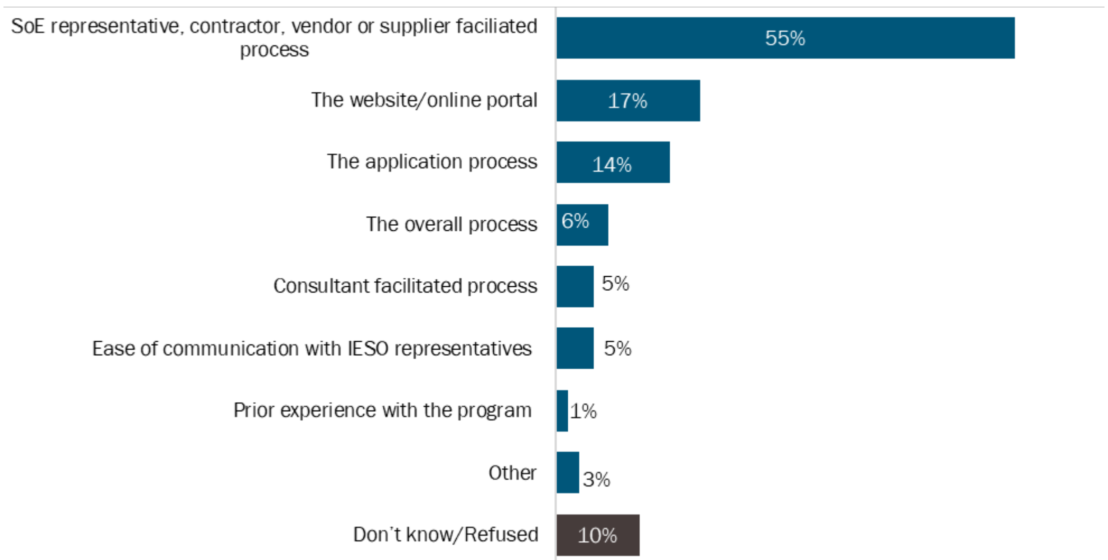


Respondents who rated their participation as somewhat to extremely easy (a rating of 3 to 5) were asked if there were specific aspects of the program that made participation easy

(Figure 9-64). Most respondents (55%) reported that the facilitation by a Save on Energy representative, contractor, vendor, or supplier helped make it easy to participate in the program. Section 6.3.3 includes additional discussion about these aspects.

Figure 9-64: Aspects that Facilitated Participation

(Open-ended and multiple responses allowed; n=222)*

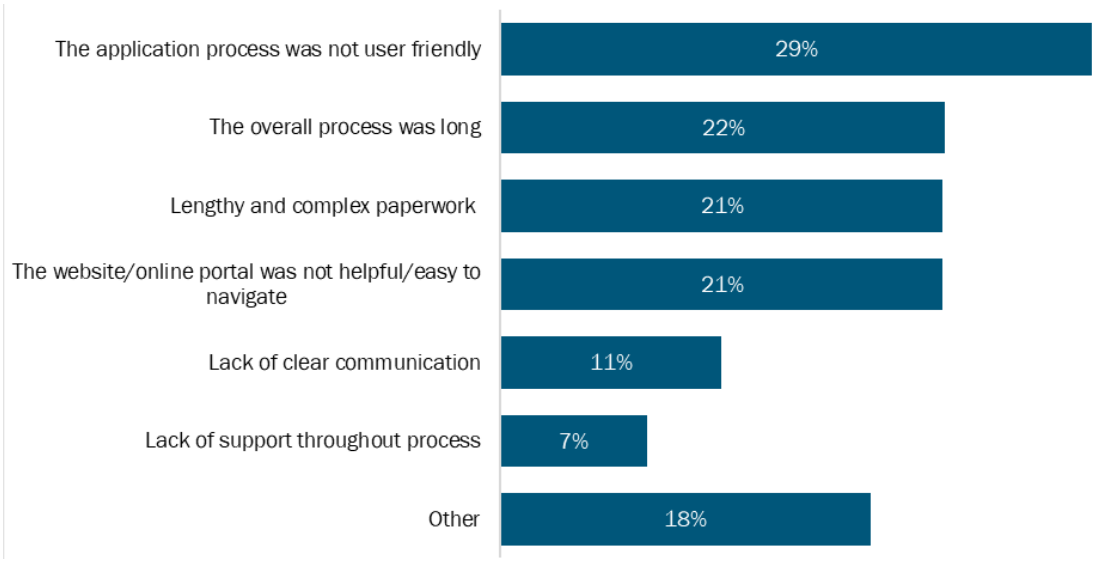


* Does not add to 100% due to multiple responses.

Respondents who rated their participation as not at all or not very easy (a rating of 1 or 2) were asked if there were specific aspects of the program that made participation challenging (Figure 9-65). Most commonly, these respondents indicated that the application process (29%) and the long process (22%) contributed to their complicated participation experience. Responses in the "other" category included the following: difficultly understanding product details and requirements, number of contacts to communicate with during the participation process, and completing the evaluation survey. Section 6.3.3 includes additional discussion about these aspects.

Figure 9-65: Aspects that Complicated Participation

(Open-ended and multiple responses allowed; n=28)*

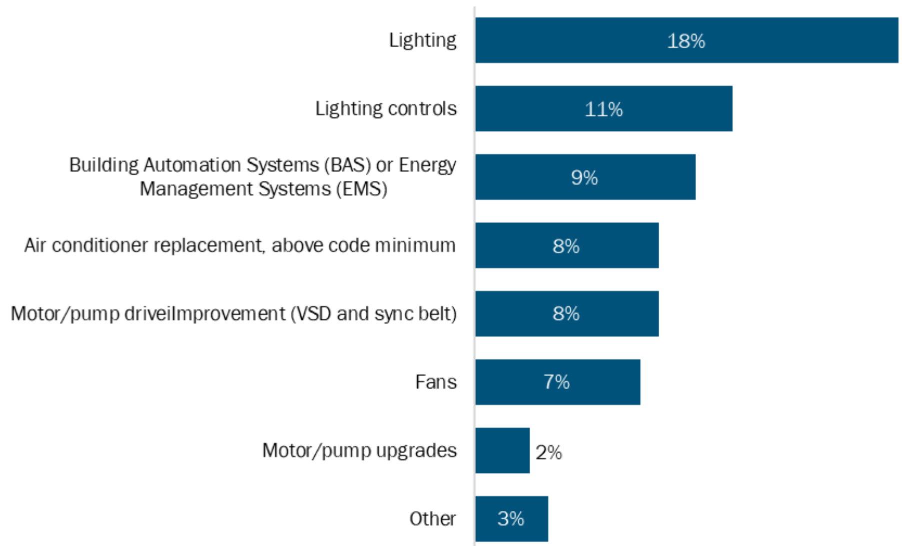


* Does not add to 100% due to multiple responses.

One-fifth of respondents (20%), upon completing the project, decided not to install energy-efficient equipment that initially interested them. These respondents were then asked what, if any, energy-efficient equipment was initially of interest to their company but that they ultimately decided not to install. As shown in Figure 9-66, these respondents commonly reported deciding not to install lighting (18%), lighting controls (11%), and building automation systems and energy management systems (9%). Section 6.3.3 includes additional discussion about decisions to not install additional energy-efficient equipment.

Figure 9-66: Energy Efficient Equipment Not Installed

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

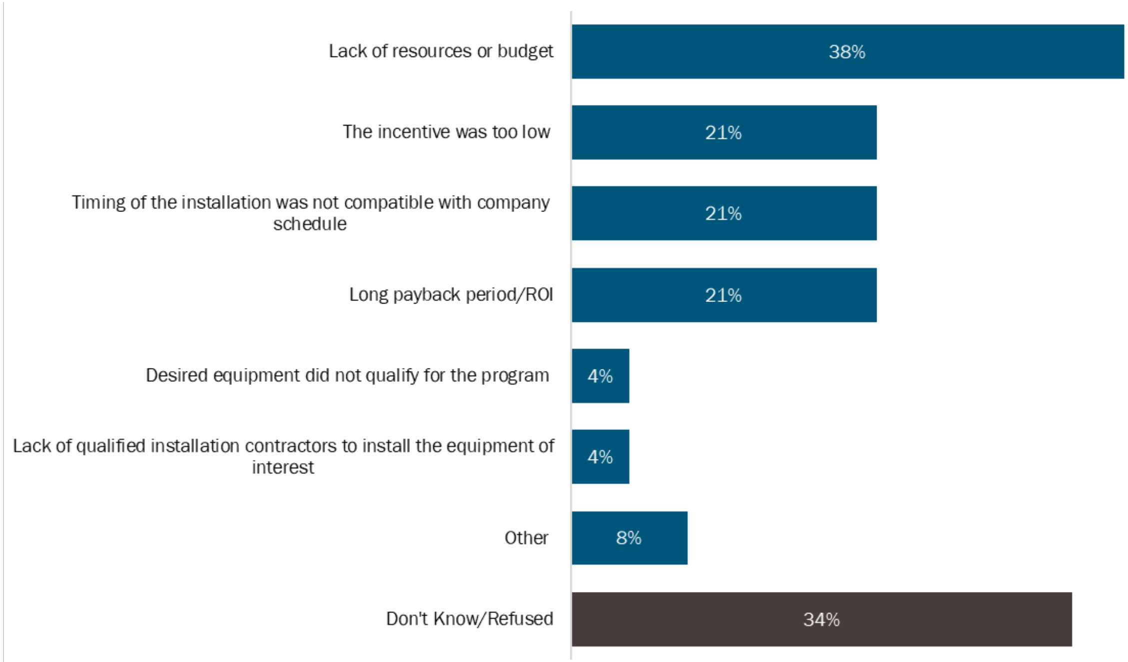


*Does not sum to 100% due to multiple responses.

The survey then asked these same respondents why they decided not to install the energy-efficient equipment initially of interest to their company. As shown in Figure 9-67, more than one-third of respondents (38%) reported lack of resources or budget as a reason for not installing the equipment. Respondents also commonly mentioned that the incentive was too low (21%), the timing of the installation was not compatible with their company's schedule (21%), and the long payback period (21%). Responses in the "other" category included the following: lack of qualified contractors to install the equipment, contractors unable to explain benefits, desired equipment did not qualify for program, and timing issues. Section 6.3.3 includes additional discussion about decisions for not installing additional energy-efficient equipment.

Figure 9-67: Reasons for Not Installing All Equipment Initially of Interest*

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

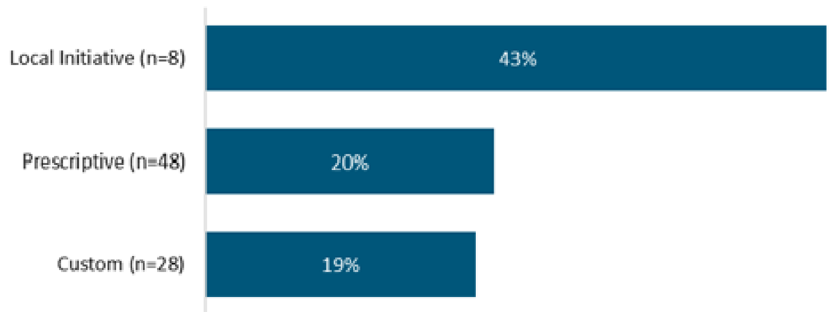


*Does not sum to 100% due to multiple responses.

NON-LIGHTING EQUIPMENT

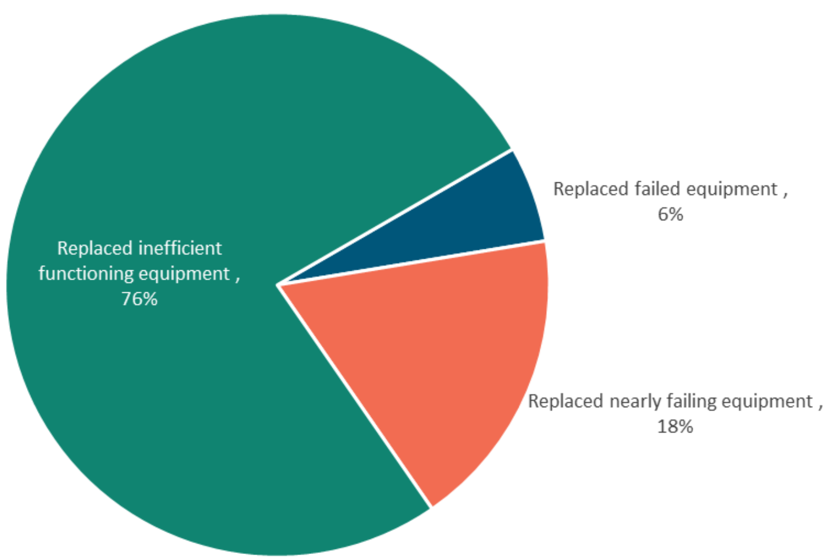
Respondents were asked what percent of their non-lighting project costs were covered by the incentive they received through the program. Figure 9-68 shows ranges of percentages of project costs covered by the program for the Prescriptive and Custom streams and the Enhanced Local Initiatives program, as reported by participants. On average, 20% of non-lighting project costs were covered in the Prescriptive stream, 19% in the Custom stream, and 43% in the Enhanced Local Initiatives Program. Section 6.3.4 includes additional discussion on this topic.

Figure 9-68: Average Percent of Non-Lighting Project Costs Covered by the Program



Respondents who provided estimates of the percentage of their non-lighting project costs that were covered by the program were then asked what percent of their non-lighting upgrades were made to replace failed equipment, nearly failed equipment, or inefficient functioning equipment (Figure 9-69). On average, respondents indicated that their non-lighting upgrades most often replace inefficient functioning equipment (76%). Less often they replace nearly failed equipment (18%) or failed equipment (6%). Section 6.3.4 includes additional discussion on this topic.

Figure 9-69: Average Percent of Equipment Types Non-Lighting Upgrades Replaced (n=54)*



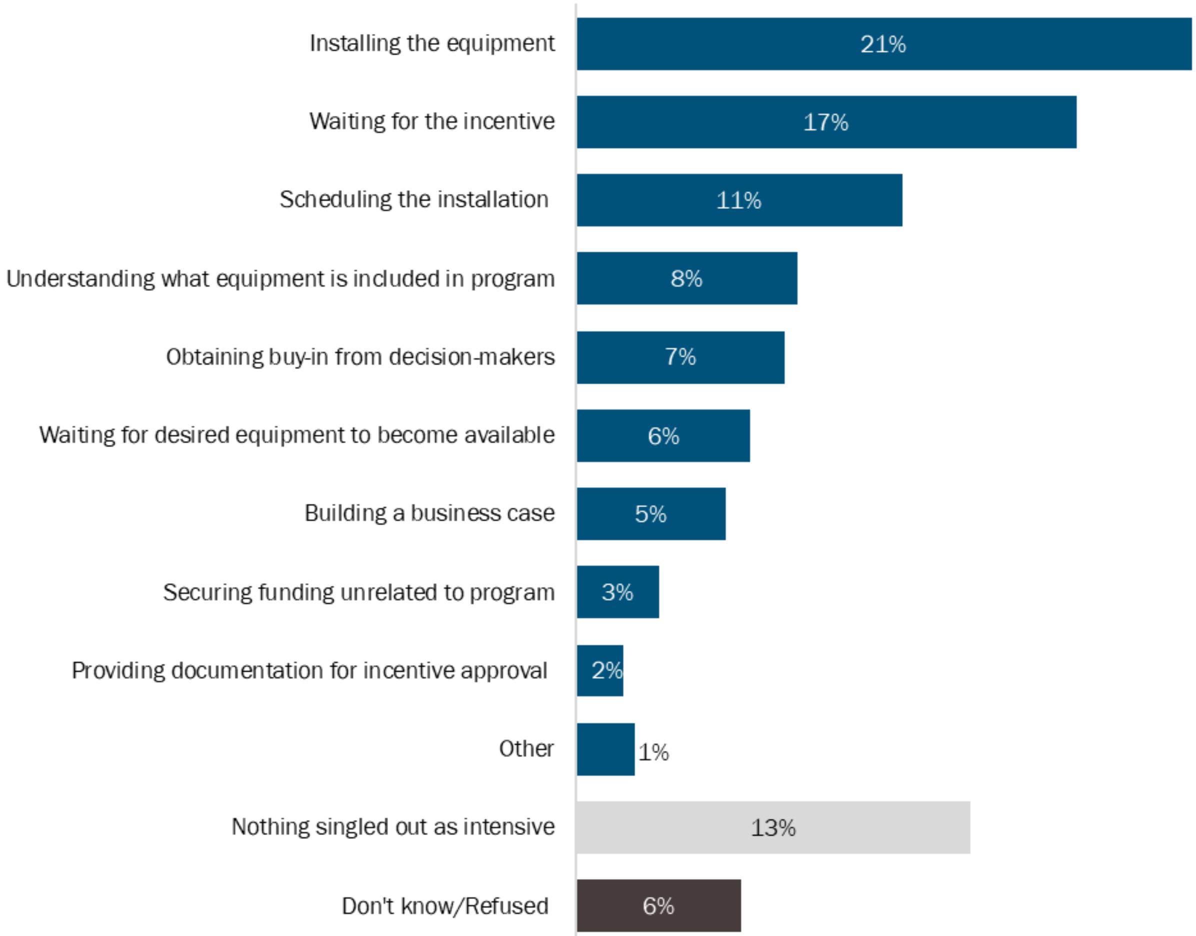
TIME INTENSIVE ASPECTS OF PROJECTS

Project Components

Figure 9-70 includes a full list of components of the project that were described by participants as being the most time intensive to complete outside of the application process. More than one-fifth of respondents (21%) stated installing the equipment was the most time intensive project component for their company to complete. Respondents also commonly mentioned waiting for the incentive (17%), scheduling the installation (11%), and understanding what equipment is included in the program (8%). Responses in the "other" category include the required paperwork, the communication process, and scope development. Section 6.3.5 includes additional discussion regarding time intensive aspects of the project.

Figure 9-70: Time Intensive Project Components

(Open-ended and multiple responses allowed; n=253)*



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

Time Spent on Completing Project Components

Respondents who had indicated that there was a part of the project that stood out as being the most time intensive to complete were then asked how much time it took them to complete this part of the project. Figure 9-71 includes the amount of time it took these respondents to complete this part of the project. Almost one-third of respondents (30%)

stated this part of the project took them 1 to 5 months to complete. Other time frames included less than one week (24%), 6 months to 1 year (18%), and 1 week to 1 month (15%).

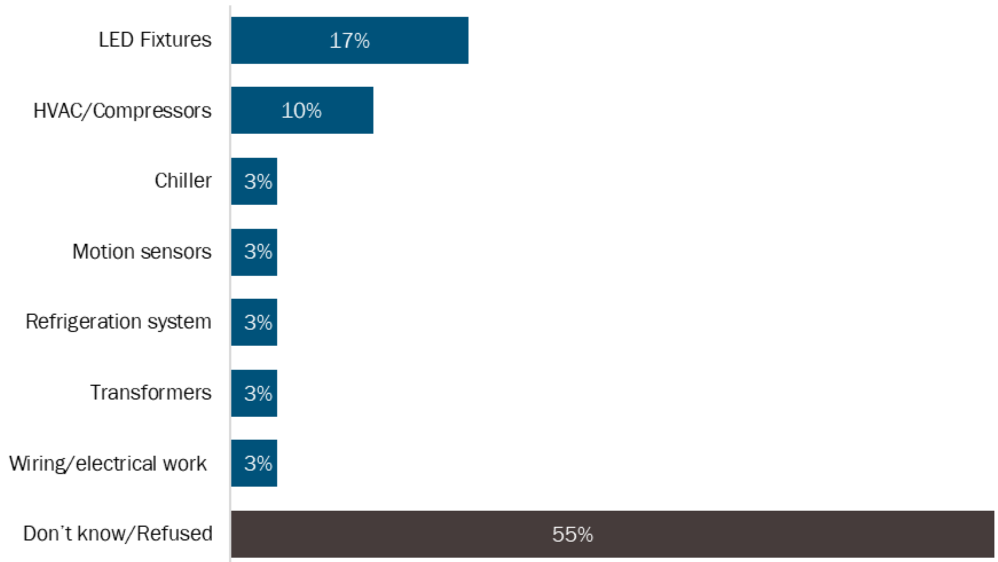
Figure 9-71: Time Frames for Time Intensive Project Components (n =140)*

*Does not sum to 100% due to rounding.

Equipment Types that made the Project Time Intensive

The respondents who had indicated how much time it took to complete the most time intensive part of the project were asked if there was a particular equipment type that made completing this part of the project so time intensive. These respondents most commonly identified LED fixtures as an equipment type that made completing parts of the project more time intensive (17%). Respondents also mentioned HVAC/compressors (10%), chillers (3%), motion sensors (3%), refrigeration systems (3%), transformers (3%), and wiring/electrical work (3%). Figure 9-72 includes a list of equipment types that made completing projects more time intensive. Section 6.3.5 includes additional discussion.

Figure 9-72: Equipment Types that made Project Components Time Intensive (n = 29)*



*Does not sum to 100% due to rounding.

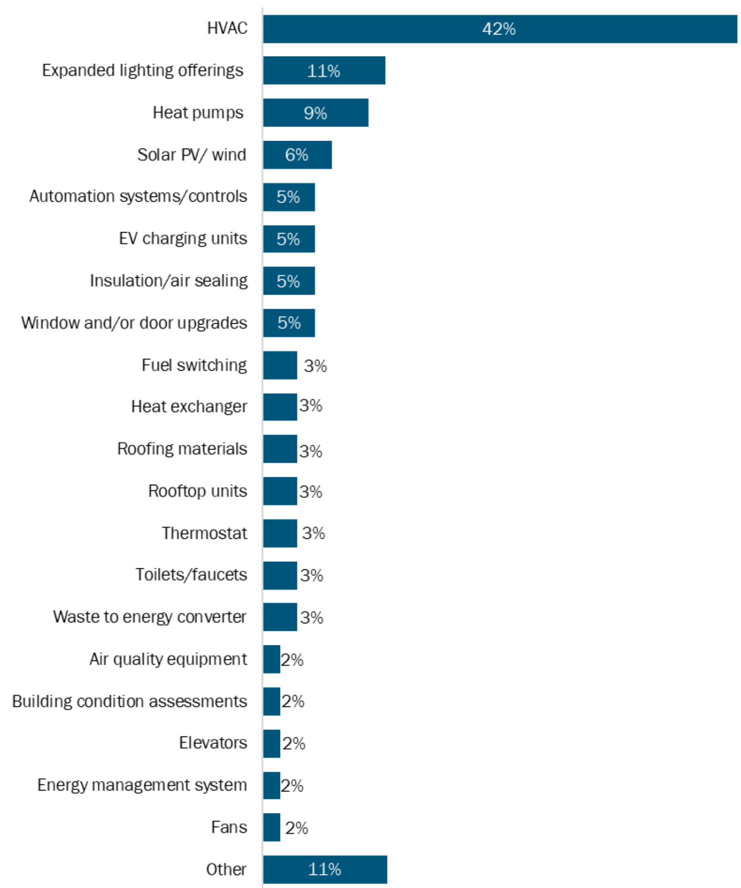
RECOMMENDATIONS FOR PROGRAM IMPROVEMENTS

Recommended Equipment and Services

Figure 9-73 includes a full list of additional energy-efficient equipment or services that respondents recommended for future inclusion in the Retrofit Program. One-fourth of respondents (25%) offered recommendations for additional energy-efficient equipment or services to consider for inclusion in the Retrofit Program. Most commonly, these recommendations included HVAC equipment (42%), expanded lighting offerings (11%), heat pumps (9%), and solar PV/wind (6%). Responses in the "other" category included the following: geothermal, motors, office equipment, and refrigeration equipment. Section 6.3.6 includes additional discussion regarding these equipment recommendations.

Figure 9-73: Recommended Energy-Efficient Equipment or Services to Improve the Retrofit Program

(Open-ended and multiple responses allowed; n=64)*



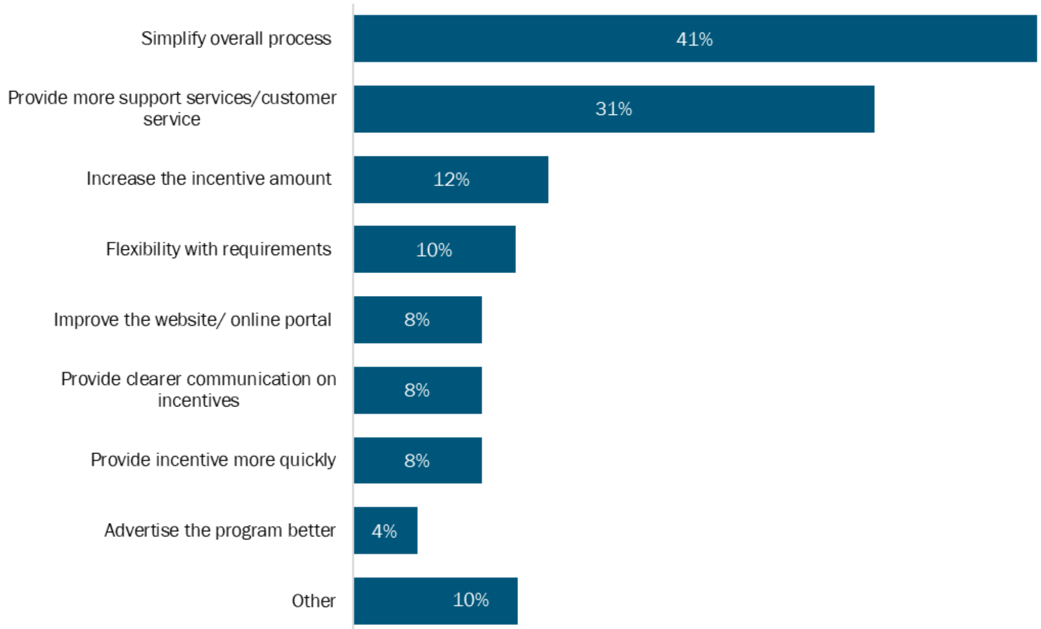
* Does not sum to 100% due to multiple responses.

Additional Recommendations for Program Improvement

Figure 9-74 includes a full list of recommendations that respondents provided to improve the Retrofit Program. One-fifth of respondents (20%) provided recommendations to improve the Retrofit Program. The most common suggestions included simplifying the overall process (41%), providing more support services/customer service (31%), and increasing the incentive amount (12%). Responses in the "other" category included the following: collaboration with other utilities, improving the incentive structure, and making it easier to determine eligibility. Section 6.3.6 includes additional discussion regarding these responses.

Figure 9-74: Recommendations to Improve the Retrofit Program

(Open-ended and multiple responses allowed; n=51)*



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

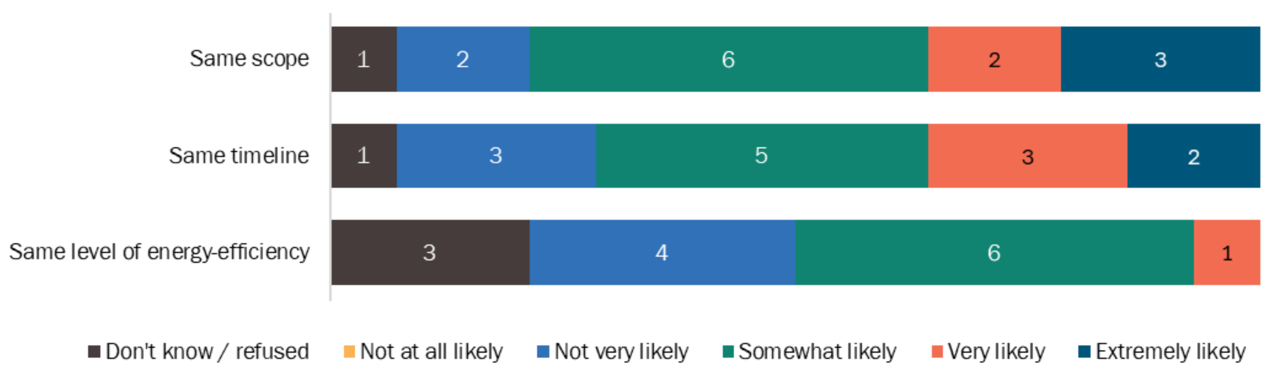
ADDITIONAL ENHANCED LOCAL INITIATIVES PROGRAM PROCESS RESULTS

The Enhanced Local Initiatives Program provided non-lighting incentives that were double the incentives normally offered through the Retrofit Program to participants in areas of the province where electricity constraints exist. Respondents were asked various questions to collect information about the impact of the higher incentives on the scope, timing, and energy efficiency level of their projects; the approval process; and their participation in other IESO energy-efficiency programs.

The evaluation team asked participants to rate the likelihood of their company completing their projects at the same scope, timeline, and energy-efficiency level that they did if the incentive amount was reduced by one-third, one-half, or two-thirds. Respondents used a scale where one meant "not at all likely" and five meant "extremely likely" to have completed the project.

Figure 9-75 shows that, had the incentive been reduced by one-third, at least one-half of respondents would have been likely to complete their project at the same scope (11 of 14 respondents with a 3, 4, or 5 rating), timeline (10 respondents with a 3, 4, or 5 rating), and energy-efficiency level (7 respondents with a 3, 4, or 5 rating).

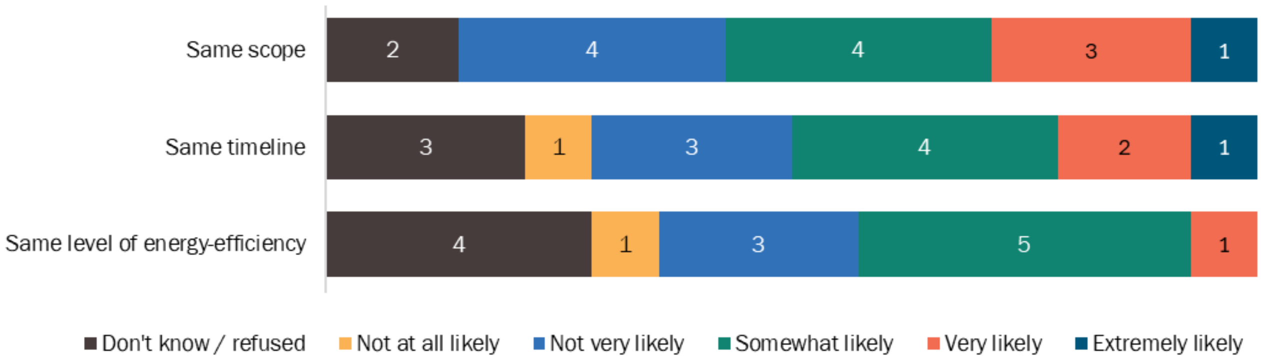
Figure 9-75: Impact of Reducing in Incentive by One-Third (n=14)*



*Counts displayed rather than percentage due to small n.

Figure 9-76 shows that, upon reducing the incentive by one-half, fewer respondents would have been likely to complete their project at the same scope (8 respondents), timeline (7 respondents), and timeline (6 respondents).

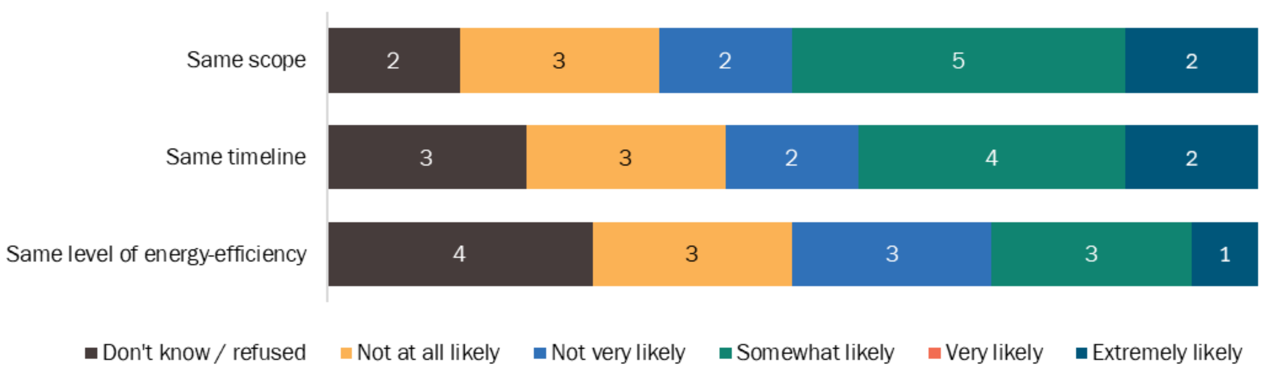
Figure 9-76: Impact of Reducing in Incentive by One-Half (n=14) *



*Counts displayed rather than percentage due to small n.

Figure 9-77 shows that, had the incentive been reduced by two-thirds, respondents were even less likely to have completed their project at the same scope (7 respondents), same timeline (6 respondents) and same level of energy-efficiency (4 respondents).

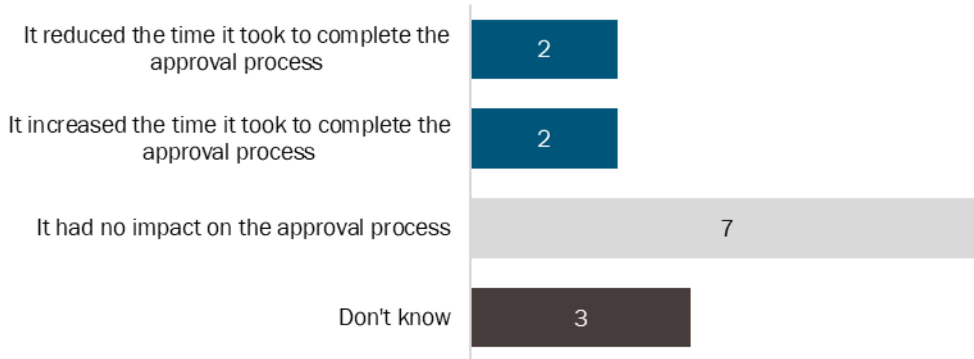
Figure 9-77: Impact of Reducing Incentive by Two-Thirds (n=14)*



*Counts displayed rather than percentage due to small n.

Respondents were asked how, if at all, the higher incentives impacted how quickly the approval process took to complete at their company. Most respondents (7 of 14) said that the higher incentive did not have an impact on the approval process timeline (Figure 9-78). Two respondents said the approval procses took less time with the higher incentives, while two respondents said it took more time to complete.

Figure 9-78: Impact of the Higher Incentive on the Approval Process (n=14)*



*Counts displayed rather than percentage due to small n.

Respondents were asked if their company participated in any other IESO energy-efficiency programs after they participated in the Retrofit Enhanced Local Initiatives Program. Most respondents (12 of 14) indicated that their company did not participate in any other IESO energy-efficiency programs. One respondent said that their company did participate in another IESO energy-efficiency program and that their prior participation in the Enhanced Local Initiatives Program was somewhat influential on their decision to do so. Two respondents did not know whether their company had participated in any other IESO energy-efficiency programs. Section 6.3.7 includes additional discussion regarding these responses.

Appendix F Job Impacts Methodology

This appendix provides a detailed breakdown of the Jobs Impact Evaluation methodology.

F.1 Developed Specific Research Questions

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

1) **What job impacts arise from new demand for energy-efficiency measures and related program delivery services?** Funds collected for the Retrofit program generated demand for efficient equipment and appliances. Additionally, they generated demand for services related to program delivery, such as general overhead for program implementation and staffing. This demand created jobs among firms supplying these products and services. Third-party implementers collected funds from the IESO to cover portions of project costs, while participants covered the remainder of costs.

2) **What job impacts arise from business reinvestments?** Once energy-efficient equipment had been installed, customers realized annual energy savings for the useful life of the measures. Businesses could choose to use this money to pay off debt, disburse to shareholders as dividends, or reinvest in the business. This additional money and the decision whether to save or spend poses implications for additional job creation. For example, additional business spending on goods and services generates demand that can create jobs in other economic sectors.

3) **What job impacts arise from funding the energy-efficiency program?** IESO energy-efficiency programs were funded via volumetric bill charges for all customers—both residential and nonresidential. This additional charge could reduce the money that households realized for savings and for spending on other goods and services, resulting in a negative impact on jobs in the Canadian economy.

4) **What job impacts arise from reduced electricity production?** The energy-efficient measures allowed businesses to receive the same benefit while using less electricity. As a whole, the program would reduce the electricity demand 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.

F.2 Developed Model Inputs

Modelling job impacts then moved to a second step: gathering data required for the StatCan IO model to answer each research questions. Model input data included dollar values of the exogenous shocks from program implementation. Data sources included the following:

1) **Demand for energy efficiency measures and related program delivery services:** The StatCan IO Model divides the Canadian economy into 240 industry classifications and 500 SUPCs. Each measure installed through of the program was classified into one SUPC. The evaluation team calculated the dollar value for each product-related demand shock using project cost and measure savings data from the impact evaluation (see Appendix F.1). The team also classified services that were part of the implementation process into SUPCs. These services were entirely program administrative services, the value of which was obtained from program budget actuals.

   The team had to specify the amount of each demand shock attributed to labour versus non-labour. For the product categories, the team used a representative sample of invoices to estimate 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).

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

3) The team identified customers' intentions regarding whether to reinvest, save, or distribute to owners/shareholders money saved on energy bills via the following **short** section of the participant surveys:

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

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 amount of bill savings that a business would reinvest served as the key input value rather than paying down debt or redistributing to shareholders.

4) **Retrofit funding:** the IESO fund its energy-efficiency programs through a volumetric charge on electricity bills; volumetrically, in 2024, residential customers accounted for 35% of consumption, and nonresidential customers accounted for 65%. The overall program budget, distributed between these two customer classes by these percentages, served as input values for the analysis.

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

F.3 Run Model and Interpret Results

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

1) Demand shock, as outlined in RQ1, representing the demand impact of energy-efficiency products and services resulting from the Retrofit program.

2) 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.

3) Household Expenditure shock, representing the portion of household funds captured by increased bill charges, thus acting as a negative shock to the economy (RQ3). The evaluation team estimated this by taking the portion of program funding paid for by increases to residential electricity bills.

The model output generated three types of job impact estimates:

Direct Impacts

Direct impacts are jobs created during the initial round of spending from the exogenous shocks. For the demand shock for energy-efficiency products and services, direct impacts resulted from adding employees to installed measures and handling administrative duties. For the business reinvestment shock, direct impacts could be internal jobs created by businesses reinvesting savings back into the company or jobs created by businesses buying additional goods and services using energy bill savings.

Indirect Impacts

Indirect impacts are job impacts due to interindustry purchases as firms respond to the new demands of directly affected industries. These include jobs created up supply chains due to demand created by the energy-efficiency program, such as manufacturing goods or supplying inputs.

Induced Impacts

Induced impacts are job impacts resulting from 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 direct and indirect requirements.

The IO model provides estimates for each type of job impact in *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 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 account for the number of hours worked per employee.
>
> **Full-time Equivalent number of jobs:** This only includes employee jobs converted to FTE based on overall average full-time hours worked in the business or government sectors.

The evaluation team presents model run results in terms of the above job-impact types (i.e., direct, indirect, and induced) and the job type (total jobs vs. FTEs). These results, along with the model input shock values, are presented and discussed in more detail in Appendix G.1.

Appendix G Detailed Job Impacts Inputs and Results

This section presents the detailed results of job impact analysis, as summarized in Section 6.2. Table F-1 presents total jobs impacts by type. As the fourth and fifth columns indicate, the analysis estimated that the Retrofit program would create 5,088 total jobs in Canada, with 4,690 jobs created in Ontario. Of 5,088 estimated total jobs, 3,100 are direct jobs, 790 are indirect jobs, and another 1,197 are induced. In terms of FTEs, numbers run slightly lower, with 3,952 FTEs created in Ontario and 4,283 FTEs created nationwide. Of the 3,952 FTEs, direct jobs account for 2.658 FTEs, indirect jobs account for 540 FTEs, and induced jobs account for 755 FTEs. In total, the Retrofit program created 62.7 jobs per million dollars of investment (i.e., the program budget).

Table F-1: Total Job Impacts by Type

Job Impact Type	FTE *(in person-years)* – Ontario	FTE *(in person-years)* – Total	Total Jobs *(in person-years)* – Ontario	Total Jobs *(in person-years)* – Total	Total Jobs per $1M Investment *(in person-years)*
Direct	2.658	2,713	3,042	3,100	38.2
Indirect	540	668	644	790	9.7
Induced	755	902	1,005	1,197	14.8
Total[1]	**3,952**	**4,283**	**4,690**	**5,088**	**62.7**

Section G.1 details impact values used in the model runs. Section F.2 presents the analysis results, including the details of job impacts and assumptions.

G.1 Model Inputs

The evaluation team used the model to estimate the impacts of three economic shocks:

- Demand shock, representing demand for energy-efficient products and services from Retrofit.
- Business reinvestment shock, representing increased business reinvestment due to bill savings (net of project funding).
- Household expenditure shock, representing decreases in household spending on goods and services due to increases in the residential portion of program funding.

Table F-2 displays input values for demand shock, representing products and services related to Retrofit. Each measure installed as part of the program was categorized according to the StatCan IO SUPCs.

The first 13 rows of Table F-2 contain categories corresponding to products (i.e., measures installed in businesses). The final row contains services. Lighting fixtures had the highest total cost among the product categories, accounting for $125.0 million of the overall program cost. The second largest product category—Switchgear, switchboards, relays and industrial control apparatus—had $40.7 million of total costs. Each measure's cost was divided into labour and non-labour, as the IO Model required this distinction to determine direct versus indirect impacts. Labour costs were determined by examining a random sample of program invoices. The analysis used a sample size of 122 invoices that specified the portion of project costs for labour versus materials. Labour percentages were calculated and applied by measure type, based on when the project was completed in the year. Of 122 invoices examined, these projects had a weighted average labour percentage of 36%. Thus, demand shock for each SUPC was assumed to be 36% labour and 64% non-labour.

The table's two service categories – office administrative services and vendor admin costs—included general overhead and administrative services associated with program delivery. The labour and non-labour amounts were not specified for this category, as the IO Model used built-in assumptions for this category.

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

Category Description	Non-Labour *($ Thousands)*	Labour *($ Thousands)*	Total Demand Shock *($ Thousands)*
Lighting fixtures	79,600	44,653	124,253
Switchgear, switchboards, relays and industrial control apparatus	26,214	14,443	40,656
Electric light bulbs and tubes	18,827	10,792	29,618
Heating and cooling equipment (except household refrigerators and freezers)	16,668	8,975	25,644
Metalworking machinery and industrial moulds	8,399	4,522	12,921
Pumps and compressors (except fluid power)	6,909	3,724	10,633
Industrial and commercial fans, blowers and air purification equipment	3,805	2,049	5,854
Other miscellaneous manufactured products	329	177	507
Boilers, tanks and heavy gauge metal containers	183	99	282
Fabricated metal products, n.e.c.	27	15	42
Turbines, turbine generators, and turbine generator sets	18	10	28

Agricultural, lawn and garden machinery and equipment	3	2	5
Electric motors and generators	1	1	2
Subtotal	**160,984**	**89,461**	**250,445**
Office Administrative Services	-	-	13,813
Total			**264,257**

The second shock modelled through the IO Model was the business reinvestment shock. This shock represented the amount that businesses would reinvest and inject back into the economy. The net amount that businesses had available to reinvest, pay off debt, or distribute to owners/shareholders ($472.2 million) was the net of electricity bill savings (NPV = $669.2 million) and the portion of project costs not covered by incentives ($197.0 million). The portion of this $472.2 million reinvested was estimated using surveys administered to participants as part of the Retrofit Process Evaluation. The surveys included several questions about what businesses would do with money they saved on electricity bills and the business type. Overall, respondents indicated that 79% of bill savings would be reinvested ($371.8 million). Remaining savings would be used to pay off debt or disbursed to owners/shareholders.

To properly model the business reinvestment shock effects, the IO Model required reinvestment estimates by industry. Each industrial category had a production function in the model, and these functions were adjusted to account for the reinvestment shock. Table F-3 presents input values for the business reinvestment shock by industry. The total business expenditure shock would be $371.8 million over 23 industries, as shown.

Table F-3: Summary of Industries for Business Reinvestment Shock

Category Description	Business Reinvestment Shock *($ Thousands)*
Other	107,902
Crop and animal production	55,281
Educational services	26,605
Non-profit institutions serving households	24,724
Arts, entertainment and recreation	19,327
Retail trade	12,675
Primary and fabricated metal	10,775
Crop, animal, food, and beverage	9,977
Health care and social assistance	9,977
Other municipal government services	9,977
Other services (except public administration)	9,977
Owner occupied dwellings	9,977
Transportation and warehousing	9,350

Category Description	Business Reinvestment Shock *($ Thousands)*
Chemical, soap, plastic, rubber, and non-metallic minerals	6,651
Non-residential building construction	6,651
Repair, maintenance and operating and office supplies	6,651
Residential building construction	6,651
Wholesale trade	6,651
Finance, insurance, real estate, rental and leasing and holding companies	6,024
Machinery	6,024
Automotive and transportation	3,326
Other activities of the construction industry	3,326
Support activities for agriculture and forestry	3,326
Total	**436,464**

The third model input was the household expenditure shock,[19] representing the incremental increase in electricity bills to the residential sector due to funding the program. The team assumed that the IESO programs were funded by all customers in proportion to overall electricity consumption. Thus, the residential funding portion was 35% of the $81.1M program budget or $28.4M.

G.2 Results

The StatCan IO Model generated results based on input values detailed in Sections 7.2.2 and Section G.1. Table F-4 shows the model run results for demand shock for products and services. This shock accounted for over one-half of job impacts. As the table's two right columns show, the model estimated that demand shock would result in the creation of 3,029 total jobs (measured in person-years) in Canada, 2,880 of which would be in Ontario. Of 3,029 jobs, 2,049 were direct, 244 indirect, and 736 induced. In terms of FTEs, the numbers were slightly lower; 2,415 FTEs were estimated to be created in Ontario and 2,537 in total across Canada. Of 2,537 FTEs, 1,769 were direct, 214 indirect, and 554 induced. Direct jobs impacts were realized exclusively in Ontario, as the table shows. As we move to indirect and induced jobs, impacts disperse outside of the province.

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

Table F-4: Job Impacts from Demand Shock

Job Impact Type	FTE *(in person-years)* Ontario	FTE *(in person-years)* Total	Total Jobs *(in person-years)* Ontario	Total Jobs *(in person-years)* Total
Direct	1,769	1,769	2.049	2,049
Indirect	169	214	195	244
Induced	477	554	636	736
Total	**2,415**	**2,537**	**2,880**	**3,029**

Table F-5 shows the model run results for the business reinvestment shock. Job impacts generated by business investment equaled to 1,001 direct total FTEs and 1.127 direct total jobs. Overall, business investments were responsible for 1,859 FTEs and 2,208 total jobs across Canada.

Table F-5: Job Impacts from Business Reinvestment Shock

Job Impact Type	FTE *(in person-years)* Ontario	FTE *(in person-years)* Total	Total Jobs *(in person-years)* Ontario	Total Jobs *(in person-years)* Total
Direct	940	1,001	1,062	1,127
Indirect	395	491	484	593
Induced	293	368	389	488
Total	**1,631**	**1,859**	**1,935**	**2,208**

The third shock was the reduction in household spending from the increase in electricity bills that funds the program. Table F-6 presents job impacts from the model run. This represents the number of jobs attributed to reduced household spending; this amount could have been spent in other sectors of the economy. Instead, it was spent on funding the Retrofit program. The model estimated a reduction of 113 FTEs and 149 total jobs across Canada due to decreased household spending.

Table F-6: Job Impacts from Residential Funding Shock

Job Impact Type	FTE *(in person-years)* Ontario	FTE *(in person-years)* Total	Total Jobs *(in person-years)* Ontario	Total Jobs *(in person-years)* Total
Direct	52	57	69	76
Indirect	27	37	35	47
Induced	15	20	20	26

Total	**94**	**113**	**124**	**149**

The nonresidential sector also contributed to program funding. The StatCan IO Model did not adjust production functions for all industries experiencing marginally higher electricity price changes; so this portion of the shock would be modeled by assuming surplus would be reduced by the extra amount spent on electricity. The model captured 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 due to program funding.

Another potential economic shock was the economic impact of electricity production reduction as a result of increased in energy efficiency. Technically speaking, this could be estimated using StatCan Input-Output multipliers without running the model. As the IO model is linear and not well suited to modeling small decreases in electricity production. Total electricity demand has increased over time and is projected to continue increasing.[20] The relatively small decrease in overall consumption attributed to Retrofit program savings may work to 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 IO model's linearity means it will provide estimates regardless of the impact size. Given the nature of electricity production, it was reasonable to conclude that the linear IO multiplier was not appropriate for estimating job impacts. Consequently, this analysis assumed job losses from decreased electricity production would be negligible.

Table F-7 shows total estimated job impacts by type, calculated by combining the jobs estimated in Table F-5, Table F-6, and Table F-7. Of 3,100 estimated total direct jobs, 3,042 were in Ontario. A slightly smaller proportion of indirect and induced jobs were in Ontario, with 644 out of 790 indirect jobs and 1,005 of 1,197 induced jobs estimated to be created within the province. FTE estimates were slightly lower overall than total jobs, with 3,952 FTEs (of all types) created in Ontario and 4,283 FTEs added nationwide. Almost all of the direct FTEs (2,658 of 2,713) were added in Ontario, with this number representing approximately 67% of total FTEs added in Ontario and 62% of all FTEs created across Canada. In 2024 each $1M of program spending resulted in the creation of 62.7 total jobs, compared to 60.1 jobs per $1M in 2023. The change between years is small enough that it can be considered a side effect of general variability in program activities during any given year, which is to be expected.

[20] *Annual Planning Outlook–A View of Ontario's Electricity System Needs*; 2024. IESO.

Table F-7: Total Job Impacts by Type

Job Impact Type	FTE *(in person-years)* Ontario	FTE *(in person-years)* Total	Total Jobs *(in person-years)* Ontario	Total Jobs *(in person-years)* Total	Total Jobs per $1M Investment *(in person-years)*
Direct	2,658	2,713	3,042	3,100	38.2
Indirect	540	668	544	790	9.7
Induced	755	902	1,005	1,197	14.8
Total	**3,952**	**4,283**	**4,690**	**5,088**	**62.7**

In order to provide a sense of any trends in the program's effectiveness in catalyzing job creation, Table F-8 shows the jobs per $1M of investment over the course of the four-year CDM framework. Overall, there were no noticeable trends in the jobs created per $1M of investment over the four years of the CDM framework. The reasons behind the fluctuations from one year to the next were varied but generally were related to differences in the magnitude of a specific shock. For example, the large increase from 2021 to 2022 was due to an almost 4x increase in the overall amounts reinjected into the economy via the demand and reinvestment shocks; conversely, the decrease from 2022 to 2023 was potentially related to decreases in the amount of money that is circulated back into the economy through the reinvestment shock. These variations from year-to-year can result in vastly different pools of available funds that are responsible for job creation, especially in the first few years as program activities ramp up. There is some indication that the program might be stabilizing around 60 jobs per $1M based on the results of the last two years of the framework, but further evaluations will be necessary to determine whether that is the case or if program variability will continue in the future.

Table F-8: 2021-2024 Jobs per $1M Investment

Job Impact Type	2021	2022	2023	2024
Direct	25.6	39.7	30.9	38.2
Indirect	12.4	20.9	15.3	9.7
Induced	13.0	21.1	13.9	14.8
Total	**51.0**	**81.6**	60.1	62.7

Though the model did not provide year-by-year results for job impacts, the evaluation team made some estimates about the temporal nature of impacts. Table F-9 shows total jobs created due to program activities and energy savings in the first year versus those after the first year. The table assumes "first year activities" pose the initial demand shock for energy-efficiency 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 resulted from energy savings over the course of the measures' EULs. Job impacts from first-year activities made up roughly 62.3% of the total, representing 3,170 out of 5,088 person-years; 141 of these person-years derived from first-year energy savings while 3,029 person-years were due to demand for equipment and services. The remaining 1,919 total job-years resulted from energy savings after the first year and reinvestment generated by the bill savings.

Table F-9: Job Impacts from First-Year Shocks

Job Impact Type	Total Jobs *(in person-years)*		
	From First Year Activities	From Bill Savings After First Year	Total
Direct	2,121	979	3.100
Indirect	282	509	790
Induced	767	431	1,197
Total*	**3,170**	**1,919**	**5,088**

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

Table F-10 shows job impacts in greater detail, with jobs added by type and industry category. The table sorts industries from top to bottom, from with the greatest impacts to the least, with industries showing no impacts not included in the table. The table shows that the industry with the largest job impacts was administrative and support, waste management and remediation services, which added 2,179 jobs. 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 (e.g., office administration, call centre operations, program management). Retail trade and Non-residential building construction were the industries with the next most added jobs, gaining 416 and 337 jobs, respectively.

Table F-10: Job Impacts by Industry

Output Industry Category	FTE (in person-years) Ontario	FTE (in person-years) Total	Total Jobs (in person-years) Ontario	Total Jobs (in person-years) Total
Administrative and support, waste management and remediation services	1,851.3	1,867.2	2,158.2	2,179.4
Retail trade	281.4	304.7	383.8	415.5
Non-residential building construction	299.7	299.7	336.5	336.5
Manufacturing	216.9	303.0	224.3	314.3
Professional, scientific and technical services	203.3	244.0	249.9	299.6
Wholesale trade	239.7	281.8	251.6	296.2
Finance, insurance, real estate, rental and leasing and holding companies	166.0	190.0	204.6	233.7
Transportation and warehousing	95.5	119.5	116.3	144.4
Accommodation and food services	70.9	88.0	113.7	140.4
Government education services	115.7	117.4	134.5	136.6
Health care and social assistance	43.6	46.9	67.9	73.5
Information and cultural industries	52.2	65.3	58.0	73.2
Other services (except public administration)	42.0	50.8	57.8	70.5
Residential building construction	51.1	51.1	66.2	66.2
Repair construction	47.6	52.0	55.4	60.5
Engineering construction	51.2	51.2	49.4	49.4
Arts, entertainment and recreation	12.4	15.5	23.5	29.7
Other federal government services	25.7	26.2	27.2	27.8
Non-profit institutions serving households	18.3	20.2	23.0	25.5
Other municipal government services	20	22	22	24
Educational services	8.6	9.4	20.4	22.3
Crop and animal production	5.9	11.3	11.3	20.9
Utilities	12.9	14.6	13.3	15.1
Government health services	10.7	12.2	11.3	12.9

Output Industry Category	FTE *(in person-years)* Ontario	FTE *(in person-years)* Total	Total Jobs *(in person-years)* Ontario	Total Jobs *(in person-years)* Total
Mining, quarrying, and oil and gas extraction	3.5	9.6	3.2	9.0
Other provincial and territorial government services	3.5	4.5	3.6	4.7
Support activities for agriculture and forestry	0.9	1.8	1.2	2.2
Other activities of the construction industry	0.6	0.8	1.4	1.7
Forestry and logging	0.5	1.4	0.5	1.4
Fishing, hunting and trapping	0.1	0.5	0.1	0.5
Total*	**3,952**	**4,283**	**4,690**	**5,088**

*Columns may not add to totals due to rounding. Real values are rounded to the nearest whole number, and whole numbers do not sum exactly to the whole number total in every column. Values presented in this table are rounded to the nearest 0.1 to better show the distribution of small jobs impacts.

The retrofit contractor and applicant representative survey responses supported the model results showing positive job impacts. The survey instrument contained questions for contractors and applicant representatives related to impacts of the Retrofit program on their firms and employment levels. Two questions in particular proved informative in understanding the nature of impacts to respondents, which would be considered direct impacts. Relevant illustrative verbatim responses follow:

1) Did the 2024 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:

   - *"The existence of an incentive helps reinforce the savings calculations that I share with my customers. They figure that if there is an incentive the savings must be real."*
   - *"Incentives helped convince clients to act by improving the ROI."*
   - *"Some projects wouldn't have happened if there were no subsidies from this program. This program is KEY!"*
   - *"Helped me to get much more clients, much more sales , and more people and businesses learned about the program"*

- *"incentive monies helped clients to finally take the step to upgrade due to ROI help the incentive money provided."*

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

- *"The application process / review is too rigid and time consuming - frustrating and hard to make money."*
- *"In the past, the incentives were higher and it was easier to encourage clients to proceed with the project."*
- *"We spent considerable time learning the procedures and processes of the IESO program. We completed 1 project as a test, received the incentive payment, then launched a marketing campaign to our customers, and various hotel chains, only to find out that we were not allowed to receive the incentive cheque directly. Without receiving the incentive cheque directly, and eliminating the CapEx portion of the retrofit project, 98% of our customers will not proceed. They will only proceed when they have an approved capital budget for a new build or major renovation, which normally does not cover the HVAC equipment."*

2) Did the 2024 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 :

Positive Impacts:

- *"Hired salesperson to [work] either in-person or with website and email advertising as well as processing paper works for the application."*
- *"We now have a full time rebate analyst."*

Negative Impacts:

- *"We had to let some people go."*
- *"We were prepared to hire additional people, we even had an additional manufacturing station built in our factory, but it now sits empty."*

Respondents indicated that the program generally resulted in slight increases in overall staffing. Participants additionally stated that the program added value to projects and allowed contractors to win projects that otherwise would have been lost. In particular, the increased ROI was identified as a key factor in convincing clients to move forward with a project. Contractor verbatims further supported the model's estimated direct job gains, with respondents indicating that additional staff had been hired due to the Retrofit program.

A few respondents stated that program activities in PY2024 resulted in negative employment impacts, including one respondent who noted that they had laid off employees due to the lack of Retrofit program projects. Respondents indicating a negative effect on their businesses primarily stated that the application and rebate process were seen as particular pain points. In the case of one respondent, the rebate process resulted in none of his clients being willing to take on projects. These issues could be examined further if parts of the program were redesigned to enhance job impacts.

Input-Output models produce informative results, useful in understanding the potential magnitude and dynamics of economic shocks created by policies and programs. While useful, the StatCan IO Model represents is a simplified vision of the Canadian economy and thus faces limitations. Based on the assumption of fixed technological coefficients, the model does not account for economies of scale, constraint capabilities, technological change, externalities, or price changes. This makes analyses less accurate in estimating 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 final demand tends to be overestimated. For household consumption, the model is based on assumptions regarding constant consumption behaviour and fixed expenditure shares relative to incomes.

Appendix H Detailed Non-Energy Benefits Methodology and Additional Results

This appendix provides additional detail about the NEB methodology as well as additional NEB results. Section 3.3.1 summarizes the methodology.

H.1 Methodology

PARTICIPANT SURVEY

The four previous studies–the *PY2023, PY2022 and PY2021 Retrofit Evaluation Reports* and the *Non-Energy Benefits Study: Phase II*–assessed NEBs from energy-efficiency projects funded by the IESO over the 2017-2023 period.[21] The PY2024 evaluation applied the same methodology as previous studies in assessing NEBs, using two different question types to determine the NEBs' value that program participants realized by installing program measures:

- **Relative scaling:** Relative scaling questions asked participants to state the value of an item of interest relative to some base. For this survey, participants were asked to state the value of each NEB relative to annual electricity bill savings that they estimated, or, if they could not estimate savings, their annual electricity bill.
- **Willingness-to-pay:** Willingness-to-pay questions asked participants to assign the dollar value that they would be willing to pay for an item of interest. In this case, participants were asked what they would be willing to pay for each relevant NEB.

All survey respondents were asked to value all NEBs using both techniques. Data collected from these questions were then used to quantify the NEBs.

NEBs QUANTIFICATION

For each individual NEB, the total value across all participants was divided by total gross savings values across all participants. This was completed using both relative scaling and willingness-to-pay NEB values. Two hybrid approaches were calculated to better represent the sample:

[21] Dunsky. (July 2021). *Non-Energy Benefits: Phase II; Quantified Benefits and Qualitative Insights*. https://www.ieso.ca/-/media/Files/IESO/Document-Library/conservation-reports/Non-Energy-Benefits-Study-Phase-II.ashx

- **Hybrid, relative scaling priority,** in which the team gave priority to the relative-scaling response value. Through this approach, the team only considered willingness-to-pay if the participant did not answer the relative scaling question.
- **Hybrid, minimum approach,** in which the team considered the lowest non-null response between relative scaling and the willingness-to-pay questions.

As a final step, the evaluation team calculated the average value ($/kWh) for each NEB, weighted by energy savings across all participants.

Table G-1 presents average NEB values, based on two different calculation approaches:

- **Average (per participant).** A $/kWh value calculated for each individual participant, with all values then averaged.
- **Average (overall).** An overall average value, where total NEB benefits ($s) were summed across all participants and then divided by total energy savings (kWh) across all participants.

All recommended values in the Phase II study were based on the hybrid minimum approach. Additional details on the methodology and NEBs quantification can be found in the Phase II study.

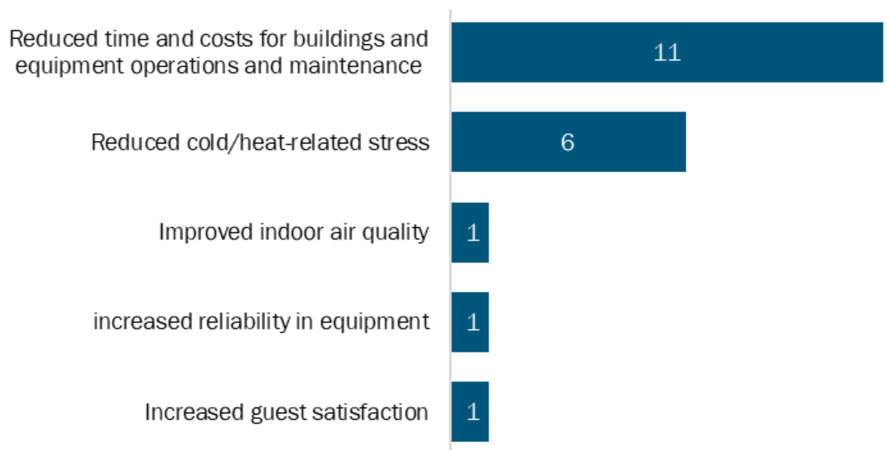
Table G-1: Quantified NEBs by Participant and by Savings, Phase II, PY2021, PY2022, PY2023, & PY2024

NEB Test	PY2024 (Retrofit)	PY2024 (Retrofit)	PY2023 (Retrofit)	PY2023 (Retrofit)	PY2022 (Retrofit)	PY2022 (Retrofit)	PY2021 (Retrofit)	PY2021 (Retrofit)	Phase II (Retrofit & SBL)	Phase II (Retrofit & SBL)
Hybrid (min approach) ($/kWh)	**Per participant**	**Overall**	**Per participant**	**Overall**	**Per participant**	**Overall**	**Per participant**	**Overall**	**Per participant**	**Overall**
Reduced building & equipment O&M	$0.22	$0.03	$0.09	$0.04	$0.18	$0.05	$0.26	$0.20	$0.12	$0.08
Thermal comfort	$0.10	$0.02	$0.07	$0.02	$0.08	$0.02	$0.06	$0.07	$0.63	$0.05
Improved indoor air quality	$0.09	$0.01	$0.003	$0.001	$0.04	$0.01	$0.02	$0.02	$0.09	$0.01
Reduced spoilage	$0.002	$0.005	$0.0004	$0.004	$0.00	$0.0005	$0.00	$0.00	$0.01	$0.0002
Hybrid (RS-priority) ($/kWh)	**Per participant**	**Overall**	**Per participant**	**Overall**	**Per participant**	**Overall**	**Per participant**	**Overall**	**Per participant**	**Overall**
Reduced building & equipment O&M	$0.30	$0.04	$0.55	$0.11	$0.50	$0.12	$0.31	$0.24	$0.72	$0.17
Thermal comfort	$0.42	$0.07	$0.09	$0.02	$0.29	$0.07	$0.19	$0.28	$0.65	$0.09
Improved indoor air quality	$0.13	$0.02	$0.01	$0.005	$0.10	$0.02	$0.08	$0.10	$0.10	$0.02
Reduced spoilage	$0.01	$0.01	$0.002	$0.01	$0.01	$0.01	$0.00	$0.00	$0.01	$0.0003

H.2 Applicant Representative and Contractor Non-Energy Benefits Results

As part of the applicant representative and contractor survey, contractors were asked to indicate NEBs that they believed their customers might have experienced due to their Retrofit Program participation, as shown in Figure 9-79. Among contractors reporting NEBs, eleven of twelve indicated that their customers experienced reduced time and costs for building and equipment O&M. Six indicated that their customers experienced improved thermal comfort. When asked to rank the importance of various NEBs to their customers, half of responding contractors (three of six) rated the reduced time and costs for operations and maintenance as the most important element.

Figure 9-79: Contractor Reported Non-Energy Benefits
(Open-ended and multiple responses allowed; n=12)*



*Does not add to 12 due to multiple responses. Counts displayed rather than percentage due to small n.