PROGRAM YEAR 2017 EVALUATION REPORT

ENERGY PERFORMANCE PROGRAM FOR MULTI-SITE CUSTOMERS

Date: 15 November 2018

Prepared for: Independent Electricity System Operator (IESO)

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CONTENTS

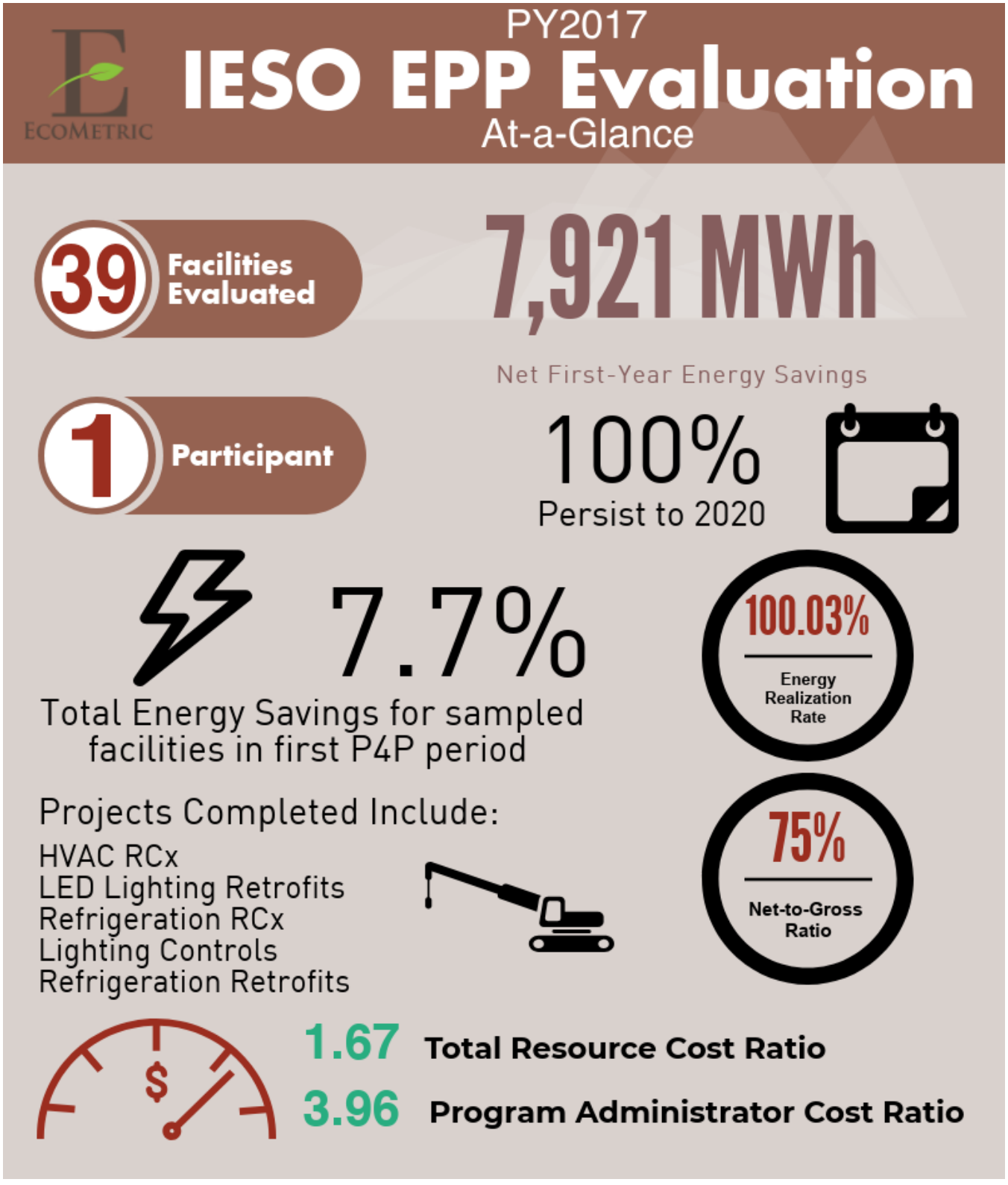
TABLES

FIGURES

ABBREVIATIONS

AEE	Association of Energy Engineers
AESP	Association of Energy Services Professionals
BOMA	Building Owners and Managers Association
CDD	Cooling Degree Day
CDM	Conservation and Demand Management
CE	Cost Effectiveness
CFF	Conservation First Framework
CaGBC	Canada Green Building Council
GWh	Gigawatt Hour
HDD	Heating Degree Day
EM	Energy Manager
EPP	Energy Performance Program
EUI	Energy Use Intensity
EUL	Effective Useful Life
IESO	Independent Electricity System Operator
IPMVP	International Performance Measurement and Verification Protocol
kW	Kilowatt
kWh	Kilowatt hour
LC	Levelized Cost
LDC	Local Distribution Company
M	Million
MAL	Measure and Assumption List
M&V	Measurement and Verification
MW	Megawatt
MWh	Megawatt Hour
NTG	Net-to-Gross
O&M	Operation and Maintenance
PAC	Program Administrator Cost
PES	Program Enabled Savings
PY	Program Year
RCx	Retrocommissioning
RR	Realization Rate
TRC	Total Resource Cost
YOY	Year-on-Year

Figure 1: PY2017 IESO EPP Evaluation Results Summary



1 EXECUTIVE SUMMARY

Independent Electricity System Operator (IESO) retained EcoMetric Consulting, LLC to conduct an evaluation of the Energy Performance Program (EPP) for Multi-Site Customers administered in Ontario. The EPP program provides a performance-based whole-building approach to incenting energy efficiency improvements for multi-site customers that span multiple LDCs in the province. This chapter is a summary of the impact and process evaluation for program year (PY) 2017. PY2017 evaluation activities for the EPP program spanned the period from August 2017 to August 2018, culminating with IESO's publication of this PY2017 Evaluation Report in Q4 2018.

1.1 IMPACT EVALUATION RESULTS

Verified savings from the 2017 evaluation of the EPP program is summarized in Table 1 below.

Table 1: EPP Impact Results Summary

# of facilities Evaluated & Reported	39
Energy Realization Rate	100.03%
Gross Verified Energy Savings (MWh)	10,562
Demand RR	n/a
Gross Verified Summer Peak Demand Savings (MW)	-
NTG Ratio	75.0%
Net Verified Energy Savings (MWh)	7,921
Net Verified Summer Peak Demand Savings (MW)	-
Persistence of Savings in 2020	100%

1.1.1 GROSS VERIFIED SAVINGS

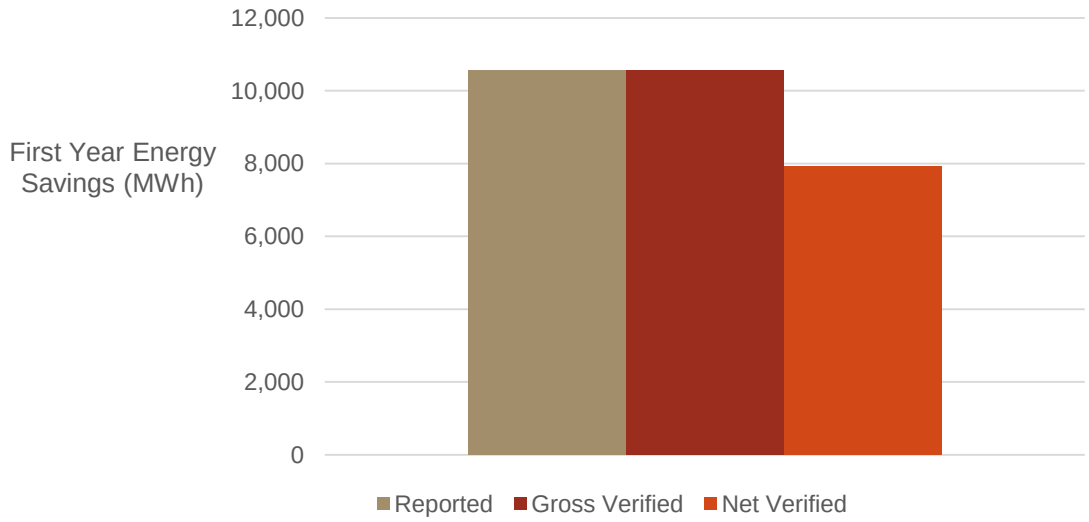
Total gross verified energy savings for the EPP program are 10,562 MWh. Net verified first year energy savings are 7,921 MWh, or 75% of gross verified savings. Savings persistence is an important component of the Conservation First Framework (CFF), and **100% of first-year PY2017 savings persist through 2020**. Summer peak demand savings were not required to be tracked by the program design. As such, no demand savings are reported in this evaluation. EcoMetric recommends that the IESO include peak demand savings verification in the technical review process in *Section 4.1.3*.

The average first-year gross energy savings per facility are 270.81 MWh for the 39 facilities evaluated in PY2017. The highest performing facility achieved 559.39 MWh of gross first-year energy savings while the lowest achieved 22.91 MWh.

1.1.2 NET VERIFIED SAVINGS

Figure 2 illustrates the differences between reported, gross verified, and net verified savings in the EPP program year 2017.

Figure 2: Reported, Gross Verified, and Net Verified Savings



Free-ridership - EcoMetric estimates that free-ridership in the EPP is between 19.6% and 30.4%. The average free-ridership value derived via decision-maker interviews is 25%, with an approximate error bound of +/- 5.4%. However, in the absence of EPP, some portion of these energy savings would very likely have still occurred and would have been incented through other Save on Energy programs.

All free-ridership apparent in EPP can be traced to the interviewees' responses surrounding the intention of program participants, specifically, the intent to carry out the efficiency project without program assistance. Interview responses strongly suggest that while the EPP enabled participants to expand the scope and depth of the energy efficiency projects being implemented, at least some portion of these changes would have been made even if they did not participate in EPP. Influence free-ridership scores are zero for all interviewees, indicating that the program had considerable influence on the respondent's decision to carry out the efficiency projects.

1.1.3 COST EFFECTIVENESS

The EPP program was highly cost-effective in 2017 according to both TRC and PAC tests, when using a benefit-cost threshold of 1.0. The PAC ratio is 3.96, while the TRC ratio is 1.67. Levelized costs are low for the program at 0.01 $/kWh.

Table 2: PY2017 Cost Effectiveness Results

Total Resource Cost Ratio	Program Administrator Cost Ratio	Levelized Cost $/kWh
1.67	3.96	0.01

The TRC and PAC ratios are likely to improve in future program years, as the EPP Program is relatively young and administrative costs are borne earlier in the program's life cycle. In PY2017, the program's cost effectiveness was supported by a large share of Operation & Maintenance (O&M) measures, which are generally much less costly than capital measures while still achieving significant savings.

1.2 PROCESS EVALUATION SUMMARY

EcoMetric designed this process evaluation to assess EPP's processes following its first full year (PY2017) of program activity. We conducted seven in-depth interviews with program staff, implementation staff, and the program's largest customer (and only customer to complete a full year of the program at the time of evaluation). In addition, our team reviewed key program materials, including the website, application forms, marketing materials, and the savings database. The objectives of this first EPP process evaluation were to:

- Understand program goals, management and processes;
- Identify specific preliminary findings including successes and challenges;
- Provide recommendations for improvement of program processes;
- Identify opportunities for future research.

The following bullets provide a high-level view of our initial observations from the PY2017 process evaluation, as well as our suggestions for future research based on these findings:

- The EPP program achieved savings in its first program year and exceeded its target for number of facilities enrolled in the program.
- The program participant interviewed for this evaluation reported high satisfaction with the program, citing low administrative overhead compared to standard commercial incentive programs. That said, IESO may require participants to begin tracking project cost data for the purposes of evaluating cost effectiveness.
- Technical reviewers for EPP report that program processes are generally effective, although there may be opportunity for simplification of the data tracking spreadsheet.

1.3 KEY OBSERVATIONS AND RECOMMENDATIONS

The findings and recommendations below represent the most impactful results and analysis from the impact and process evaluations of the EPP program in PY2017. Greater detail on the data and analysis that lead to these key findings and recommendations can be found in *Chapter 4*.

Finding 1: Enhancements to data tracking and project documentation can improve insight into program activities and facilitate program planning and evaluation. (Section 4.1.1.1)

Recommendation 2: Require participants to provide measure-level cost data as part of their annual Savings Reports for every project implemented under the EPP program. Cost data should also be available in the tracking database. This can be achieved without placing too much burden on the participant by requiring invoices for equipment installed and associated measure costs.

- Measure-level cost data would allow evaluators to identify the most cost effective types of measures being implemented in the EPP program. With this information, the IESO can work with program participants to plan and execute the most cost effective energy savings strategies as possible.
- However, it may not be feasible to change program rules and technical review priorities required to collect and verify measure-level cost data at this point in the program's implementation. While measure-level cost data would allow for the most robust cost effectiveness evaluation of the program, facility-level or participant-level total costs would also allow for a relevant analysis of the program's cost effectiveness. It is recommended that the IESO review the feasibility of collecting cost data from participants and weigh the benefits of the data's granularity against the increased administrative burden for the participant.

Finding 3: Peak summer demand savings were not verified or reported in the EPP program. (Section 4.1.3)

- Demand savings are easily calculated using annual interval billing analysis, which is already required by the program.
- While the focus of the CFF has shifted towards persisting net verified energy savings in 2020, evaluating and reporting peak summer demand savings remains an important metric to understand the impact of the EPP program. Cost effectiveness is especially affected by the lack of reported demand savings, which can provide ample benefits. Demand savings can also be a metric for LDCs to leverage when thinking about their total capacity; and evaluating demand savings is critical when LDCs are trying to understand their growth and potential.

Recommendation 5: Require that the technical reviewer verify peak summer demand savings for all participating facilities.

Finding 5: **In PY2017, 19 of the 25 facilities sampled reached the savings threshold in their first year. (Section 4.1.3.4)**

- This high rate of success in meeting the 5% savings threshold for facilities in the program's first full year of implementation illustrates the strength of the program's design to incite energy savings.
- The six projects that did not meet the minimum threshold in the first year had not yet installed a planned lighting project which accounted for large portions of savings for other facilities, if those capital projects are installed in the second year of the program then it is likely that all the facilities will meet the minimum threshold.

Recommendation 8: For facilities that do not reach 5% energy savings in their first year, IESO should review the facility's future measure plans and ensure high-performing measures will be completed. If no major efficiency measures are planned, consider holding a meeting with the participant to develop a plan to reach the minimum threshold by year two.

1.4 EVALUATION METHODOLOGY AND GOALS

Methods used to conduct this evaluation include engineering analysis, on-site measurement, interval billing analysis, telephone surveys, program and project documentation review, best practice review, and interviews with IESO staff, implementation vendors, technical reviewers, and program participants. The process component of the evaluation seeks to understand the EPP program's effectiveness from multiple perspectives: the IESO's oversight, implementation, program processes, and the individual customer experiences. The evaluation methodology is explained in more detail in *Chapter 3.*

The primary objectives of this evaluation are to deliver, on an annual basis, net verified results produced by the EPP program, and to identify improvements to program delivery. In abbreviated form, evaluation goals include:

- Verify energy savings created by the program
- Estimate the net change in greenhouse gas emissions from changes in electricity and natural gas consumption
- Estimate program attribution, including free-ridership, participant & non-participant spillover through net-to-gross analysis
- Evaluate the overall effectiveness and comprehensiveness of key program elements
- Analyze the cost-effectiveness of the program
- Analyze and make recommendations to improve the program
- Determine participating customer satisfaction with the program

2 EPP PROGRAM OVERVIEW

2.1 EPP PROGRAM OVERVIEW

The Energy Performance Program for Multi-Site Customers (EPP) provides a performance-based whole-building approach to incenting energy efficiency improvements which gives multi-site customers with greater flexibility in measure selection. The program was designed to reduce the administrative burden and challenges for multi-site customers in participating in Save on Energy programs across multiple Local Distribution Company (LDC) service areas. Energy savings are rewarded at the same rate for both capital and non-capital efficiency measures, which are calculated at the whole-building level.

2.2 REPORTED SAVINGS

For the PY2017 evaluation, there were 39 facilities with EPP projects in-service and ready for evaluation. Facilities ready for evaluation have completed their first annual pay-for-performance period and have been technically reviewed by the implementer by March 31, 2018. All 39 of these facilities are owned by one multi-site participant and began their performance period in 2017. As shown in Table 3, total reported energy savings are 10,558 MWh.

Table 3: EPP Completed Projects and Reported Savings

2017 Facilities Evaluated and Reported	2017 Reported Energy Savings (MWh)
39	10,558

3 METHODOLOGY

3.1 EVALUATION APPROACH

Techniques used to conduct this evaluation include engineering analysis, interval billing analysis, telephone surveys, documentation review, best practice review, and interviews with IESO staff, technical reviewers, and program participants. This section explains the evaluation approach in more detail, including the overall sample design and basic descriptions of the methods applied. More detailed descriptions of the methodology are included in *Appendix A: Select Methodology Details.*

3.1.1 SAMPLE DESIGN

This section outlines the overall sample design for the EPP program. One overarching theme that guides this plan is the limited population of program participants. Compared with other sectors, participation in the EPP program is composed of a relatively small number of participants. Other key overall sample design implications include:

1. EcoMetric utilized a single sample of program participants for the gross impact. The net impact and process evaluations include multiple interviews/surveys in the same organization where appropriate.
2. A 90/10 confidence/precision stratified random sample was utilized with a certainty stratum of 400 MWh in savings or higher.

Table 4 presents the preliminary participant sample size for impact evaluation (gross and net) and process evaluation of the EPP program.

Table 4: PY2017 Sample Design

Evaluation Activity	PY2017 Evaluation Population	Confidence/ Precision	Sample Size
Gross Impact	39[1]	90/10	25
Net Impact			1[2]
Process			2[3]

[1] EPP projects technically reviewed by March 31st, 2018.
[2] As the evaluation population is comprised of 39 facilities for just one participant, the net impact evaluation included multiple interviews with primary decision makers at the company.
[3] The process evaluation included an interview with a participant representative and the third-party firm the participant hired to manage their EPP participation.

The gross sampling unit for the EPP gross impact evaluation was the individual facilities within the multi-site customer program. The net sampling unit is the participating organization. The sample frame was defined by facilities that had completed at least one annual performance period in PY2017 which had been technically reviewed by March 31st, 2018. Facilities with performance periods ending in 2017 that had not been technically reviewed by the cutoff date will be evaluated in the PY2018 evaluation as PY2017 adjustments. EcoMetric's sampling approach is designed to achieve at least ± 10% precision at the 90% confidence level.

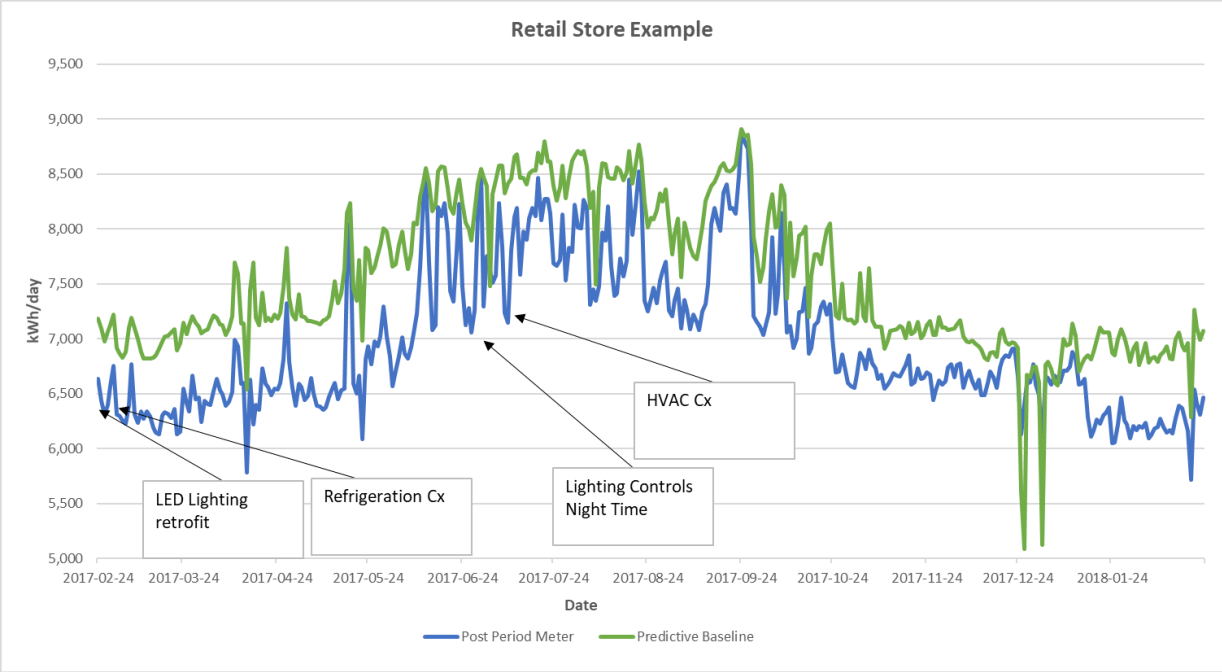
3.2 GROSS SAVINGS VERIFICATION

EcoMetric completed a review of relevant project documentation for each facility in the evaluation sample. Project documentation includes technical assessments, incentive applications, billing regression models, project cut sheets, invoices, reports, work order forms, and other supporting documents.

Level 1 audits were conducted for all facilities in the sample. Level 1 audits consist of a desk review of project documentation available in the program database, such as applications, IESO savings worksheets, savings calculations performed by participants, third-party contractors, technical reviewers (if applicable), billing regression models, savings reports, invoices for equipment or contracting services, and any other documentation available to IESO.

In the EPP Program, savings are calculated via interval billing analysis. Billing analysis relies on pre- and post-project utility bills. Hourly interval data is volunteered by the customers for the savings analysis. A regression is performed that looks at the relationships between cooling degree days (CDD), heating degree days (HDD), and pre and post utility consumption. Where statistically significant relationships are found, those variables are factored into a regression equation to arrive at a savings value. Once the regression is performed, the difference is taken between the actual post retrofit utility consumption and the predictive baseline. Figure 3 below is an example of a load curve for one of the participating facilities. The graph overlaid with the efficiency measures placed at the times they were installed helps visually demonstrate the impact of each individual installed measure.

Figure 3: Billing Analysis Savings Chart



Data sources and methods of data collection and review, including retrieval of tracking system and program documentation, and telephone interviews, are explained in more detail in *Appendix A.1*.

3.3 NET SAVINGS ANALYSIS

NTG is the process of determining what portion of project savings is attributable to the influence of the IESO programs versus what the customer would have done in the absence of incentive programs. The calculation of NTG factors includes both free-ridership, defined as the savings customers would have achieved in the absence of the program's influence, and spillover, defined as savings influenced by the program but not formally incentivized and/or claimed by the program. As the EPP program was in its first full year in PY2017, spillover was not assessed as it accumulates over time. Future evaluations will include a spillover assessment as part of the net savings analysis. The primary method of determining NTG ratios is through direct query surveys with decision-maker(s) at the participating customer organizations.

In the PY2017 evaluation, there was only one participating organization in the sample. Details of the NTG approach can be found in *Appendix A.2*.

3.4 EFFECTIVE USELFUL LIFE ESTIMATION

EPP projects at facilities can have several diverse energy saving measures completed throughout the program's performance period. To assess the persistence of energy and demand savings resulting from the EPP program, a weighted average approach was used to develop a single Effective Useful Life (EUL) for the multiple measures completed at each facility. By employing engineering algorithms and thumb rule industry assumptions, EcoMetric leveraged facility-level metered data to break down whole facility

savings into individual measures. Each individual measure was assigned EUL based on IESO Measure and Assumption Lists (MALs) or industry norms. Retrocommissioning and other Operational and Maintenance (O&M) measures are popular in the EPP program and were assigned a EUL of 5 years due to the EPP program's robust design and longer performance measurement period resulting in sustained savings. With EULs assigned at the individual measure level, EcoMetric created a site-level EUL using an average weighted by the savings created by each measure. Facility-level EULs allow for the analysis of the long-term savings impact of the EPP program on a diverse set of projects and facilities.

3.5 GREENHOUSE GAS EMISSIONS ESTIMATION

EcoMetric estimated net greenhouse gas (GHG) impacts for each project and program by utilizing measure-level energy savings load shapes based on metered data, natural gas consumption meter data, and emissions factors (EFs) provided by the IESO at the annual and hourly level and aggregated to the eight IESO peak periods as defined in the Conservation and Demand Management Energy Efficiency Cost Effectiveness Tool. The functionality for estimating GHG impacts is built into IESO's Conservation and Demand Management Cost Effectiveness tool, and estimates impacts on emissions in tonnes of GHGs (measured in metric tonnes of CO2 equivalent), considering both decreases in electricity consumption and net changes in natural gas usage.

3.6 PROCESS EVALUATION APPROACH

EcoMetric designed this process evaluation to document EPP's achievements following its first full year (PY2017) of program activity. We collected, reviewed, and analyzed qualitative data including interviews of program administrators and participants, and relevant program materials including forms and marketing materials.

3.6.1 PROCESS EVALUATION GOALS

The goals of this first EPP process evaluation were to:

- Understand program goals, management and processes;
- Identify specific preliminary findings including successes, challenges, and lessons learned;
- Provide recommendations for improvement of program processes;
- Identify opportunities for future research.

3.6.2 PROCESS EVALUATION METHODOLOGY

EcoMetric conducted seven in-depth telephone interviews with program staff, implementation staff, and the program's largest participant – a retail chain with 97[4] facilities enrolled in EPP across Ontario as of June 2018. We also reviewed key program materials, including the website, application forms, marketing materials, and the savings database.

Given that there is currently only one EPP participant that has completed a full year in the program, the customer perspective for this evaluation is limited to a single company's experience.

3.6.2.1 Process Evaluation Data Collection

Table 5: Process Evaluation Data Collection

Type	Individuals Interviewed
IESO staff overseeing EPP implementation	3
Implementation Contractor – Program Manager	1
Implementation Contractor – Technical Reviewer	1
Program Participant	1
Program Participant – 3rd Party Energy Consultant	1
Total	7

3.7 COST EFFECTIVENESS EVALUATION

The IESO Conservation and Demand Management (CDM) Cost-Effectiveness Tool[5] was used to estimate measure-level costs and benefits, which were then aggregated to program-level cost effectiveness. Program administrative costs were provided to EcoMetric by IESO. Other key inputs for the CE analysis include lifetime electric energy and demand savings, measure lives, and energy savings load shapes. Incremental project costs were not required to be reported by the participants or technical reviewer, so EcoMetric leveraged actual project cost data from similar projects completed as part of a DSM program in a comparable jurisdiction to estimate these costs for the projects completed at the EPP participant's facilities. Participant costs were collected from invoices for similar retrofit and retrocommissioning projects installed at similar building types as the participant and these costs were used to develop an average cost per measure type. These average costs were then applied to each facility in the population based on the measures completed in the performance period. Finally, the average costs were then

[4] As of June 2018, according to the EPP Program Tracker.
[5] http://www.ieso.ca/en/Sector-Participants/Conservation-Delivery-and-Tools/LDC-Toolkit

increased by 25% to account for uncertainty surrounding the variable costs between projects and jurisdictions.

4 EVALUATION RESULTS

4.1 EPP PROGRAM RESULTS

The Energy Performance Program for Multi-Site Customers (EPP) provides a performance-based whole-building approach to incenting energy efficiency improvements which gives multi-site customers with greater flexibility in measure selection. In this pay-for-performance model, building-specific energy models are used to determine a baseline, which is then compared to metered consumption to determine a performance payment. The consumption data is robust in the program, as two years of M&V data is a program requirement and the participants are required to use a billing analysis Savings Report developed by the IESO.

EPP was designed to provide solutions for multi-site customers with a large geographical footprint to historical challenges of participating in Save on Energy programs across more than one LDC service area. As such, the program targets customers with two or more commercial and industrial buildings located in two or more LDC services territories. Measures in the EPP program include both capital and non-capital efficiency measures, with performance being rewarded at the same rate. With measure savings being calculated at the whole-building level for multi-site customers, the cost of implementing the program and administrative burden are greatly reduced.

For the PY2017 evaluation, there were 39 facilities with EPP projects in-service and ready for evaluation. Facilities ready for evaluation have completed their first annual pay-for-performance period and had been technically reviewed by the implementer by March 31, 2018. All 39 of these facilities are owned by one multi-site participant and began their first performance period in 2017.

4.1.1 TRACKING SYSTEM & PROGRAM DOCUMENTATION REVIEW RESULTS

We reviewed the EPP tracking system as well as several pieces of program documentation and marketing materials for comprehensiveness and consistency with program theory and intent. The following documents and materials were included in our review:

4.1.1.1 Program Enrollment and Participation Materials

- Program Website
- Program Tracking Database
- EPP for Multi-Site Customer Facility Application Form
- EPP for Multi-Site Customer Facility Agreement
- Baseline Energy Model Validation Reports Tool
- EPP for Multi-Site Customers Savings Report

- Schedule "E" M&V Procedures for the Energy Performance Program for Multi-Site Customers
- Hourly-to-Daily Meter Data Aggregation Tool
- Energy Performance Program Technical Training Webinar PowerPoint

Overall, the customer-facing program materials, including the program requirements and enrollment forms, are straightforward and easy to understand. The IESO website explains the basics of program eligibility and potential benefits to participants clearly and concisely. The IESO provides a technical training webinar to new participants to help them navigate the baseline modeling procedure, performance tracking, and reporting savings.

Tracking data is generally accurate and project files are comprehensive. Files needed for project analysis and verification are mostly accurate and comprehensive enough to complete energy savings verification and other evaluation activities. This is especially helpful to facilitate facility-level audits without overly burdening customers/participants with data requests and other questions.

The Savings Report, Baseline Energy Model Validation Reports Tool and Hourly-to-Daily Meter Data Aggregation Tool required to be used by the participants result in uniform presentation of data needed for project analysis and verification by the technical reviewer and evaluator. The uniformity of the data, modeling and regression analyses allows the program implementer and evaluator to perform their duties in an effective manner and provides ample opportunities to compare facility performance to determine best practices for achieving energy savings.

The technical reviewer's method for creating the billing regressions and the way the projects were evaluated was very consistent between facilities. This allowed EcoMetric to develop a consistent method of determining the measure substantiation which was used to approximate the EULs for savings persistence.

Finding 1: Enhancements to data tracking and project documentation can improve insight into program activities and facilitate program planning and evaluation.

Recommendation 1: List specific measures completed and in-service dates at each facility in the EPP tracker maintained by program implementer. Currently, the tracker only lists proposed measures, with no confirmation of when or if the measure was completed.

- There were several instances in the participant's documentation of refrigeration RCx projects that had multiple dates listed as the implementation date in their project documentation. It is important to encourage participants to list what pieces of the measure were installed at what time, as that can contribute to the discussion of payback when trying to determine the most cost-effective measures. Accurate tracking of installation dates can result in a greater understanding of program performance and participation at any given time.

Recommendation 2: Require participants to provide measure-level cost data as part of their annual Savings Reports for every project implemented under the EPP program. Cost data should also be available in the tracking database. This can be achieved without placing too much burden on the participant by requiring invoices for equipment installed and associated measure costs.

- Measure-level cost data would allow implementers to identify the most cost effective types of measures being implemented in the EPP program. With this information, the IESO can work with program participants to plan and execute the most cost effective energy savings strategies as possible. It would also allow the evaluators to report more accurate cost benefit rations for the program.
- However, it may not be feasible to change program rules and technical review priorities required to collect and verify measure-level cost data at this point in the program's implementation. While measure-level cost data would allow for the most robust cost effectiveness evaluation of the program, facility-level or participant-level total costs would also allow for a relevant analysis of the program's cost effectiveness. It is recommended that the IESO review the feasibility of collecting cost data from participants and weigh the benefits of the data's granularity against the increased administrative burden for the participant.

4.1.1.2 Marketing and Outreach Materials

- EPP Marketing Brochure
- Toronto Hydro's OPsaver Sell Sheet (which cross-promotes EPP)

The IESO markets the program through a variety of means, using a key piece of collateral – the EPP Marketing Brochure. According to the Program Manager, the IESO has distributed the EPP Marketing Brochure at conferences and workshops as well as directly to prospective participants. The LDCs have the opportunity to co-brand the brochure and send to their own customers.

One key way the program conducts outreach to potential new participants is to work closely with funded Energy Managers[6] to cross-promote the two programs. The IESO distributes the brochure to Energy Managers and energy consulting companies working with commercial customers. In addition, the IESO has hosted webinars in conjunction with the Building Owners and Managers Association (BOMA), Canada Green Building Council (CaGBC), Association of Energy Engineers (AEE), and Association of Energy Services Professionals (AESP) to promote EPP.

The IESO has taken advantage of several outreach channels, leveraging both the LDCs relationships with their customers through co-branding of materials, and the membership base of existing energy related

[6] The Energy Manager program helps customers with facilities across multiple LDC territories to access funding for the hiring of a dedicated energy manager.

associations through webinar presentations. The program also makes strategic use of the Energy Manager program, which naturally complements EPP by addressing whole building performance.

Our review of program materials finds that the marketing brochure clearly highlights the key elements of the program and its potential benefits in a concise (double-sided) single page format. Given that one of the program's objectives is to build capacity to pursue energy efficiency within organizations, our one recommendation for the brochure would be to clarify, on page 2, that the expected "Annual Cost Savings" are independent of the Pay-for-Performance incentive payments. This is a subtle change but one that highlights the business case for ongoing facility energy management beyond the duration of the program. Placing emphasis on the potential savings attainable through strategic energy management, performance tracking, and continual improvement would also reinforce the IESO's program objective of achieving both savings persistence and potentially spillover.

Recommendation 3: Clarify, on page 2 of the EPP Marketing brochure, that the expected "Annual Cost Savings" are independent of the Pay-for-Performance incentive payments.

4.1.2 MEASURE DESCRIPTIONS

Projects in the PY2017 EPP Program included both capital and operations & maintenance (O&M) measures such as: lighting retrofits, refrigeration and HVAC recommissioning, inoccupancy scheduling, and refrigeration retrofits. With just one participant in the PY2017 EPP evaluation, these measures were fairly consistent between facilities. Nearly three-fourths of the measures evaluated in PY2017 were O&M with the most popular measures being HVAC and refrigeration retrocommissioning. Capital measures included interior and exterior lighting LED retrofits, as well as the replacement of refrigerator cases.

4.1.3 GROSS VERIFIED SAVINGS RESULTS

Total gross energy savings for the EPP program in PY2017 were 10,562 MWh, 100.03% of reported savings. Reported energy savings values are very accurate on average. Where adjustments to gross verified savings were made as part of the evaluation, they were minor and did not have significant impact on overall portfolio performance. The relative precision[7] of the energy savings realization rate was just 0.5% at the 90% confidence level.

The average first-year gross energy savings per facility are 271 MWh for the 39 facilities evaluated in PY2017. The highest performing facility achieved 559 MWh of gross first-year energy savings while the lowest achieved 23 MWh.

[7] Relative precision represents the uncertainty of the calculated realization rate for the program's population relative to the value of the program's realization rate for the sample at the 90% confidence level.

Summer peak demand savings were not required to be tracked by the program design. As such, no demand savings are reported in this evaluation.

Table 6: EPP Gross Verified Savings Results

# of Projects Evaluated	Energy Realization Rate (%)	Gross Energy Savings (MWh)	Gross Summer Peak Demand Savings (MW)	Persistence of Savings in 2020
39	100.03%	10,562	-	100%

Finding 2: Some of the statistical models provided to calculate savings via billing analysis were generally of low statistical significance and quality, particularly the holiday models.

- There were three models utilized by a single program participant evaluated in this program year to calculate savings for each facility in the PY2017 EPP program: standard, holiday and December. The holiday models were not statistically significant at a number of sites in the billing analyses evaluated by EcoMetric. Many projects reported negative savings for those models, but EcoMetric found insignificant correlation between variables which led to crediting zero savings instead of negative savings, accounting for a small increase in verified savings. Building additional models that do not have the resolution to significantly capture program impact is not a good use of resources, and most of the current holiday models reviewed by EcoMetric were not statistically valid.

Recommendation 4: Revise the M&V guidelines for the program to provide criteria for the inclusion of separate holiday models. Possibilities for criteria include a specific number of yearly holidays or a specific p-value threshold. (25 holidays or p<=0.1 would be reasonable levels). When these criteria are not met, guidelines should recommend the use of a dummy variable for holidays rather than fully separate models. This would allow information learned throughout the regular year to better inform the modeling during off-peak periods.

Finding 3: Peak summer demand savings were not verified or reported in the EPP program.

- Demand savings are easily calculated using annual interval billing analysis, which is already required by the program.
- While the focus of the CFF has shifted towards persisting net verified energy savings in 2020, evaluating and reporting peak summer demand savings remains an important metric to understand the impact of the EPP program. Cost effectiveness is especially affected by the lack of reported demand savings, which can provide ample benefits. Demand savings can also be a metric for LDCs to leverage when thinking about their total capacity; and evaluating demand savings is critical when LDCs are trying to understand their growth and potential.

Recommendation 5: Require that the technical reviewer verify peak summer demand savings for all participating facilities.

Finding 4: Natural gas savings were not verified or reported in the EPP program.

- Verified natural gas savings would allow for accurate pre- and post-energy use intensity (EUI) to be developed and provide a quick reference to the program's efficacy. Performing a regression to account for any gas savings would also provide a greater opportunity to capture the full benefits of the program and improve the accuracy of the cost effectiveness analysis.

Recommendation 6: Consider expanding the technical reviewer's scope to verify natural gas savings for all participating facilities.

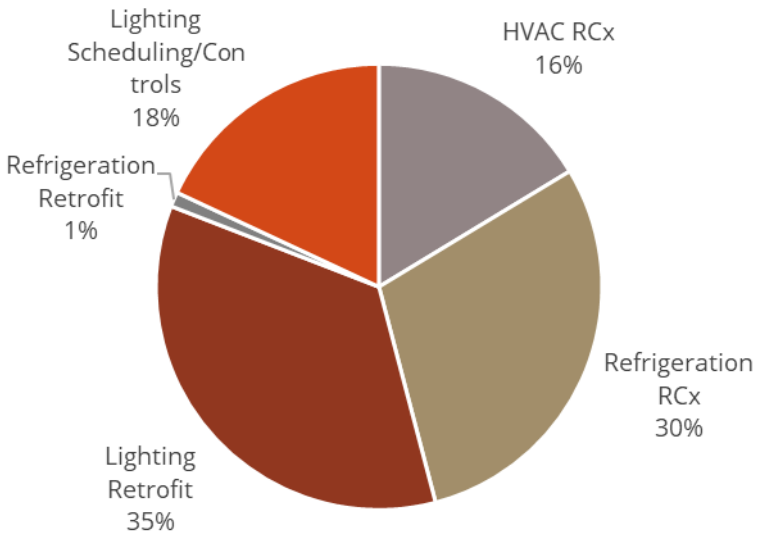
- It may not be feasible to change program rules and technical review priorities required to verify natural gas savings at this point in the program's implementation. It is recommended that the IESO reevaluate the importance of tracking and verifying natural gas savings as part of the EPP program in future program planning or redesign discussions.

4.1.3.1 Savings by Measure Type

While billing analysis and modeling was used to determine energy savings at the whole facility level, EcoMetric estimated measure-level savings for the facilities in the evaluation sample.[8] Of the 25 projects in the sample, an estimated 64% of the PY2017 gross savings in the EPP program came from O&M measures including retrocommissioning[9] (RCx) and lighting scheduling. RCx measures for refrigeration accounted for 30% of energy savings, while HVAC RCx resulted in an estimated 16% of total savings. Lighting controls were used to setback the lighting schedule at facilities during the night, resulting in 18% of total gross savings. Meanwhile, capital measures were overwhelmingly LED retrofits, representing an estimated 35% of total gross savings. Figure 4 below illustrates the estimated distribution of PY2017 energy savings by measure type.

[8] Measure-level savings for projects in the sample were estimated using engineering algorithms and standard industry assumptions during the gross savings verification audits.
[9] Retrocommissioning is the process of systematically implementing operational and maintenance measures to improve the facility's performance and reduce energy consumption.

Figure 4: Estimated Energy Savings by Measure Type



O&M measures account for an estimated 64% of gross verified energy savings. RCx measures on HVAC and refrigeration systems created nearly half of the program's energy savings in PY2017. These types of measures have several implications on the EPP program. O&M measures tend to be much more affordable than capital measures such as lighting or HVAC retrofits, resulting in high cost effectiveness. However, O&M measures often have shorter effective useful lives that create lower savings persistence for the program. As participants enter their performance periods following the first year of participation, projects are likely to become more complex and costlier to achieve the same level of savings. This is common in pay for performance programs, as participants are likely to begin their participation with "low hanging fruit" measures such as RCx or behavioural measures.

4.1.3.2 Geographical Distribution of Program Savings

Gross energy savings were distributed between 17 of Ontario's LDCs. Geographically, the majority of savings are concentrated in the populous areas of Greater Toronto, Windsor and Ottawa. However, sites in more rural areas, such as Thunder Bay, did contribute to EPP program savings in PY2017. While this distribution is as expected—following the distribution of population and business centers in Ontario—it is encouraging to see the program is reaching more rural areas of the province as well. Participation in rural facilities illustrates the success in the EPP program design of removing barriers to participation for companies with facilities located throughout the province.

4.1.3.3 Savings Persistence to 2020

EPP projects at facilities can have several diverse energy saving measures completed throughout the program's performance period. To assess the persistence of energy and demand savings resulting from the EPP program, a weighted average approach was used to develop a single Effective Useful Life (EUL) for the multiple measures completed at each facility. By employing engineering algorithms and industry

assumptions, EcoMetric leveraged facility-level metered data to break down whole facility savings into individual measures. Each individual measure was assigned an EUL based on IESO Measure and Assumption Lists (MALs) or industry norms. RCx measures were assigned a EUL of 5 years due to the EPP program's robust design and longer performance measurement period resulting in sustained savings. With EULs assigned at the individual measure level, EcoMetric created a site-level EUL using an average weighted by the savings created by each measure. Facility-level EULs allow for the analysis of the long-term savings impact of the EPP program on a diverse set of projects and facilities.

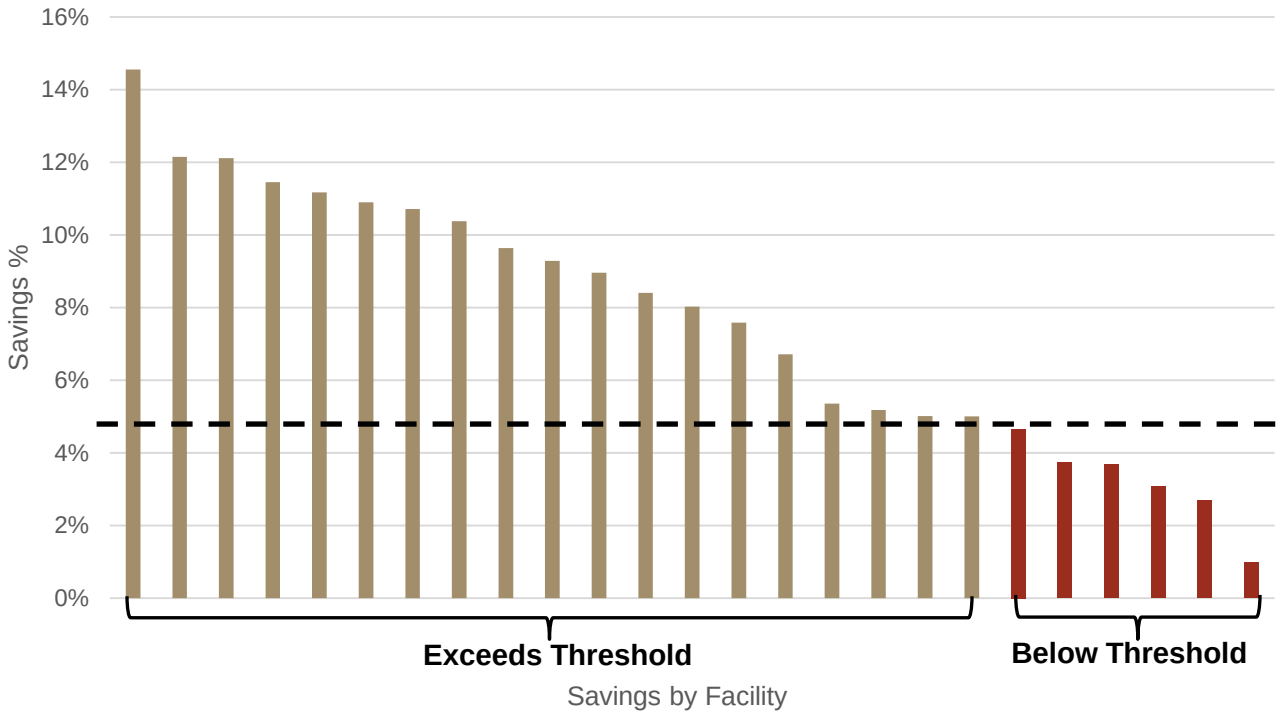
As a result of this analysis, 100% of the gross savings persist to 2020.

Recommendation 7: In order to simplify and standardize savings persistence and cost-effectiveness calculations for future evaluations, the EPP program should calculate a standard average measure life for each project, considering the typical mix of measures and savings at the facilities.

4.1.3.4 Facility Savings Performance

The EPP Program requires that each participating facility reach a 5% minimum savings threshold over the first two years of its participation. In PY2017, 19 of the 25 facilities sampled reached the savings threshold in their first year, depicted in Figure 5. For the overall sample, annual savings were calculated to be 7.7%, which is a good margin over the 5% minimum threshold. The highest performing facility sampled achieved 14.6% annual savings, while the lowest was less than 1%. On a savings per square foot basis, the facilities evaluated ranged from 0.5 kwh/ft^2 to 8.3 kWh/ft^2 with a program average of 3.5 kWh/ft^2 in energy savings.

Figure 5: PY2017 EPP Facility Savings Threshold



The six projects that did not meet the minimum threshold in the first year had not yet installed a planned lighting project which accounted for large portions of savings for other facilities, if those capital projects are installed in the second year of the program then it is likely that all the facilities will meet the minimum threshold. The evaluation team would also anticipate the savings to persist year to year at a minimum throughout the three-year program period.

Finding 5: In PY2017, 19 of the 25 facilities sampled reached the savings threshold in their first year.

- This high rate of success in meeting the 5% savings threshold for facilities in the program's first full year of implementation illustrates the strength of the program's design to incite energy savings.

Recommendation 8: For facilities that do not reach 5% energy savings in their first year, IESO should review the facility's future measure plans and ensure high-performing measures will be completed. If no major efficiency measures are planned, consider holding a meeting with the participant to develop a plan to reach the minimum threshold by year two.

4.1.4 NET VERIFIED SAVINGS RESULTS

Total net energy savings were 7,921 MWh in PY2017, 75% of total gross savings. Net summer peak demand savings are not reported as the verification of demand savings was not in the technical reviewer's scope for the program.

Table 7: EPP Net Savings

# of Facilities Evaluated	NTG Ratio (%)	Net Energy Savings (MWh)	Net Summer Peak Demand Savings (MW)
39	75.0%	7,921	-

Free-ridership - EcoMetric estimates that free-ridership in the EPP is between 19.6% and 30.4%. The average free-ridership value derived via decision-maker interviews is 25%, with an approximate error bound of +/- 5.4%. However, in absence of EPP, some portion of these energy savings would very likely have still occurred and would have been incented through other Save on Energy programs.

All free-ridership apparent in EPP can be traced to the interviewees' responses surrounding the intention of program participants, specifically, the intent to carry out the efficiency project without program assistance. Interview responses strongly suggest that while the EPP enabled participants to expand the scope and depth of the energy efficiency projects being implemented, at least some portion of these changes would have been made even if they did not participate in EPP. **Influence free-ridership scores are zero for all interviewees, indicating that the program had considerable influence on the respondent's decision to carry out the efficiency projects.** Spillover was not calculated in PY2017 because enough time had not passed for accumulation of measurable spillover savings. Spillover analysis will be included in future EPP evaluations.

4.1.5 COST EFFECTIVENESS RESULTS

The EPP program was highly cost-effective in 2017 according to both TRC and PAC tests, when using a benefit-cost threshold of 1.0. The PAC ratio is 3.96, while the TRC ratio is 1.67. Levelized costs are low for the program at 0.01 $/kWh.

Table 8: EPP Cost Effectiveness Results

Total Resource Cost Ratio	Program Administrator Cost Ratio	Levelized Cost $/kWh
1.67	3.96	0.01

The TRC and PAC ratios are likely to improve in future program years, as the EPP Program is relatively young and administrative costs are borne earlier in the program's life cycle. In PY2017, the program's cost effectiveness was supported by a large share of Operation & Maintenance (O&M) measures, which are generally much less costly than capital measures while still achieving significant savings.

However, the lack of participant cost data increased the difficulty in estimating the program's cost effectiveness. While a robust analysis of similar projects completed in similar jurisdictions was leveraged to estimate incremental project costs at each facility in the population, improved access to actual

participant costs would result in a more accurate analysis. (See Recommendation #2). A more detailed explanation of the methodology used to estimate participant costs and the program's overall cost effectiveness can be found in *Section 3.7*.

4.1.6 GREENHOUSE GAS EMISSIONS RESULTS

Net greenhouse gas (GHG) emissions impacts of the EPP program in PY2017 are positive, resulting in net first year emissions reductions of approximately 1,535 tonnes (t) of CO_2 equivalent (CO_2e). All the emissions reductions were created by electric savings. Gas savings were not required to be verified by the program, but the mix of measures completed by the participant certainly resulted in gas savings and GHG emissions reductions.

Table 9: PY2017 Greenhouse Gas Emissions Impacts

First Year GHG Impacts (tonnes CO_2e)			First Year GHG Reduction Costs ($/tonne CO_2e) (Total Resource Costs)
Electric	Gas	**Total**	
1,535	0	**1,535**	$1,046

4.1.7 PROCESS EVALUATION RESULTS

In this section, we provide the key take-aways from our PY2017 process assessment, presented by topic areas related to the overall evaluation objectives. This assessment was independent of the net-to-gross surveys conducted in 2017 and was based on a materials review, and in-depth interviews with program staff, implementation staff, and one program participant that completed a full year of the program.

A key objective of this research was to review the program's design and methods of implementation in relation to the IESO's program objectives and provide our findings and suggestions for future research based on those findings.

IESO Designed EPP for Ease of Participation

The IESO designed the Energy Performance Program specifically to help multi-site retailers participate in energy efficiency programs with less administrative effort than conventional retrofit programs. In our

> *"Our issues with [standard rebate] programs were in the process, validation and verification. There were many steps you had to go through. They have too many stores and it's onerous to do individual upgrades through the standard process."*
>
> *– IESO Customer's Energy Consultant*

interview with this customer, we learned that the number of administrative hours required to complete application and verification requirements for standard rebate programs, when multiplied by many (potentially upwards of a hundred) stores, can become burdensome. This customer noted that time spent on administration is a cost to the business.

In addition to making it administratively easier for multi-site customers to pursue energy efficiency, the IESO designed EPP to fulfill two other key strategic objectives: 1) build customers' internal capability to select and implement energy efficiency upgrades and initiatives; and 2) encourage persistence of savings through deep retrofits, O&M optimization, and behavioral change. The two objectives are related, as increased capacity could result in more companies engaging in energy efficient practices in the absence of program intervention.

IESO Promotes EPP Through a Variety of Channels

The IESO uses a marketing brochure, webinar presentations to industry associations, and conference appearances to promote EPP and recruit new participants. Program administrators also leverage the LDCs' relationships with their customers through co-branding of the brochure, and they also collaborate with the Energy Manager Program, which naturally complements EPP by addressing whole building performance.

Our evaluation found that IESO program staff thought the Energy Manager – EPP link could and should be stronger and yield more EPP enrollees than it currently does.

Both IESO and the Customer are Highly Satisfied with EPP

Both the IESO and its one EPP participant that has completed a full year of participation see the program as successful. From the implementation side, IESO has seen savings results, and has exceeded the number of facilities it hoped to enroll in the program overall – including the customer interviewed for this evaluation as well as others. The IESO also noted that having multiple program models available provides increased customer choice.

> *"In a [Pay-for-Performance] program, you're paying for actual [energy] reduction, which is more accurate and more cost effective. At the same time, for the customer... there is a huge opportunity; they can outperform, they can save more electricity and get more incentive for that."*
>
> *-IESO Program Manager*

The program participant and the participant's energy consultant, during interviews for this evaluation, cited ease of participation and reduced paperwork as a key benefit of EPP from the customer side. They believed that the EPP pay-for-performance program model unencumbered them to pursue projects at their own pace, which they said has enabled them to accomplish more in a shorter amount of time than if they had implemented those same projects through the commercial Business Retrofit Program.

The program implementation contractor was also satisfied with the way the program was running. They noted the program's emphasis on ease of participation and streamlined data collection protocols as positive aspects. The implementer offered two suggestions for program improvement – first to consider ways of simplifying the program tracking spreadsheet; and second for all parties to be consistent in their program terminology to ensure it adheres to the International Performance Measurement and Verification Protocol (IPMVP) guidelines to avoid potential confusion. For example, when using the term 'baseline,' one may be referring to an initial baseline or an adjusted baseline.

EPP Faces Two Key Challenges

EcoMetric found that, going forward, EPP faces two central challenges:

1. Cost effectiveness calculations are not possible without project cost data, which EPP does not currently require participants to track or provide as part of annual savings reports[10]; and
2. Ontario's current Conservation First Framework (CFF)[11], of which EPP is a contributor, expires at the end of 2020. This affects the value proposition for prospective program participants the closer one gets to the expiration date, since customers enroll for a 2-year period, with the option of renewing once for a maximum participation period of 4 years. According to program rules, if a customer can sustain their energy reduction year over year, they can receive an incentive of $0.04/kWh, up to 20% of energy use compared to baseline, each year for up to 4 years. But if there are not four – or even the typical program period of two – years left in the eligibility timeframe, customers do not stand to reap the same reward as one who enrolled earlier.

[10] See Sections 4.1.1 and 4.1.5 of this report for a detailed explanation of the lack of project cost data and program cost effectiveness.

[11] Ontario's Ministry of Energy issued the Conservation First Framework, effective 2015-2020, which set a target for the province to reduce energy consumption by 7 terawatt-hours by December 31, 2020. https://cms.powerauthority.on.ca/opa-conservation/conservation-first-framework-2015-2020

Recommended Future Research

Given the nascence of this program, EcoMetric recommends that subsequent evaluations address the following topics:

- Once more participants have completed their first program year, survey a broader set of EPP participants to enable a more robust assessment of the EPP participant perspective;
- Conduct a detailed assessment of the ways in which Energy Manager and EPP currently collaborate, and identify opportunities for enhanced cooperation and joint marketing between the two programs;
- Examine ways to address the recruitment and participation barrier posed by the Conservation First Framework's upcoming 2020 expiration.

4.1.7.1 EPP Process Evaluation Snapshot

Below we provide a high-level "snapshot" view of the program's design and objectives, as well as our initial observations from the PY2017 process evaluation and suggestions for future research. The snapshot is organized into the categories of program design and objectives, delivery and execution, customer experience, and EPP's technical review and evaluation processes.

Initial Observations	Further Research
Program Design and Objectives	
▸ IESO designed EPP for ease of participation for multi-site commercial customers. ▸ IESO hopes EPP will build capability and result in persistence of savings.	▸ In future years, conduct follow-up research with EPP past participants to assess spillover of energy efficiency practices adopted during the program. ▸ Examine ways to address the recruitment and participation barrier posed by the Conservation First Framework's upcoming 2020 expiration.
Delivery/Execution	
▸ IESO promotes EPP through a variety of channels ▸ IESO recruits and helps enroll participants; the implementation contractor conducts technical reviews and maintains ongoing communication with participants.	▸ Conduct a detailed assessment of the ways in which Energy Manager and EPP currently collaborate and identify opportunities for enhanced cooperation and joint marketing between the two programs.
Customer Experience	
▸ The program participant interviewed for this	▸ If program requirements change to include tracking

Initial Observations	Further Research
evaluation reported high satisfaction with the program, citing low administrative overhead compared to standard commercial incentive programs. That said, IESO may require participants to begin tracking project cost data for the purposes of evaluating cost effectiveness.	project cost data, assess what, if any, impact this may have on participant satisfaction.
Technical Review/Evaluation	
▸ Technical reviewers for EPP report that program processes are generally effective, although there may be opportunity for simplification of the data tracking spreadsheet. ▸ EcoMetric was able to make a limited assessment of the participant experience due to the program's nascence and only one full participant at the time of the evaluation.	▸ Revisit the design of the data tracking spreadsheet in collaboration with the technical reviewers. ▸ Survey a broader set of EPP participants once more participants have completed a full program year, to enable a more robust assessment of the EPP participant perspective.

Largest Successes	Largest Opportunities
▸ The EPP program achieved savings in its first program year and exceeded its target for number of facilities enrolled.	▸ Maximize cooperation between EPP and Energy Manager. ▸ Expand program reach to include other sectors and building types.

5 FINDINGS AND RECOMMENDATIONS

Table 10: PY2017 EPP Evaluation Findings and Recommendations

Findings		Recommendations	
Tracking System & Program Documentation Review Results (Section 4.1.1)			
1	Enhancements to data tracking and project documentation can improve insight into program activities and facilitate program planning and evaluation.	1	List specific measures completed and in-service dates at each facility in the EPP tracker maintained by program implementer. Currently, the tracker only lists proposed measures, with no confirmation of when or if the measure was completed.
		2	Require participants to provide measure-level cost data as part of their annual Savings Reports for every project implemented under the EPP program. Cost data should also be available in the tracking database. This can be achieved without placing too much burden on the participant by requiring invoices for equipment installed and associated measure costs.
		3	Clarify, on page 2 of the EPP Marketing brochure, that the expected "Annual Cost Savings" are independent of the Pay-for-Performance incentive payments.
Gross Savings Verification Findings (Section 4.1.3)			
2	The participant's holiday models provided to calculate savings via billing analysis were generally of low statistical significance and quality, as there are few holidays in a single year.	4	Revise the modeling guidelines for the program to provide criteria for the inclusion of separate holiday models. Possibilities for criteria include a specific number of yearly holidays or a specific p-value threshold. (25 holidays or p<=.10 would be reasonable levels). When these criteria are not met guidelines should recommend the use of a dummy variable for holidays rather than fully separate models. This would allow information learned throughout the regular year to better inform the modeling during off-peak periods.
3	Peak summer demand savings were not verified or reported in the EPP program.	5	Require that the technical reviewer verify peak summer demand savings for all participating facilities.

Findings		Recommendations	
4	Natural gas savings were not verified or reported in the EPP program.	6	Consider expanding the technical reviewer's scope to verify natural gas savings for all participating facilities.
		7	In order to simplify and standardize savings persistence and cost-effectiveness calculations for future evaluations, the EPP program should calculate a standard average measure life for each project, considering the typical mix of measures and savings at the facilities.
5	In PY2017, 19 of the 25 facilities sampled reached the savings threshold in their first year.	8	For facilities that do not reach 5% energy savings in their first year, IESO should review the facility's future measure plans and ensure high-performing measures will be completed. If no major efficiency measures are planned, consider holding a meeting with the participant to develop a plan to reach the minimum threshold by year two.

APPENDIX A SELECT METHODOLOGY DETAILS

A.1 GROSS SAVINGS DATA COLLECTION AND REVIEW

This section outlines the data collection and analysis approach to verify measures installed and savings claims, and to estimate gross verified program savings based on evaluation findings.

A.1.1 DATA COLLECTION

A.1.1.1 Data Sources

Table 11 below contains a list of the data used by EcoMetric to verify gross savings.

Table 11: Data & Information Used for Impact Evaluation

Item	Description
Reported (Ex-Ante) participation & savings	Savings by project, & measure
Participant contact information	For survey administration
Project files	Including M&V data & documentation
Reporting template(s)	For impact reporting
Cost-effectiveness parameters	Avoided costs, admin costs, discount rate

The primary data source for EPP projects in the gross impact evaluation sample are the savings reports submitted by participants for each facility site.

During the project documentation review, EcoMetric assessed the completeness and reliability of the measurement and verification completed to date.

A.1.1.2 Tracking System & Program Documentation

Impact evaluation activities commenced with a review of program tracking systems and methods for thoroughness and consistency. At this time, EcoMetric assessed the accuracy, consistency, and reasonableness of tracking system inputs—for instance, effective useful life (EUL) assumptions—and corrected these when justified, recording findings and providing recommendations for future improvements to IESO program tracking methods. Additional data gathering was conducted using telephone interviews.

A.1.1.3 Telephone Interviews

Telephone interviews were utilized in conjunction with engineering desk reviews when additional information can supplement project files and facilitate preparation for on-site data gathering. For instance, operating parameters may be refined to improve the accuracy of engineering analyses, and

facility or equipment characteristics will inform the development of site-specific evaluation plans before site visits. As is discussed below, in many cases gross, net, and process research will be integrated, to the extent that interview time allows.

A.1.2 VERIFICATION METHODS

A.1.2.1 Project Documentation Review

EcoMetric completed a review of relevant project documentation for each facility in the evaluation sample. Project documentation includes technical assessments, incentive applications, billing regression models, project cut sheets, invoices, reports, work order forms, and other supporting documents.

A.1.2.2 Project Audits

Facility audits are the key to the accurate evaluation of programs and an important task to verify the accuracy of the M&V conducted by the customer, contractor, technical reviewer, and other parties in the implementation process. Audits were performed on the projects for each facility in the sample, utilizing end use-specific or technology-specific analysis tools and testing the calculations and related assumptions used to estimate savings for each project. Where significant revisions to savings estimates are needed, findings were carefully documented in this report.

Audits were conducted for all facilities in the sample. Audits consisted of a desk review of project documentation available in the program database, such as applications, IESO savings worksheets, savings calculations performed by participants, third-party contractors, technical reviewers (if applicable), billing regression models, savings reports, invoices for equipment or contracting services, and any other documentation available to IESO.

The first step in the audit was to confirm whether the project documentation substantiates initiative eligibility. Application documents were used to validate applicant, facility, and measure eligibility, while financial records confirm that incentive amounts were tabulated correctly, and program rules were followed. This step confirmed proper classification of the project track and measure types.

The protocol for the audits for all EPP projects in the sample is summarized in Figure 6 below.

Figure 6: Facility Audit Protocol

A.1.2.3 Analysis Approach & Methods

Data collected from the audit activities allowed EcoMetric to verify energy and demand savings for each sampled facility, termed "gross verified savings." The ratio of gross verified savings to the reported savings is the project "realization rate," while the program-level and/or stratum-level realization rate is the weighted average for all projects in the program sample or specific stratum. These savings do not account for customer or market behaviour that may add to or subtract from an initiative's direct results; these market effects are captured through tasks carried out in net savings analysis. The gross verification approach was tailored to the individual project selected for evaluation.

A.2 NET SAVINGS ANALYSIS

This section describes the net savings or net-to-gross (NTG) approach for the research and computation of free-ridership and spillover factors during the evaluation of EPP's 2017 program year (PY2017). NTG is the process of determining what portion of project savings is attributable to the influence of the IESO programs versus what the customer would have done in the absence of incentive programs. The calculation of NTG factors focused on free-ridership, defined as the savings customers would have achieved in the absence of the program's influence. The primary method of determining the NTG ratio was through direct query surveys with decision-maker(s) at the participating customer organization.

A.2.1 NET-TO-GROSS EVALUATION CORE APPROACH

The primary data collection method for NTG data was through in-depth self-report interviews. The general NTG process is as follows:

A.2.1.1 Survey Development

The NTG surveys were designed to avoid survey burden while seeking to minimize self-report bias, by including two core components of free-ridership: 1) intention to implement the energy efficiency project(s) in the absence of program funds, and 2) influence of the program in the decision to carry out the energy efficiency project. Each of these components is scored from zero to 50, resulting in a combined free-ridership score of zero to 100.

Spillover analysis was not completed as a part of the PY2017 NTG analysis as the program was in its early stages and spillover is accumulated over time. Future evaluations will include spillover analysis. Spillover questions will take place in a separate interview and will address other projects implemented by the participant since implementation of the energy efficiency projects in question.

A.2.1.2 Training and Testing

Prior to roll-out of the NTG survey instruments, EcoMetric conducted training exercises to ensure that the team has the appropriate training and expertise to conduct the interviews. This included a refresher session on interviewing tone, follow-up questions, time management, and avoiding leading questions, as well as pre-tests of interview scripts and pilot testing with initial recruited participants.

A.2.1.3 Recruitment

EcoMetric recruited the primary decision-maker(s) for the one organization included in the PY2017 evaluation sample. Interviews were conducted with multiple people where more than one individual were responsible for the "go/no-go" decision. EcoMetric leveraged IESO and the consultants engaged by the customers to help identify appropriate contacts and to send personalized recruitment emails notifying participants of the upcoming interviews.

EcoMetric took considerable steps to ensure that interviews are conducted with the primary decision-maker(s) involved in the decision-making, or at the very least, aware of the decision-making criteria for the project. EcoMetric worked with IESO to identify the primary decision-makers for each project by first reviewing the project files and customer contact information.

Once likely decision-makers are identified, EcoMetric contacted the customers directly, screening them prior to starting the interview to confirm that they were the decision-maker or involved/aware of the decision-making process. The interviews were conducted shortly after the program contract was signed to ensure that the decision-makers had the factors surrounding their decision-making process fresh in their minds. EcoMetric leveraged a combination of email and phone messages to customers at different times of day and week, and logs each contact attempt (time, date, target, result), in a contact tracking system.

A.2.1.4 Post-Interview Processing

After completing each interview, the interviewer reviewed notes and submitted results for quality control review. This step examined the results for consistency and completeness, removing any results where interviewee responses were incomplete or inconsistent or demonstrated a clear lack of familiarity with the decision-making process.

A.2.2 NTG ANALYSIS APPROACH & METHODS

The NTG data was analyzed to calculate two core components of free-ridership: 1) intention to implement the energy efficiency project(s) in the absence of program funds, and 2) influence of the program in the decision to carry out the energy efficiency project. Each of these components is scored from zero to 50, resulting in a combined free-ridership score of zero to 100.

Intention and influence components are potentially subject to different and opposing biases; that is, intention may be subject to biases that would increase the estimate of free-ridership (social desirability bias), while influence may be subject to biases that would decrease the estimate of free-ridership (participants who are satisfied with the program may report greater program influence). Combining these two components into an overall free-ridership score at least partially cancels out the opposing biases.

Intention is assessed through a battery of questions to determine how the efficiency upgrade or equipment replacement would have differed if the respondent had not received the program assistance.

Response options generally capture three outcomes. In absence of the program, the respondent would have:

- canceled or postponed the project, upgrade, and/or purchase beyond one year;
- completed an efficiency project that would have produced energy savings different than those savings achieved through the project as-implemented; or
- completed the project as-implemented anyway.

Each outcome indicates a different level of intention.

Influence is assessed by asking how much impact various program elements (e.g. financial incentive, technical support, energy audit, marketing) had on the decision to complete the efficiency upgrades as they were done.

In addition to identifying free-riders, it is important to estimate the extent of free-ridership for the customer.

Pure free-riders (100%) would have completed the same energy efficient project at that time in the absence of the program.

Partial and/or deferred free-riders (1–99%) are those customers who would have undertaken some energy efficiency project on their own, but with a different scope/size/efficiency (partial), and/or later (deferred). In these cases, the program had some impact on their decision, but was not wholly responsible for the efficiency improvements.

Non-free-riders (0%) are those who would not have installed or implemented any energy efficient project within one year without the program services.

Total Free-ridership score = Intention score + Influence score

The free-ridership factor was used to estimate net savings using the following formula:

*Net savings = verified gross savings * (1 – FR)*

As there was only one participant in the PY2017 sample, there was only one free-ridership score for the entire program.