# IMPACT AND PROCESS EVALUATION REPORT

## INTERIM FRAMEWORK PROCESS & SYSTEMS UPGRADES PROGRAM PY2020

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Prepared for: Independent Electricity System Operator (IESO)

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## ACKNOWLEDGEMENTS

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EcoMetric would also like to thank all the program participants and contractors that EcoMetric interviewed. Their insights have been invaluable to EcoMetric's efforts to improve the Conservation Programs and have produced high quality data that will serve Ontario conservation efforts for years to come.

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## ABBREVIATIONS

| | |
|---|---|
| CDM | Conservation and Demand Management |
| CFF | Conservation First Framework |
| CHP | Combined Heat and Power |
| EF | Emissions Factors |
| GHG | Greenhouse Gas |
| IESO | The Independent Electricity System Operator |
| IF | Interim Framework |
| M&V | Measurement and Verification |
| NTG | Net-to-Gross |
| PSUP | Process & Systems Upgrades Program |
| PY | Program Year |
| StatCan | Statistics Canada |

## E.1 EVALUATION GOALS AND OBJECTIVES

This report documents the impact and process evaluation results conducted for the Process & Systems Upgrades program (PSUP) in Program Year (PY) 2020. PSUP provides incentives to industrial facilities to implement energy efficiency or system optimization projects that are complex and capital-intensive.

In April 2019, the IESO began to centrally deliver all energy efficiency programs in Ontario by implementing a new Interim Framework (IF) following a directive from the Ministry of Energy, Northern Development and Mines. The IF replaced the Conservation First Framework (CFF) with an updated Save on Energy Programs portfolio that was in effect from April 1, 2019, through December 31, 2020.

The goals of the PY2020 evaluation were to:

- Verify annual energy and summer peak demand savings.
- Assess program attribution (net-to-gross or NTG), including free ridership.
- Annually estimate the net greenhouse gas impacts in tonnes of $CO_2$ equivalent using the IESO's Cost-Effectiveness Tool.
- Monitor the overall effectiveness and comprehensiveness of key program elements.
- Conduct annual cost-effectiveness analyses and report on key indicators of cost-effectiveness, including the Total Resource Cost (TRC) test, Program Administrator Cost (PAC) test, and the Levelized Unit Energy Cost (LUEC) metric.
- Analyze and make recommendations to improve the program.
- Determine customer satisfaction.

## E.2 EVALUATION RESULTS

This section summarizes the results of the PY2020 PSUP impact and process evaluation.

### E.2.1 IMPACT EVALUATION RESULTS

The PY2020 PSUP gross verified savings results are summarized in Table 1 and Table 2. In total, five PSUP projects were evaluated and ready for reporting in the PY2020 evaluation frame. The total gross verified energy savings for PSUP in PY2020 are 6,297 MWh, including PY2019 true ups, representing 105% of reported savings. Total gross verified summer peak demand savings for PSUP are 0.62 MW, 99% of reported savings.

Total net first-year energy savings for PSUP projects evaluated in PY2020 are 4,162 MWh, 66% of gross verified savings. Net demand savings for PSUP in PY2020 are 0.37 MW. Free ridership was 34% for the program, and there was no spillover attributed to the program. One hundred percent of net verified energy savings persist through 2022.

*Table 1: PY2020 PSUP Energy Savings Summary*

| Program Year | Projects Evaluated & Reported | Energy Realization Rate | Gross Verified Energy Savings (MWh) | Gross Verified 2022 Energy Savings (MWh) | NTG Ratio | Net Verified Energy Savings (MWh) | Net Verified 2022 Energy Savings (MWh) |
|---|---|---|---|---|---|---|---|
| 2020 | 3 | 101% | 3,275 | 3,275 | 52% | 1,712 | 1,712 |
| 2019 True Ups | 2 | 110% | 3,022 | 3,022 | 81% | 2,450 | 2,450 |
| **TOTAL** | **5** | **105%** | **6,297** | **6,297** | **66%** | **4,162** | **4,162** |

*Table 2: PY2020 PSUP Summer Peak Demand Savings Summary*

| Program Year | Projects Evaluated & Reported | Demand Realization Rate | Gross Verified Summer Peak Demand Savings (MW) | Gross Verified 2022 Summer Peak Demand Savings (MW) | NTG Ratio | Net Verified Summer Peak Demand Savings (MW) | Net Verified 2022 Summer Peak Demand Savings (MW) |
|---|---|---|---|---|---|---|---|
| 2020 | 3 | 97% | 0.35 | 0.35 | 52% | 0.15 | 0.15 |
| 2019 True Ups | 2 | 101% | 0.27 | 0.27 | 81% | 0.22 | 0.22 |
| **TOTAL** | **5** | **99%** | **0.62** | **0.62** | **66%** | **0.37** | **0.37** |

As shown in Table 3, PSUP is not cost effective from the TRC or PAC test perspective using a benefit/cost threshold of 1.0[1]. This is an interim finding based on the completion of fewer than 10%

[1] PSUP cost effectiveness analysis for PY2020 only includes projects implemented in the calendar year 2020.

of projects approved in PSUP. The cost effectiveness of the program in PY2020 was negatively affected by the COVID-19 pandemic as fewer projects were implemented, and more administrative support and guidance for the participants under contract was required of the IESO and technical reviewers. The robust project pipeline for the program is expected to improve the program's cost effectiveness by the next evaluation.

*Table 3: PY2020 Cost Effectiveness Results*

| TRC Costs (CAD) | TRC Benefits (CAD) | TRC Ratio | PAC Costs (CAD) | PAC Benefits (CAD) | PAC Ratio | LC CAD/kWh |
|---|---|---|---|---|---|---|
| $4,241,633 | $1,089,293 | **0.26** | $3,031,939 | $947,212 | **0.31** | 0.16 |

Over the lifetime of the PY2020 sample frame projects, including PY2020 and PY2019 true up projects, net GHG reductions totaled 10,978 tonnes of CO2e. EcoMetric did not include net benefits from GHG reductions in the cost effectiveness analysis of PSUP, but it is an important metric to track the overall impact of the program.

### E.2.2 PROCESS EVALUATION RESULTS

Several completed data collection activities informed the PY2020 process evaluation of PSUP. EcoMetric collected process evaluation data in two waves: the first in PY2019 and the second wave in PY2020. The data collection activities included in-depth interviews with PSUP staff at the IESO and technical reviewers, semi-structured interviews with PSUP contractors, and mixed-mode surveys with PSUP participants. The key findings and recommendations from the process evaluation can be found in Section E.3, starting with Finding #3, and detailed results can be found in Section 4.

### E.2.3 JOB IMPACTS RESULTS

PSUP created an estimated 24 jobs in PY2019 and PY2020, as summarized in Table 4. Nearly all the job creations from the program were local, with 22 of the 24 total jobs created in Ontario. In terms of full-time equivalent (FTE), PSUP created an estimated 23 jobs.

*Table 4: PY2020 PSUP Job Impacts Results*

| Program Year | Ontario FTE | Canada Total FTE | Ontario Jobs | Canada Total Jobs |
|---|---|---|---|---|
| PY2019 | 7 | 6 | 6 | 7 |
| PY2020 | 15 | 17 | 16 | 17 |
| **Total** | **22** | **23** | **22** | **24** |

## E.3 KEY FINDINGS AND RECOMMENDATIONS

**Finding #1**: Project documentation for several projects did not include sufficient information for evaluators to determine how project savings were calculated.

**Recommendation #1: Project documentation should include not only a spreadsheet-based savings analysis but a clear and logical explanation for how the ex-ante savings were calculated and rationale for any assumptions involved.**

**Finding #2**: Technically reviewed summer peak demand savings for a few projects were either not calculated or calculated incorrectly. For example, one project used the average demand savings as the reported summer peak demand savings.

**Recommendation #2: The technical reviewer should always strive to calculate demand savings for the summer peak period defined by the IESO, regardless of the time of year that the performance data comes from. If there is no data from the peak summer period, various methods could be employed to estimate peak summer demand savings, including:**

- **Weather variable-based (i.e., outside air temperature) regression**
- **If the measure is not weather-dependent, assume the peak summer demand savings is the same as the peak demand savings from the period that the performance data comes from.**

**Finding #3**: One-on-one outreach and individual communication are key to recruiting participants to the PSUP program. Not only is the IESO business development manager instrumental in attracting customers, but the IESO's interactions with contractors help in bringing in more projects.

**Finding #4**: The Energy Manager Program was successful at bringing projects into PSUP.

**Recommendation #3: Consider leveraging energy managers to drive participation from industrial sector participants as they adjust to the new 2021-2024 Conservation and Demand Management Framework. Energy managers are a critical conduit between the participant organization and program delivery staff and know how program offering changes will affect their organization specifically. Strategies include developing webinars on program updates and processes, case studies on successful projects, and training focused on getting buy-in from decision-makers.**

**Finding #6**: Participants expressed moderate to high satisfaction with PSUP; however, they were least satisfied with the domain knowledge of technical reviewers and the M&V requirements, indicating that establishing baselines was difficult and that the M&V process was often burdensome in the amount of data required. Participants also indicated that although there were application changes that helped reduce timelines, and at times, the application process was overly complicated.

**Recommendation #4: Communicate the program requirements and changes at each critical stage more clearly: the engineering study, application, and the M&V plan. Establishing clear communication patterns can help streamline project requirements and be vital when new programs are rolled out.**

**Finding #8**: Participants indicated that the main barriers to scoping and installing energy efficiency projects were difficult in establishing a baseline and COVID-related uncertainty.

**Recommendation #5: Consider providing more webinars on establishing a baseline within program M&V requirements. Establishing a solid baseline can be difficult for industrial customers with precise processes.**

**Recommendation #6: Increase messaging and outreach to participants and contractors regarding navigating energy efficiency and IESO program participation during the COVID-19 pandemic. Provide case studies of participants that are successfully navigating these uncertain times. Highlight opportunities in the 2021-2024 Conservation and Demand Management Framework that current PSUP participants can take advantage of in the near future.**

**Finding #9**: Nearly half of the surveyed participants indicated that in order to apply to future programs, their organization needed moderate or high certainty that the project would be accepted to the program. Additionally, most participants indicated that their organizations do not have a set threshold for fast-tracked project approval.

**Recommendation #7: Provide current PSUP participants and interested parties with case studies and examples of projects that can be accepted by the current 2021-2024 Conservation and Demand Management Framework programs.**

**Recommendation #8: Continue to gather feedback from current and former participants on what types of program offerings and projects they would be most successful in.**

**Finding #10:** Participants are most interested in a pay-for-performance program structure where the organization receives a set dollar amount per kWh or kW of savings. Other program structures like strategic energy management were less popular.

**Recommendation #9: Highlight the benefits of the Energy Performance Program for current PSUP participants. Provide training and technical support to industrial customers to pass EPP baseline modeling requirements.**

**Recommendation #10: If the IESO offers new programs for industrial customers that follow PSUP, program planners should consider a pay-for-performance program that incentivizes kWh savings and includes kW and GHG reductions. Ensuring that industrial customers can pursue a variety of measures will appeal to that customer segment. Additionally, strategies learned from the transition to the interim framework to streamline application processes, and M&V requirements can be repurposed for any new program rollouts.**

**Finding #13:** PSUP in PY2019 and PY2020 has resulted in the creation of 24 jobs throughout Canada. Direct jobs in Ontario's construction and engineering industry accounted for 16 of these jobs.

# 1 INTRODUCTION

## 1.1 EVALUATION GOALS AND OBJECTIVES

The Independent Electricity System Operator (IESO) retained EcoMetric Consulting, LLC, to evaluate the 2019-2020 Interim Framework (IF) Industrial Programs administered in Ontario. The industrial programs incentivize equipment measures, engineering studies, and energy management services for commercial and industrial facilities in Ontario.

The goals of the PY2020 evaluation were to:

- Annually verify energy and summer peak demand savings.
- Assess program attribution (NTG), including free ridership.
- Annually estimate the net greenhouse gas impacts in tonnes of $CO_2$ equivalent using IESO's Cost-Effectiveness Tool.
- Monitor the overall effectiveness and comprehensiveness of key program elements.
- Conduct annual cost-effectiveness analyses and report on key indicators of cost-effectiveness, including the Total Resource Cost (TRC) test, Program Administrator Cost (PAC) test, and the Levelized Unit Energy Cost (LUEC) metric.
- Analyze and make recommendations to improve the program.
- Determine customer satisfaction.

This report contains the findings from the impact and process evaluation conducted for the Process & Systems Upgrades program (PSUP) in Program Year (PY) 2020.

## 1.2 PROGRAM DESCRIPTION

PSUP provides financial support for implementing energy efficiency projects and system-optimization projects to intrinsically complex and capital intensive facilities. In response to prior customer feedback, the IESO made several changes to the program in the IF to streamline and simplify the offering. Those changes include the following:

- The program application now contains a single point for customer sign-off.
- Incentives are now based on actual savings.
- The measurement and verification (M&V) period is shorter: one year for smaller projects and four years for larger projects.

- The total incentive available for the project includes engineering study funding (as opposed to full study funding as a separate incentive). Studies are still fully funded (50% upfront and 50% upon project application).

Furthermore, PSUP no longer incentivizes gas-driven Combined Heat and Power (CHP) following a Ministerial Directive in 2019.

# 2 METHODOLOGY

This section of the report outlines the methodologies used in the PY2020 evaluation of PSUP.

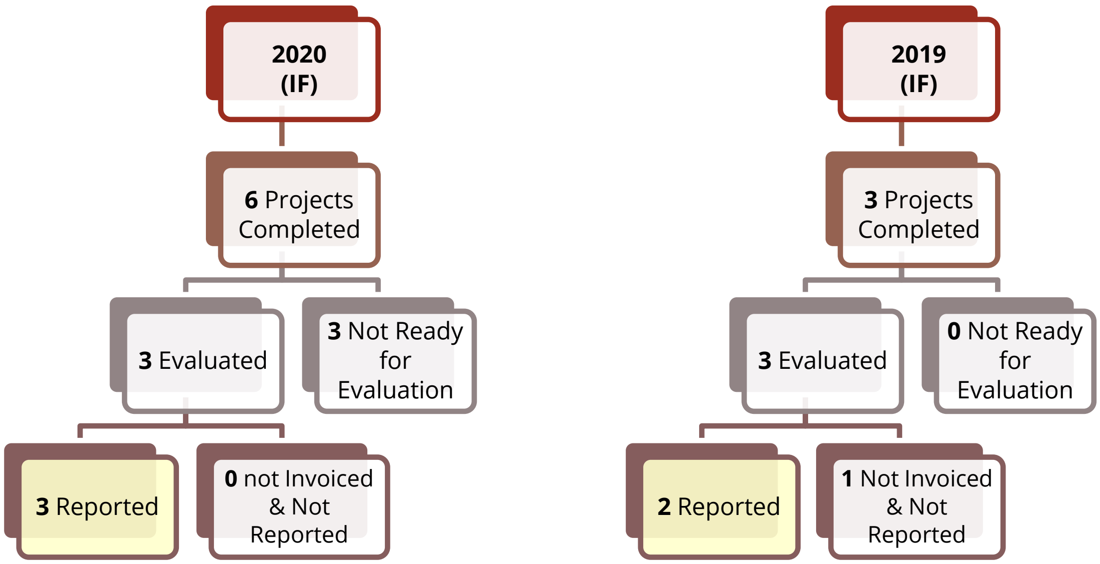
## 2.1 EVALUATION APPROACH

Methods used to conduct this evaluation include virtual inspections and measurement, engineering analysis, interval billing analysis, telephone surveys, documentation review, best practice review, and interviews with program participants and contractors. This section explains the evaluation approach in more detail, including the overall sample design and basic descriptions of the methods applied.

Six industrial customers completed PSUP projects in PY2020. Initially, there were seven completed projects in the PSUP sample frame. EcoMetric identified one of the projects as not feasible to evaluate this year due to insufficient post-retrofit usage data. EcoMetric will include this project in the PY2021 sample frame once more post-retrofit data is available. Three of the six projects had undergone technical review and were ready for evaluation when the sample frame for this evaluation was established on April 1, 2021. EcoMetric included all three projects in this report because they have been invoiced to the IESO. Completing the invoicing process for a project is a requirement for savings to be reported. Another three projects from PY2019 were included in this year's sample frame. Due to the transition into the Interim Framework beginning in April 2019, no projects were ready for impact evaluation in the PY2019 report. EcoMetric included two of these three projects in the report as one from PY2019 and has not yet been invoiced to the IESO. These projects from PY2020 and PY2019 included in this report are collectively referred to as the PY2020 sample frame. EcoMetric will report projects completed and evaluated in PY2019 and PY2020 that have not yet been invoiced in the PY2021 results once invoiced. Figure 1 shows how the PSUP sample frame comprises projects from PY2019 and PY2020.

Measures evaluated and reported in the PY2020 PSUP sample frame include chiller plant optimization, wastewater UV disinfection upgrades, cold storage refrigeration improvements, demand control ventilation, and snowmaking system upgrades.

*Figure 1: PY2020 PSUP Sample Frame*




### 2.1.1 SAMPLING APPROACH

EcoMetric conducted a census review of all PSUP projects. This program warrants the census approach in this evaluation year because of the relatively small number of projects, each with a high reported contribution to overall industrial portfolio savings. However, the pipeline of PSUP projects under contract that has yet to be implemented is robust in the IF and will likely require the gross and net evaluation to utilize sampling in future evaluations. Figure 2 illustrates the process of defining the PY2020 sample frame for PSUP.

*Figure 2: PSUP Sampling Process*

| December 2020 | March 31, 2021 | April 2021 | June 2021 |
|---|---|---|---|
| • Program snapshot defines initial PY2020 sample frame: projects with reported savings that were in service starting in 2020 and have at least one quarter of completed technical review.<br><br>• PY2019 true up projects are added: projects in service starting in 2019 that did not make the prior evaluation cutoff.<br><br>• Data collection & analysis activities commence. | • PY2020 cutoff is enacted.<br><br>• On April 1, current program snapshot is collected. Any projects where technical review has been completed since preliminary are added to the sample frame. | • EcoMetric submits an evaluation project list to the IESO. This list contains all projects for inclusion in the PY2020 and PY2019 true up results.<br><br>• Final project list confirmed with the IESO | • Projects in service starting in 2019 that did not make the March 31 cutoff are considered true ups for the next evaluation, and are expected to be evaluated later in 2022.<br><br>• Verified impacts of PY2019 true up projects are used to adjust PY2019 results. |

## 2.2 IMPACT METHODOLOGY

### 2.2.1 DATA COLLECTION

The primary data source for PSUP projects was measurement and verification (M&V) reports, equipment logs, analysis workbooks, and other data and documentation submitted by the technical reviewer in support of reported savings estimates. EcoMetric carefully reviewed the application and annual and/or quarterly M&V reports prepared for each project and facility. Every project contained at least one quarter of baseline operational data and one quarter of post-retrofit operational data. This review of project documentation provided an initial understanding of the efficiency upgrades implemented, and just as importantly, how savings from these upgrades have been estimated.

### 2.2.2 GROSS SAVINGS VERIFICATION

A thorough review of the M&V completed by the IESO's technical reviewer enabled EcoMetric to assess the key assumptions and potential areas of uncertainty for each PSUP project. In the rare instances where assumptions were undocumented or appeared inconsistent, EcoMetric flagged them for further investigation. Similarly, if key parameters that would affect the observed savings of the project were not included in established savings estimates, EcoMetric gathered these values and incorporated them into the gross verified savings calculation.

For specific projects, further investigation involved a virtual onsite inspection. The virtual onsite inspections, which were deemed appropriate (as opposed to onsite inspections) due to COVID-19 restrictions, involved connecting with a facility representative via a video call application. The facility representative then walked around the facility in spaces affected by the energy efficiency project, holding a phone or tablet with the camera ON and facing forward. EcoMetric member on the other end guided the facility representative to spaces and equipment of interest. Where relevant, screenshot images were captured.

EcoMetric performed energy and peak demand savings analyses for all projects. Energy savings were annualized, regardless of the time-of-year or duration of measured data available. Details on the peak demand savings analysis are included in Section 2.2.4.

More detailed descriptions of the gross savings verification methodology are included in Appendix B.

### 2.2.3 NET SAVINGS ANALYSIS

Net Savings and net-to-gross (NTG) ratios were calculated to incorporate free ridership factors for the projects evaluated. 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 typically includes both free ridership, defined as the savings customers would have achieved in the absence of the program's influence (commonly called the counterfactual condition), and spillover, defined as savings influenced by the program but not formally incentivized or claimed by the program.

The approach for PY2020 will continue to utilize the enhancements made to the NTG questionnaire for the CFF evaluation. Results from the prior NTG spillover assessments from PY2013 through PY2017 sites did not identify any spillover attributable to any of the programs in the industrial portfolio, so the team did not assess participant spillover for PY2020. As in the past, the basis of free ridership analysis for IESO's industrial programs was direct query (interviews with past participants) about the theoretical counterfactual condition. This method is considered best practice for programs with large savings per project, unique applications, and low participant counts.

A more detailed net savings analysis methodology is provided in Appendix B.

### 2.2.4 SUMMER PEAK DEMAND ANALYSIS

EcoMetric verified summer coincident peak demand impacts for each project based on the IESO-defined peak periods summarized in Table 5. High-resolution energy savings load shapes, vital for calculating on-peak demand savings, were developed for each project where possible, and used to account for the seasonal, daily, and hourly variations in operating schedules and energy consumption.

*Table 5: IESO EM&V Protocol Peak Period Definitions*

| Definition Source | Months | Days and Hours | Calculation of Demand Savings |
|---|---|---|---|
| EM&V Protocols: Standard Peak Calculation | Summer: Jun-Aug | Weekdays 1pm-7pm | Average over entire peak period |
| EM&V Protocols: Standard Peak Calculation | Winter: Jan-Dec | Weekdays 6pm-8pm | Average over entire peak period |
| EM&V Protocols: Alternative Peak Protocols for Weather-Dependent Measures | Summer: Jun-Aug | Weekdays 1pm-7pm | Weighted average of the top hour in each of 3 months per IESO weights |
| EM&V Protocols: Alternative Peak Protocols for Weather-Dependent Measures | Winter: Jan-Dec | Weekdays 6pm-8pm | Weighted average of the top hour in each of 3 months per IESO weights |

### 2.2.5 AVOIDED GREENHOUSE GAS EMISSIONS ESTIMATION

EcoMetric estimated net greenhouse gas (GHG) impacts for each project by utilizing measure-level energy savings load shapes based on metered 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.

### 2.2.6 COST EFFECTIVENESS ANALYSIS

EcoMetric used the IESO Conservation and Demand Management (CDM) Cost-Effectiveness tool to estimate measure-level costs and benefits, then aggregated to program- and portfolio-level cost effectiveness. Program administrative costs were provided to EcoMetric by the IESO. Other key inputs for the cost effectiveness analysis include lifetime electric energy and demand savings, measure lives, energy savings load shapes, and incremental project costs.

EcoMetric states benefits and costs in present value terms, using the appropriate discount and inflation rates conforming to the IESO's requirements outlined in the IESO CDM Cost-Effectiveness Guide.

### 2.2.7 JOB IMPACTS ESTIMATION

EcoMetric leveraged the Statistics Canada (StatCan) custom input output (I/O) economic model to estimate the job impacts of PSUP. The StatCan I/O model simulates the economic and employment impacts of economic activity related to PSUP. The economic activity related to PSUP was leveraged as "shocks" which act as inputs into the model to show the direct, indirect, and induced impacts on the number of jobs created by the program. The I/O model uses regional and national multipliers to estimate the economy-wide effects of the economic activity induced by the program. The I/O model used three shocks to determine job impacts of PSUP:

- Demand for goods and services related to PSUP
- Business reinvestment
- Program funding

The demand for goods and services related to PSUP shock represents the spending on goods and services to participate in the program. This includes spending on capital measures, hiring contractors and consultants, all labor costs related to program participation, and the administrative costs for the IESO. EcoMetric derived the value of this shock from the estimated project costs for each project.

The business reinvestment shock represents the amount of savings from reduced energy bills that the participants reinvest in the local economy. The portion of project costs not covered by IESO incentives was deducted from the total bill savings for each facility. EcoMetric calculated the energy bill savings using the net energy savings from the impact evaluation and the IESO's electricity retail rates. As for the amount of reinvestment, the team collected primary data from the participants through the process and NTG interviews. EcoMetric asked participants what percentage of their bill savings they plan on reinvesting.

Finally, the program funding shock represents the incremental increase in electricity bills in Ontario's residential sector used to fund the program. EcoMetric sourced the PSUP program budget data from the IESO and the assumption of the share of the residential sector's funding portion of the program.

## 2.3 PROCESS EVALUATION METHODOLOGY

Several completed data collection activities enhanced the current process evaluation. These activities are summarized in Table 6. EcoMetric collected process evaluation data in two waves: the first in PY2019 and the second wave in PY2020. This report documents findings from the data collection activities, including 1) the program participant survey and 2) the Wave 1 and 2 of the contractor surveys.

*Table 6: PSUP Process Interview and Survey Counts*

| Interview or Survey Group | Method | Population | Target Sample | Description of Contacts |
|---|---|---|---|---|
| PSUP Staff | In-depth interview (IDI) | 7-15 | Wave 1 = 5 | IESO program leads, marketing staff, & technical reviewer, as well as implementer (technical reviewer) staff |
| PSUP Contractors | Semi-structured interview | 32 | Wave 1 = 7 completed the survey<br>Wave 2 = 4 completed the survey<br><br>11 Total responses | Contractors who installed (or are in the process of installing) the equipment for the participants |
| PSUP Participant Survey (joint with NTG) | Mixed-mode survey (Online and over the phone) | 33 | Census (17 completed)* | Participants |

* In addition to the impact sample of five projects, EcoMetric interviewed PSUP participants under contract to enhance data collection for the process evaluation.

### 2.3.1 DOCUMENT AND DATA REVIEW

EcoMetric reviewed program documents associated with the redesign and the transition, including the business case, the revised rules document, any other revised documents (such as the application and customer agreement), fact sheets, training provided to contractors and customers (if applicable), and any other relevant documents. This activity confirmed our knowledge of and identified any changes to program processes and rules and guided application tracker database analysis and interview guide development.

EcoMetric also conducted a strategic application tracker review to ascertain if changes made to the contracting in the IF shortened the application process. These results were presented in the PY2019 PSUP evaluation report.

### 2.3.2 IN-DEPTH AND SEMI-STRUCTURED INTERVIEWS

The team interviewed program actors and participants' contractors to gain insight into the program delivery efficiency and challenges.

- **In-depth Interviews** – Interviewed IESO program team and the technical reviewers involved with the delivery of PSUP. In-depth interviews are unstructured or semi-structured interviews that use open-ended questions and probe to elicit detailed responses for qualitative analysis. The team conducted these interviews to ask program staff about implementation challenges, reasons for program changes, and processes used to manage participants, report, or track results, conduct inspections, approve project selection, and allocate incentives. These results were presented in the previous report.
- **Contractor semi-structured interviews/surveys** – Interviewed/surveyed contractors listed on project applications. The team asked closed- and open-ended questions to gather feedback on the PSUP processes, the transition, and suggestions for improvement. This activity occurred in two waves, and this report includes combined findings.

### 2.3.3 PARTICIPANT SURVEY

EcoMetric conducted participant surveys for this evaluation. This survey combined process and NTG questions and attempted a census. To address process evaluation objectives, the team asked participants about:

- Interest and reactions in different future program structures since there is no PSUP option in the 2021-2024 Framework.
- How IESO can support customers during the transition and recovery from COVID-19.
- Participant experience, including satisfaction with the overall program and program features such as engineering feasibility study, the application process, M&V plan, measure/project eligibility, site inspection, and incentive amount and turnaround.
- Future upgrade plans.
- Suggestions for improvement.

This section details the results from the impact evaluation of PSUP in PY2020.

## 3.1 GROSS VERIFIED SAVINGS RESULTS

The PY2020 PSUP gross verified savings results are summarized in Table 7. The total gross verified energy savings for PSUP in PY2020 are 3,275 MWh, representing 101% of reported savings. True up projects from PY2019 totaled 3,022 MWh of gross verified energy savings, representing 110% of reported savings. When combined, the total gross verified energy savings for PY2020 and PY2019 true up projects are 6,297 MWh—105% of reported energy savings. Total gross verified summer peak demand savings for PSUP are 0.62 MW, representing 99% of reported demand savings.

*Table 7: PY2020 PSUP Gross Verified Savings Results*

| Program Year | Projects Evaluated | Energy Realization Rate (%) | Gross Energy Savings (MWh) | Gross 2022 Energy Savings (MWh) | Peak Demand Realization Rate (%) | Gross Summer Peak Demand Savings (MW) | Gross 2022 Summer Peak Demand Savings (MW) |
|---|---|---|---|---|---|---|---|
| 2020 | 3 | 101% | 3,275 | 3,275 | 97% | 0.35 | 0.35 |
| 2019 True Ups | 2 | 110% | 3,022 | 3,022 | 101% | 0.27 | 0.27 |
| **Total** | **5** | **105%** | **6,297** | **6,297** | **99%** | **0.62** | **0.62** |

Project-level realization rates – the ratio of gross verified savings to reported savings - ranged between 100% and 115% for energy savings and 95% and 101% for peak demand savings.

One hundred percent of the energy savings achieved by the PY2020 sample frame persist to 2022. PSUP commonly consists of large, complicated industrial projects that have relatively long persistence.

**Finding #1**: Project documentation for several projects did not include sufficient information for evaluators to determine how project savings were calculated.

**Recommendation #1: Project documentation should include not only a spreadsheet-based savings analysis but a clear and logical explanation for how the ex-ante savings were calculated and rationale for any assumptions involved.**

**Finding #2**: Technically reviewed summer peak demand savings for a few projects were either not calculated or calculated incorrectly. For example, one project used the average demand savings as the reported summer peak demand savings.

**Recommendation #2: The technical reviewer should always strive to calculate demand savings for the summer peak period defined by the IESO, regardless of the time of year that the performance data comes from. If there is no data from the peak summer period, various methods could be employed to estimate peak summer demand savings, including:**

- **Weather variable-based (i.e., outside air temperature) regression**
- **If the measure is not weather-dependent, assume the peak summer demand savings are the same as the peak demand savings from the period that the performance data comes from.**

More detailed project-specific findings and recommendations are included in Appendix A.

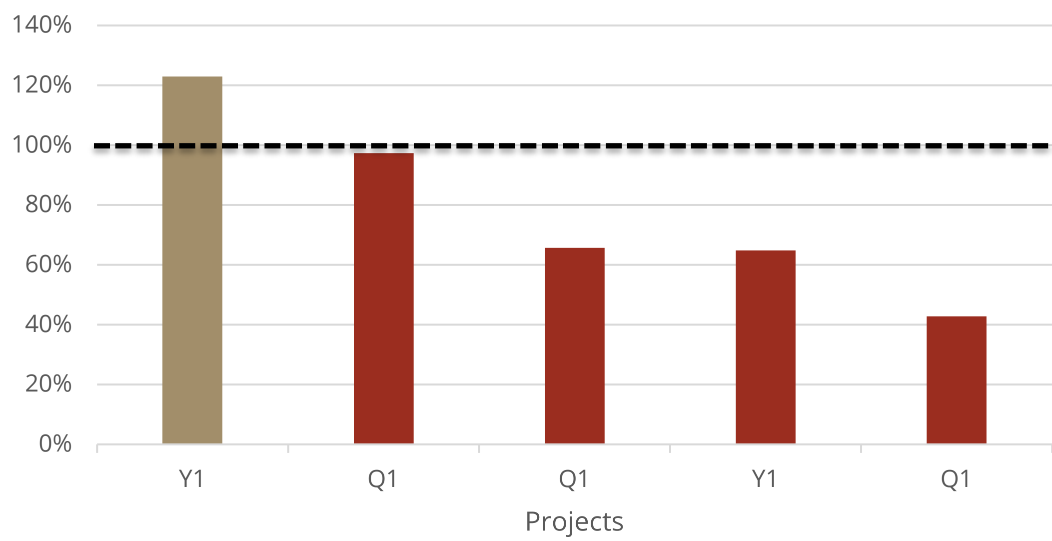
### 3.1.1 PROJECT PERFORMANCE AGAINST ANTICIPATED SAVINGS

PSUP program rules specify that project incentives are recalculated following the project's actual performance after one year of M&V against anticipated savings calculated before the project is installed. As shown in Figure 3, one out of the five PSUP projects evaluated exceeded their anticipated savings. This project achieved 123% of anticipated savings. Overall, the PSUP projects evaluated and reported in PY2020 achieved 75% of the total anticipated savings.

Three of the four PSUP projects that did not meet anticipated savings have not yet completed their first year M&V technical review, so they still have an opportunity to improve savings and reach their first year anticipated savings.[2]

[2] EcoMetric prorated the anticipated and verified gross savings to represent Q1 performance.

*Figure 3: PSUP Savings Performance Results*




PSUP projects that failed to meet anticipated savings fell short for reasons including:

- Efficient equipment not operating as designed, resulting in higher than expected energy consumption.
- A refrigeration project had actual cooling loads 24% lower than originally predicted.
- A project was completed at a pharmaceutical facility where production was increased in response to the COVID-19 pandemic.

## 3.2 NET VERIFIED SAVINGS RESULTS

Total net first year energy savings for PSUP projects evaluated in PY2020 are 4,162 MWh, 66% of gross verified savings, as summarized in Table 8. Net demand savings for PSUP in PY2020 total 0.37 MW. Free ridership was 34% for the program. This result was driven by one large project that indicated that the IESO program had no influence on their decision to pursue the project, and thus their free ridership was 100%.[3] This project can be described as an outlier compared to the relatively

[3] During the PSUP results presentation on 8/17/21, EcoMetric discussed this free rider project with program staff. While the result for this project (100% free rider) is unchanged due to the clear and decisive responses in the NTG survey, EcoMetric acknowledges the point raised by program staff that there could be alternative program influences, outside the scope of this survey, that could have affected the customer's decision-making.

low levels of free ridership estimated in the other projects in the PY2020 sample frame and historical analyses of Conservation First Framework (CFF) PSUP projects from PY2015 to PY2017. For the other PY2020 projects, interviewees expressed favorable opinions of the PSUP program and indicated that the program provided needed support to enable them to implement their projects.

*Table 8: PY2020 PSUP Net Verified Savings Results*

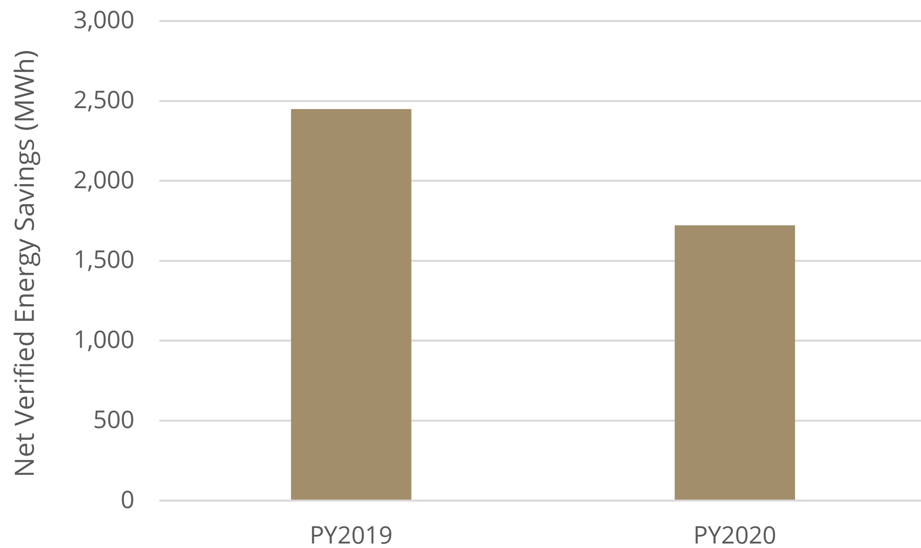
| Program Year | Projects Evaluated | NTG Ratio (%)[4] | Net Energy Savings (MWh) | Net 2022 Energy Savings (MWh) | Net Summer Peak Demand Savings (MW) | Net 2022 Summer Peak Demand Savings (MW) |
|---|---|---|---|---|---|---|
| 2020 | 3 | 52% | 1,712 | 1,712 | 0.15 | 0.15 |
| 2019 True Ups | 2 | 81% | 2,450 | 2,450 | 0.22 | 0.22 |
| **Total** | **5** | **66%** | **4,162** | **4,162** | **0.37** | **0.37** |

### 3.2.1 TOTAL IF PSUP NET SAVINGS

Figure 4 summarizes the net energy savings achieved in PSUP throughout the IF. As part of the Interim Framework, PSUP has achieved 4,162 MWh of net first year energy savings, representing 66% of gross verified energy savings so far. PY2020 net energy savings fell 30% year-on-year due to a lower NTG ratio. As PSUP projects tend to be complex and often demand more time to be technically reviewed, growth in net savings achieved by PSUP in the IF is expected to be supported by an increasing number of true up projects for PY2019 and PY2020.

[4] NTG Ratios in this table are illustrative only, representing total net verified savings divided by total gross verified savings for each program year. EcoMetric applied a unique NTG ratio to each individual project, calculated from our primary NTG research.

*Figure 4: Total IF PSUP Net Verified First Year Energy Savings*




## 3.3 AVOIDED GREENHOUSE GAS EMISSIONS

Net first year greenhouse gas (GHG) reductions total 453 metric tonnes of $CO_2$ equivalent ($CO_2e$) for the PY2020 sample frame, as summarized in Table 9. As PSUP projects focus on electric savings, these GHG reductions are derived from the avoided generation of electricity. Over the lifetime of the PY2020 sample frame projects, net GHG reductions total 10,978 tonnes of $CO_2e$.

For the PY2020 sample frame, the cost of first year GHG emissions reductions is $13,371 per tonne of $CO_2e$ from the total resource cost perspective. Reduction costs were much higher for the PY2020 PSUP projects due to the lower NTG ratio, which decreased the amount of net reductions compared to full total resource costs.

*Table 9: PY2020 PSUP Greenhouse Gas Emissions Impacts*

| Program Year | First Year GHG Impacts (tonnes $CO_2e$) | First Year GHG Reduction Costs ($/tonne $CO_2e$) (Total Resource Costs) |
|---|---|---|
| 2020 | 179 | $23,696 |
| 2019 True Ups | 274 | $6,625 |
| **Total** | **453** | **$13,371** |

## 3.4 COST EFFECTIVENESS RESULTS

As shown in Table 10, PSUP is not cost effective from the TRC or PAC test perspective using a benefit/cost threshold of 1.0[5]. This is an interim finding based on the completion of fewer than 10% of projects approved in the PSUP. From the TRC perspective, benefits totaled $1,089,293 while costs totaled $4,241,633. The cost effectiveness of the program in PY2020 was negatively affected by the COVID-19 pandemic as fewer projects were implemented, and more administrative support and guidance for the participants under contract were required of the IESO and technical reviewers. The robust project pipeline for the program is expected to improve the program's cost effectiveness by the next evaluation.

*Table 10: PY2020 PSUP Cost Effectiveness Results*

| TRC Costs (CAD) | TRC Benefits (CAD) | TRC Ratio | PAC Costs (CAD) | PAC Benefits (CAD) | PAC Ratio | LC CAD/kWh |
|---|---|---|---|---|---|---|
| $4,241,633 | $1,089,293 | **0.26** | $3,031,939 | $947,212 | **0.31** | 0.16 |

[5] PSUP cost effectiveness analysis for PY2020 only includes projects implemented in the calendar year 2020.

# 4 PROCESS EVALUATION RESULTS

This section provides findings from the completed contractor survey (waves 1 and 2) and the participant process survey.

## 4.1 PROGRAM AWARENESS AND MOTIVATIONS

EcoMetric asked participants how they first heard about PSUP. The most prevalent marketing channels were the IESO Business Development Manager and contractors/engineering firms responsible for recommending and installing projects. Table 11 shows the breakdown of how participants heard about the program. Their responses indicate that one-on-one communication about program offerings is essential for customer awareness. It also shows the importance of engaging the contractor/engineering community in the program to carry that messaging to their customer base.

*Table 11: PSUP Awareness Method (n=15)*

| Introduction Method | Count | Proportion |
|---|---|---|
| IESO Business Development Manager | 4 | 27% |
| A contractor or engineering firm | 4 | 27% |
| LDC Key Account Manager / program consultant | 2 | 13% |
| SaveOnEnergy marketing | 2 | 13% |
| Internal Training/Employees | 2 | 13% |
| Organic Search | 1 | 7% |

**Finding #3**: One-on-one outreach and individual communication are key to recruiting participants to the PSUP program. Not only is the IESO business development manager instrumental in attracting customers, but the IESO's interactions with contractors also help bring in more projects.

We asked participants if they also participated in the Energy Manager Program and submitted a project to PSUP, and 60% of surveyed participants (count=9) indicated that they did. Overlap between EM and PSUP programs suggests that energy manager staff is key to developing program-supported energy efficiency projects.

**Finding #4**: The Energy Manager Program was successful at enrolling projects into PSUP.

**Recommendation #3: Consider leveraging energy managers to drive participation in industrial programs as participants adjust to the new 2021-2024 Conservation and Demand Management Framework. Energy managers are a critical conduit between the participant organization and program delivery staff, and they know how program offering changes will affect their organization specifically. Strategies include developing webinars on program updates and processes, case studies on successful projects, and training focused on getting buy-in from decision-makers.**

Table 12 shows participants' motivating factors for participating in PSUP to implement energy efficiency projects.

*Table 12: PSUP Participation Motivation (n=15, multiple response)*

| Motivation | Count | Proportion |
|---|---|---|
| Savings on energy | 10 | 67% |
| Program incentives and support | 10 | 67% |
| Emissions reductions | 2 | 13% |
| Other environmental benefits | 2 | 13% |
| Support our organization's image/mission/customer values | 2 | 13% |

**Finding #5**: Surveyed participants indicated that their primary motivation for pursuing energy efficiency projects is financial and that emissions reductions and environmental goals are secondary.

## 4.2 PROGRAM SATISFACTION

Overall, participants indicated that PSUP is meeting their expectations – 73% of participants indicated that the program met expectations, and 27% indicated it exceeded expectations.

We asked participants to rate their satisfaction with various program components, with zero being not satisfied at all and 10 being extremely satisfied. Table 13 shows the average ratings for each program component.

*Table 13: Average Participant Satisfaction Ratings*

| Component | Count | Average Satisfaction Score |
|---|---|---|
| The incentive amount | 15 | 8.6 |
| The site inspection or virtual inspection requirements | 7 | 8 |
| IESO or their technical reviewer staff support | 15 | 7.9 |
| The project eligibility requirements | 13 | 7.8 |
| The technical review of the project after it was done | 13 | 7.8 |
| The overall program | 15 | 7.7 |
| The engineering feasibility study requirements | 14 | 7.4 |
| The M&V or monitoring & verification requirement | 13 | 7.2 |
| The application process | 13 | 6.9 |
| The technical review of the study by IESO | 12 | 6.6 |

The application process, the study technical review process, and the M&V requirements received the lowest average ratings among surveyed participants. When asked why these components received lower ratings, three of the surveyed participants indicated that the program required too much data for the project and technical review process. One indicated that the study review process became very labor-intensive. Additional reasons for low ratings included the process being too lengthy and the application being too cumbersome, despite being updated to be more streamlined.

**Finding #6**: Participants expressed moderate to high satisfaction with PSUP; however, they were least satisfied with the domain knowledge of technical reviewers and the M&V requirements, indicating that establishing baselines was difficult and that the M&V process was often burdensome in the amount of data required. Participants also indicated that although there were application changes that helped reduce timelines, the application process was at times overly complicated.

**Recommendation #4: Clearly communicate the program requirements and changes at each critical stage: the engineering study, application, and the M&V plan. Establishing clear communication patterns can help streamline project requirements and be vital when new programs are rolled out.**

Figure 5 shows the breakdown of how contractors rated their satisfaction with the technical review process. Given that contractors are vital to ensuring the progress of these projects, their feedback is important for future program design decisions surrounding the technical review. When asked what could be improved about the technical review process, contractors indicated that improving the technical reviewer's domain knowledge and providing a quicker turnaround time would increase their satisfaction with the process.

*Figure 5: Contractor Satisfaction with Study Technical Review (n=10)*

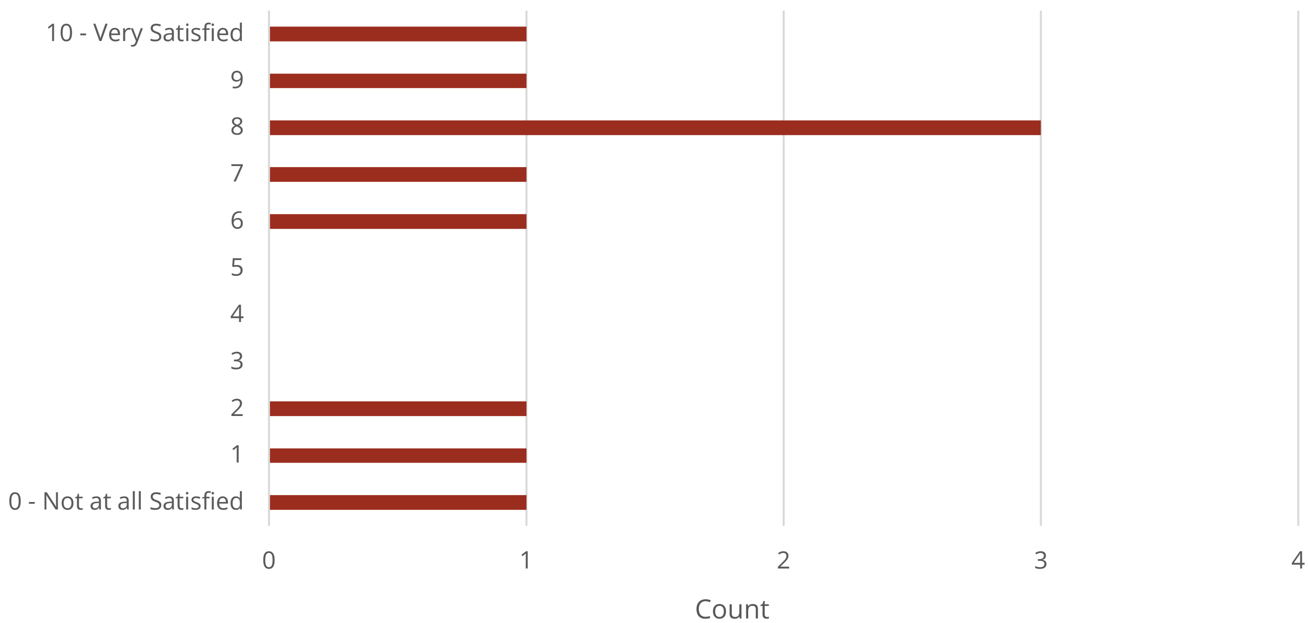
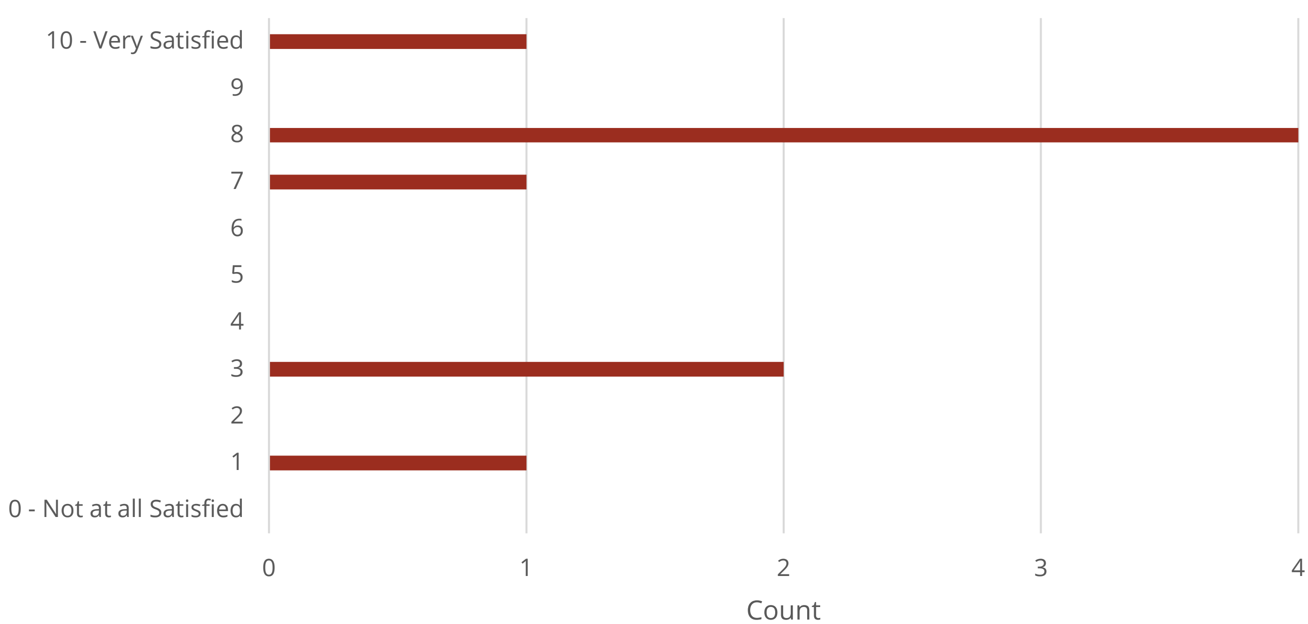



Figure 6 shows the breakdown of how contractors ranked the application process.

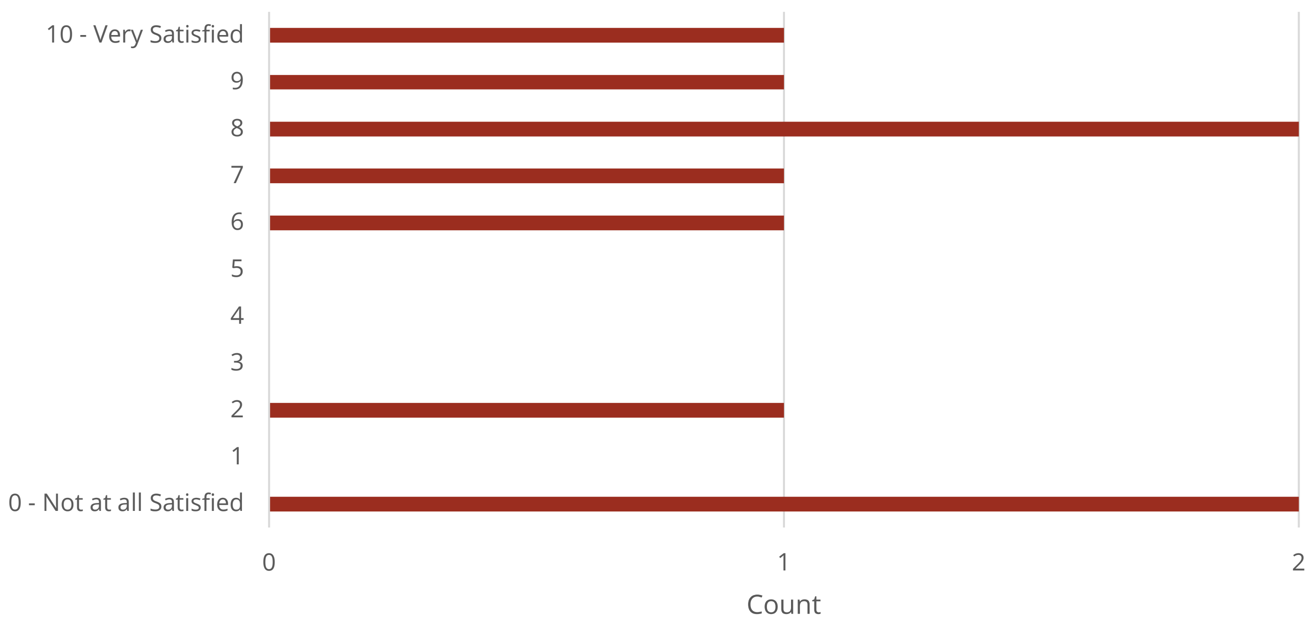
*Figure 6: Contractor Satisfaction with the Application Process (n=9)*




Two of the contractors indicated that the application process could be further streamlined for a quicker turnaround. One contractor indicated that a clearer setting of expectations for the application process was needed. Additionally, two contractors indicated that communications regarding application changes during the transition to the interim framework were lacking. This underscores the importance of clear application rules, streamlined application approval, and clear communication from IESO staff on program requirements.

Among those who expressed concerns with the M&V process, a key theme was difficulty establishing baselines and issues with data collection and metering process (including length of time and poor-quality data). Figure 7 shows the breakdown of how contractors ranked the M&V process.

*Figure 7: Contractor Satisfaction with M&V Process Requirements (n=9)*




**Finding #7**: Most contractors surveyed expressed moderate to high satisfaction with the study technical review process; however, three contractors expressed low satisfaction levels. Contractors were also moderately to highly satisfied with the application process, with six contractors rating the process at a 7 or above. Most contractors also expressed moderately high to very high satisfaction with the M&V requirements.

## 4.3 CHALLENGES AND BARRIERS

Table 13 shows the barrier's participants noted. Establishing baselines can be difficult, especially for industrial customers with highly specific processes. This challenge supports the slightly lower satisfaction ratings for the M&V requirements reflected in Section 4.2 and indicates that future program offerings should provide clear guidance on how to establish baselines.

*Table 14: Challenges to Project Development (n=11, multiple response)*

| Challenge/Barrier | Count | Proportion |
|---|---|---|
| Difficulty in establishing the baseline (consumption prior to the project/upgrade) | 3 | 27% |
| COVID-19-related uncertainty | 3 | 27% |
| Access to adequate information of program requirements | 2 | 18% |
| Access to upfront capital | 1 | 9% |
| Contracting terms with IESO were not adequate (had to be negotiated) | 1 | 9% |
| Unfamiliarity/skeptical about project's energy savings benefits | 1 | 9% |
| Unclear on program requirements for M&V | 1 | 9% |
| Inefficient contractor | 1 | 9% |
| Difficulty onboarding end-users | 1 | 9% |
| Staffing changes | 1 | 9% |
| Timeline did not sync | 1 | 9% |
| Difficult sourcing new equipment | 1 | 9% |
| Scheduling facility down time | 1 | 9% |

**Finding #8**: Participants indicated that the main barriers to scoping and installing energy efficiency projects were difficulty in establishing the baseline and COVID-related uncertainty.

**Recommendation #5: Consider providing more webinars on establishing a baseline within program M&V requirements. Establishing a strong baseline can be difficult for industrial customers with highly specific processes.**

**Recommendation #6: Increase messaging and outreach to participants and contractors regarding how to navigate energy efficiency and IESO program participation during the COVID-19 pandemic. Provide case studies of participants that are successfully navigating these uncertain times. Highlight opportunities in the 2021-2024 Conservation and Demand Management Framework that current PSUP participants can take advantage of in the near future.**

## 4.4 FUTURE PROGRAM OPPORTUNITIES

Since the sunset of PSUP has occurred and new industrial offerings have emerged, EcoMetric asked participants a series of questions to understand what future assistance the IESO can provide to help them pursue energy efficiency projects in the future.

Table 15 shows what level of certainty participants indicated they needed. In designing new program offerings, participant responses indicate that the program must successfully communicate requirements to give future participants confidence to pursue these projects. These responses also indicate that PSUP was instrumental in motivating facilities to pursue the projects.

*Table 15: Application Acceptance Certainty (n=15)*

| Level of Certainty | Count | Proportion |
|---|---|---|
| No guarantee of application acceptance needed | 6 | 40% |
| Very high certainty that IESO will approve the project application | 4 | 27% |
| Moderate guarantee of application acceptance or experience from past program participation success | 3 | 20% |
| Other | 2 | 13% |

When asked this question, 73% of the participants indicated that there is not a specific threshold where a quicker internal project approval process is triggered. One participant indicated that, unsurprisingly, the higher the project cost, the higher the level of scrutiny it faces in seeking approval. Another participant indicated that projects under a simple payback threshold move through approvals at a faster pace and likely do not seek incentives if under a certain value.

**Finding #9**: Nearly half of the surveyed participants indicated that in order to apply to future programs, their organization needed moderate or high certainty that the project would be accepted to the program. Additionally, most participants indicated that their organizations do not have a set threshold for fast-tracked project approval.

**Recommendation #7: Provide current PSUP participants and interested parties with case studies and examples of projects that can be accepted by current 2021-2024 Conservation and Demand Management Framework programs.**

**Recommendation #8: Continue to gather feedback from current and former participants on what types of program offerings and projects they would be most successful in.**

Table 16 shows which program incentive structures participants indicated an interest in. These responses indicate that industrial customers are interested in programs that compensate them for demonstrated/achieved energy and demand savings. Additionally, 10 (66.7%) out of the 15 participant responses indicated that they are specifically interested in programs that incentivize demand reduction.

*Table 16: Preferred Future Program Structures (n=15, multiple response)*

| Program Structure | Count | Proportion |
|---|---|---|
| Pay-for-performance structure, where your organization receives a set $/kWh saved or $/kW saved, and incentives are paid upon demonstrating that. | 11 | 73% |
| Prescriptive incentives | 8 | 53% |
| Energy Efficiency Auction, where your organization submits a proposal for an energy efficiency project(s) during a province-wide auction period, naming a $/kWh or $/kW savings incentive. | 6 | 40% |
| Strategic Energy Management, where your organization leads a holistic approach to continuously improve energy performance and is supported by tools, education, and expertise provided by the IESO. | 3 | 20% |
| Custom project offerings | 1 | 7% |
| Don't know | 1 | 7% |

**Finding #10:** Participants are most interested in a pay-for-performance program structure where the organization receives a set dollar amount per kWh or kW of savings. Other program structures like strategic energy management were less popular.

**Recommendation #9: Highlight the benefits of the Energy Performance Program for current PSUP participants. Provide training and technical support to industrial customers to pass EPP baseline modeling requirements.**

**Recommendation #10: If the IESO offers new programs for industrial customers that follow PSUP, program planners should consider a pay-for-performance program that not only incentivizes kWh savings but also includes kW and GHG reductions. Ensuring that industrial customers can pursue a variety of measures will appeal to that customer segment. Additionally, strategies learned from the transition to the Interim Framework to streamline application processes, and M&V requirements can be repurposed for any new program rollouts.**

In the absence of PSUP, 40% of participants indicated that they would allocate funding and budget to energy efficiency projects moving forward. These responses suggest that industrial facilities value energy efficiency projects but that the payback period is an important factor in moving forward with a project (20% of participants indicated that they would pursue energy efficiency projects depending on payback). One respondent indicated that a project with a payback period of less than 2 years would get immediate approval from management. Additionally, 3 participants indicated that reducing carbon emissions will be an important factor in prioritizing projects, indicating a shift away from strictly payback period and kWh or kW savings.

EcoMetric asked participants what additional support IESO could provide in the absence of PSUP and the Custom Retrofit Program. Participants indicated that they would like to see another custom incentive program or demand reduction program. They also expressed interest in case studies or webinars documenting success stories and technical assistance such as site assessments and project screenings. These responses indicate that customers continue to need programmatic and financial support for scoping out measures. Table 17 shows the breakdown of responses.

*Table 17: IESO Support Activities (n=14, multiple response)*

| Support Activity | Count | Proportion |
|---|---|---|
| More incentives - custom or demand reduction programs | 4 | 29% |
| Share success stories/case studies/webinars | 3 | 21% |
| Technical support / Project screening / Site Evaluations | 3 | 21% |
| Increase program awareness and information | 2 | 14% |
| Don't know | 1 | 7% |
| Verification of project savings | 1 | 7% |
| Make IESO contact available | 1 | 7% |
| Provide reliable energy source | 1 | 7% |
| Site evaluations to identify opportunities | 1 | 7% |

**Finding #11:** In the absence of PSUP, 40% of participants indicated that they would allocate funding and budget to energy efficiency projects moving forward, and their decision was primarily tied to shorter payback and carbon reduction outcomes. Participants indicated that they are eager for future incentive offerings, particularly pay-for-performance offerings, from the IESO for energy efficiency projects and case studies and site assessments.

Regarding desired support from the IESO for recovery from COVID-19, over half of the participants indicated they were unsure what IESO could do to assist with recovery. Some industrial customers were affected more acutely than others. One participant indicated that COVID impacted project timelines and reflected that the IESO could extend project deadlines/timelines to accommodate the situation. Additionally, one participant noted that clear communication on upcoming opportunities and programs will be helpful for their facility.

Table 18 shows a variety of projects that participants indicated they were interested in over the next five to ten years. The responses indicate that these facilities will likely participate in future program offerings and continue to make energy efficiency upgrades. A future custom program will be well-suited for meeting the variety of needs expressed by existing participants.

*Table 18: Potential Facility Improvements in the Next 5 to 10 Years (n=14, multiple response)*

| Project Types | Count | Proportion |
|---|---|---|
| Lighting/LEDs/Controls | 5 | 38% |
| VFD | 3 | 23% |
| Battery Storage | 2 | 15% |
| Larger blower/pumps | 2 | 15% |
| Solar Panels | 2 | 15% |
| Carbon Reduction | 2 | 15% |
| RTU Control System | 1 | 8% |
| EV Chargers | 1 | 8% |
| Air source heat pump | 1 | 8% |
| Replace natural gas heating equipment | 1 | 8% |
| Fuel switching equipment | 1 | 8% |
| UV system | 1 | 8% |
| Motor upgrades | 1 | 8% |
| Natural gas reduction | 1 | 8% |
| Insulation | 1 | 8% |
| Air compressors | 1 | 8% |
| Biogas | 1 | 8% |

**Finding #12:** Participants expressed interest in a wide range of future energy efficiency projects, noting that lighting upgrades (including controls) and VFDs were of primary interest.

## 5.1 JOB IMPACTS SUMMARY RESULTS

As summarized in Table 19, PSUP created an estimated 24 jobs in PY2019 and PY2020. Of these 24 jobs, 12 were direct jobs, 4 were indirect jobs, and 8 were induced jobs. Nearly all the job creations from the program were local, with 22 of the 24 total jobs created in Ontario. In terms of full-time equivalents (FTEs), PSUP created an estimated 23 total jobs.

Direct jobs include all jobs created by PSUP activity, such as administrative jobs, contractors hired to complete projects, engineers, and inspectors, among many others. Indirect jobs include the additional jobs created from economic activity related to PSUP participation, such as equipment and supply distribution centers, delivery drivers, and manufacturing, among many others. Induced jobs include the jobs supported by the "ripple effects" of economic activity from PSUP participation (i.e., the re-spending of income and benefits resulting from PSUP activity).

Job impacts results and model inputs are detailed in Section 5.2 and 5.3, respectively.

*Table 19: PSUP Job Impacts*

| Job Impact Type | Ontario FTE | Canada Total FTE | Ontario Jobs | Canada Total Jobs |
|---|---|---|---|---|
| PY2019 | | | | |
| Direct | 3 | 3 | 3 | 3 |
| Indirect | 3 | 2 | 2 | 2 |
| Induced | 1 | 1 | 1 | 2 |
| **PY2019 Total** | **7** | **6** | **6** | **7** |
| PY2020 | | | | |
| Direct | 10 | 10 | 9 | 9 |
| Indirect | 2 | 2 | 2 | 2 |
| Induced | 3 | 5 | 5 | 6 |
| **PY2020 Total** | **15** | **17** | **16** | **17** |
| **Grand Total** | **22** | **23** | **22** | **24** |

**Finding #13:** PSUP in PY2019 and PY2020 has resulted in the creation of 24 jobs throughout Canada. Direct jobs in Ontario's construction and engineering industry accounted for 16 of these jobs.

## 5.2 JOB IMPACTS DETAILED RESULTS

This section breaks down the job impacts of PSUP in PY2019 and PY2020 in greater detail.

### 5.2.1 PSUP JOB IMPACTS BY INDUSTRY

Table 20 summarizes the job impacts by the industry for PSUP in PY2019 and PY2020. As PSUP targets the industrial sector, the top three industries where the program created jobs were: engineering construction, manufacturing, and professional, scientific, and technical services. Due to the size and complex nature of the projects implemented in PSUP, over half of the jobs created by the program were in engineering construction in Ontario. PSUP also created jobs in wholesale and retail trade, finance, insurance, real estate, transportation, warehousing, administrative, and waste management. The program funding shock, represented by the portion of PSUP funding covered by Ontario's residential sector, resulted in job losses in the accommodation and food services, transportation and warehousing, and other services industries in Ontario. These are some of the largest industries in the province in terms of the number of workers, so the program funding shock impacted them the most. Moreover, the industrial focus of the PSUP program resulted in no net job creation for this sector.

*Table 20: PSUP Job Impacts by Industry*

| Industry | Ontario FTE | Canada Total FTE | Ontario Jobs | Canada Total Jobs |
|---|---|---|---|---|
| Engineering Construction | 16 | 16 | 16 | 16 |
| Manufacturing | 3 | 4 | 3 | 4 |
| Professional, scientific, and technical services | 3 | 3 | 3 | 3 |
| Wholesale Trade | 2 | 2 | 2 | 2 |
| Finance, insurance, real estate, rental, and leasing and holding companies | 0 | 1 | 1 | 1 |
| Administrative and support, waste management and remediation services | 0 | 0 | 0 | 1 |
| Retail Trade | 0 | -1 | 1 | 0 |
| Transportation and Warehousing | 0 | 0 | -1 | 0 |
| Other services (except public administration) | -1 | -1 | -1 | -1 |
| Accommodation and food services | -1 | -1 | -2 | -2 |
| **Total** | **22** | **23** | **22** | **24** |

### 5.2.2 PSUP JOB IMPACTS BY MODEL SHOCK

As described in Section 2.2.7, job impacts of PSUP were estimated leveraging three shocks in the STATCAN I/O model: demand for goods and services related to PSUP, business reinvestment, and program funding. The shock that resulted in the largest number of jobs created was the demand for goods and services associated with PSUP. As summarized in Table 21, the demand shock resulted in 30 jobs created in Ontario and 33 total jobs throughout Canada. Nearly half of these jobs are direct job impacts in Ontario, primarily representing construction and engineering jobs created to complete the complex industrial projects the PSUP incentivizes. The complex value chain of equipment and relatively high incremental cost of these complex projects also result in 17 indirect and induced jobs created throughout Canada.

*Table 21: PSUP Job Impacts from Demand for Goods and Services Shock*

| Job Impact Type | Ontario FTE | Canada Total FTE | Ontario Jobs | Canada Total Jobs |
|---|---|---|---|---|
| Direct | 16 | 16 | 16 | 16 |
| Indirect | 6 | 7 | 7 | 8 |
| Induced | 5 | 7 | 7 | 9 |
| **Total** | **27** | **30** | **30** | **33** |

The job impacts of the business reinvestment shock are summarized in Table 22. This shock represents the amount of bill savings the participating organizations reinvest in their company to spur further economic activity. The business reinvestment shock resulted in one total job being created.

In the process and NTG interviews with PSUP participants, EcoMetric asked participants directly what percentage of bill savings they planned to reinvest. EcoMetric then applied this percentage to each participants' bill savings calculated based on net energy savings multiplied by IESO's retail electricity rate. Overall, the rate of reinvestment was lower than EcoMetric expected, averaging 60%. This low rate of reinvestment is likely due to the economic uncertainty resulting from the COVID-19 pandemic.

*Table 22: PSUP Job Impacts from Business Reinvestment Shock*

| Job Impact Type | Ontario FTE | Canada Total FTE | Ontario Jobs | Canada Total Jobs |
|---|---|---|---|---|
| Direct | 1 | 1 | 1 | 1 |
| Indirect | - | - | - | - |
| Induced | - | - | - | - |
| **Total** | **1** | **1** | **1** | **1** |

The final shock, program funding, represents the increase in Ontario residents' hydro bills from funding PSUP. The IESO estimates that 35% of the portfolio's funding is supplied by the residential sector. EcoMetric applied this 35% to the total $3.7 PSUP budget across PY2019 and 2020, resulting in a shock of $1.3M. As this shock represents less money available to the residential sector for spending throughout the economy, the job impacts are negative.

The job impacts of the program funding shock are summarized in Table 23. Overall, the program funding shock resulted in -10 total jobs across Canada. These estimated job losses occurred in the largest industries in terms of employment, including accommodation and food services, retail trade, transportation and warehousing, and other services. Compared to the jobs created by PSUP through the demand shock, the jobs eliminated through program funding are relatively minor. In fact, per $1M in program funding, PSUP created 6.2 net FTEs.

*Table 23: PSUP Job Impacts from Program Funding Shock*

| Job Impact Type | Ontario FTE | Canada Total FTE | Ontario Jobs | Canada Total Jobs |
|---|---|---|---|---|
| Direct | -4 | -4 | -5 | -5 |
| Indirect | -1 | -3 | -3 | -4 |
| Induced | -1 | -1 | -1 | -1 |
| **Total** | **-6** | **-8** | **-9** | **-10** |

## 5.3 MODEL INPUTS

Table 24 summarizes the model inputs for the largest economic shocks in the PSUP job impacts analysis, the demand for goods and services from the participating organizations. The total spending on goods and services in PSUP PY2019 and PY2020 is $3.5M. Of this amount, $1.1M was spent on labor, and $2.4M was spent on the equipment.

As the projects reported included chiller and refrigeration optimizations, a snowmaking system, and a wastewater UV disinfection project, the demand for goods and services targeted the heating and cooling and waterworks sectors.

*Table 24: PSUP Demand for Goods and Services Inputs*

| Economic Category | Labor (CAD) | Equipment (CAD) | Total (CAD) |
|---|---|---|---|
| Heating and cooling equipment (except household refrigerators and freezers) | $1,131,403 | $1,275,550 | **$2,406,953** |
| Waterworks engineering construction | -[6] | $1,116,400 | **$1,116,400** |
| **Total** | **$1,131,403** | **$2,391,950** | **$3,523,353** |

Table 25 summarizes the business reinvestment shock EcoMetric leveraged for the PSUP job impacts analysis. As discussed in Section 5.2.2, the average rate of reinvestment for the participating organizations was 60%. In total, participating organizations in the PY2019 and PY2020 sample frame reinvested $292,897 of their first year bill savings from PSUP projects. EcoMetric used first year bill savings to calculate the reinvestment shock as the I/O model does not take into account long term economic and technological changes. Further, when EcoMetric asked participants about their rate of reinvestment, many expressed there was a high level of uncertainty regarding business strategies past the very near term. As such, leveraging the net present value of lifetime savings would result in an inaccurate estimation of job impacts from business reinvestment.

Based on the participating organization, the model estimates the amount of reinvestment in each economic category and applies the production function to estimate the economic impact. Eighty-four percent of business reinvestment from PSUP participants came from the retail and wholesale trade sectors, covering a wide group of goods and services through the commercial and industrial sectors. The balance was reinvested in the arts, entertainment, and recreation sector.

*Table 25: PSUP Business Reinvestment Shock Inputs*

| Economic Category | Business Reinvestment (CAD) | Percent of Total Reinvestment |
|---|---|---|
| Retail Trade | $134,609 | 46% |
| Wholesale Trade | $112,837 | 39% |
| Arts, entertainment, and recreation | $45,451 | 16% |
| **Total** | **$292,897** | **100%** |

[6] In the StatCan I/O model, labor costs for waterworks engineering construction are included in the equipment costs.

Table 26 presents the conclusions and recommendations from the PY2020 evaluation findings for PSUP.

*Table 26: PSUP Evaluation Findings and Recommendations*

| | Findings and Conclusions | | Recommendations | Actionable Audience |
|---|---|---|---|---|
| | **PSUP Impact Evaluation Results (Section 3)** | | | |
| 1 | Project documentation for several projects did not include sufficient information for evaluators to determine how project savings were calculated. | 1 | Project documentation should include not only a spreadsheet-based savings analysis but a clear and logical explanation for how the ex-ante savings were calculated and rationale for any assumptions involved. | Technical Reviewer |
| 2 | Technically reviewed summer peak demand savings for a few projects were either not calculated or calculated incorrectly. For example, one project used the average demand savings as the reported summer peak demand savings. | 2 | The technical reviewer should always strive to calculate demand savings for the summer peak period defined by the IESO, regardless of the time of year that the performance data comes from. If there is no data from the peak summer period, various methods could be employed to estimate peak summer demand savings, including:<br>- Weather variable-based (i.e., outside air temperature) regression<br>- If the measure is not weather-dependent, assume the peak summer demand savings are the same as the peak demand savings from the period that the performance data comes from. | Technical Reviewer |

| | Findings and Conclusions | | Recommendations | Actionable Audience |
|---|---|---|---|---|
| | **PSUP Process Evaluation Results (Section 4)** | | | |
| 3 | One-on-one outreach and individual communication are key to recruiting participants to the PSUP program. Not only is the IESO business development manager instrumental in attracting customers, but their interaction with contractors also helps bring in more projects. | | | |
| 4 | The Energy Manager Program was successful at funneling projects into PSUP. | 3 | Consider leveraging energy managers to drive participation in industrial programs as participants adjust to the new 2021-2024 Conservation and Demand Management Framework. Energy managers are a critical conduit between the participant organization and program delivery staff, and they know how program offering changes will affect their organization specifically. Strategies include developing webinars on program updates and processes, case studies on successful projects, and training focused on getting buy-in from decision-makers. | IESO |
| 5 | Surveyed participants indicated that their primary motivation for pursuing energy efficiency projects is financial and that emissions reductions and environmental goals are secondary. | | | |
| 6 | Participants expressed moderate to high satisfaction with PSUP; however, they were least satisfied with the domain knowledge of technical reviewers and the M&V requirements, indicating that establishing baselines was difficult and that the M&V process was often burdensome in the amount of data required. Participants also indicated that although there were application changes that helped reduce timelines, the application process was at times overly complicated. | 4 | Clearly communicate the program requirements and changes at each critical stage: the engineering study, application, and the M&V plan. Establishing clear communication patterns can help streamline project requirements and be vital when new programs are rolled out. | IESO, Technical Reviewer |

| Findings and Conclusions | | Recommendations | | Actionable Audience |
|---|---|---|---|---|
| 7 | Most contractors surveyed expressed moderate to high satisfaction with the study technical review process; however, three contractors expressed low satisfaction levels. Contractors were also moderately to highly satisfied with the application process, with six contractors rating the process at a 7 or above. Most contractors also expressed moderately high to very high satisfaction with the M&V requirements. | | | |
| 8 | Participants indicated that the main barriers to scoping and installing energy efficiency projects were difficulty in establishing the baseline and COVID-related uncertainty. | 5 | Consider providing more webinars on establishing a baseline within program M&V requirements. Establishing a strong baseline can be difficult for industrial customers with highly specific processes. | IESO, Technical Reviewers |
| 8 | See Finding #8. | 6 | Increase messaging and outreach to participants and contractors regarding how to navigate energy efficiency and IESO program participation during the COVID-19 pandemic. Provide case studies of participants that are successfully navigating these uncertain times. Highlight opportunities in the 2021-2024 Conservation and Demand Management Framework that current PSUP participants can take advantage of in the near future. | IESO |
| 9 | Nearly half of surveyed participants indicated that in order to apply to future programs, their organization needed moderate or high certainty that the project would be accepted to the program. Additionally, most participants indicated that their organizations do not have a set threshold for fast-tracked project approval. | 7 | Provide current PSUP participants and interested parties with case studies and examples of projects that can be accepted by current 2021-2024 Conservation and Demand Management Framework programs. | IESO |
| 9 | See Finding #9 | 8 | Continue to gather feedback from current and former participants on what types of program offerings and projects would be most successful. | IESO |

| Findings and Conclusions | | Recommendations | | Actionable Audience |
|---|---|---|---|---|
| 10 | Participants are most interested in a pay-for-performance program structure where the organization receives a set dollar amount per kWh or kW of savings. Other program structures like strategic energy management were less popular. | 9 | Highlight the benefits of the Energy Performance Program for current PSUP participants. Provide training and technical support to industrial customers to pass EPP baseline modeling requirements. | IESO |
| 10 | See Finding #10 | 10 | If the IESO offers new programs for industrial customers that follow PSUP, program planners should consider a pay-for-performance program that not only incentivizes kWh savings but also includes kW and GHG reductions. Ensuring that industrial customers can pursue a variety of measures will appeal to that customer segment. Additionally, strategies learned from the transition to the Interim Framework to streamline application processes, and M&V requirements can be repurposed for any new program rollouts. | IESO |
| 11 | In the absence of PSUP, 40% of participants indicated that they would allocate funding and budget to energy efficiency projects moving forward, and their decision was mainly tied to shorter payback and carbon reduction outcomes. Participants indicated that they are eager for future incentive offerings, particularly pay-for-performance offerings, from the IESO for energy efficiency projects as well as case studies and site assessments. | | | |
| 12 | Participants expressed interest in a wide range of future energy efficiency projects, noting that lighting upgrades (including controls) and VFDs were of primary interest. | | | |

| Findings and Conclusions | | Recommendations | | Actionable Audience |
|---|---|---|---|---|
| | **Job Impacts Results (Section 5)** | | | |
| 13 | PSUP in PY2019 and PY2020 has resulted in the creation of 24 jobs throughout Canada. Direct jobs in Ontario's construction and engineering industry accounted for 16 of these jobs. | | | |
| | **Project-Specific (Appendix A)** | | | |
| A1 | Project documentation for one project did not clearly show how ex-ante calculations were performed. The energy (MWh) savings realization rate for the project is 115%. EcoMetric concluded that part of the savings discrepancy between reported and verified is the voltage value used (575 volts versus 460 volts), but this does not account for the entire discrepancy. | A1 | Project documentation should include not only a spreadsheet-based savings analysis, but a clear and logical explanation for how the ex-ante savings were calculated and rationale for any assumptions involved. | |
| A2 | One project used a weather regression analysis to calculate ex-ante savings. The regression coefficients were included in project documentation, but the tabular analysis that presumably yielded the regression coefficients was not included. | A1 | See recommendation #A1 | Technical Reviewer |

| Findings and Conclusions | | Recommendations | | Actionable Audience |
|---|---|---|---|---|
| A3 | Ex-ante peak summer demand savings for one project were not calculated due to a lack of performance data from the peak summer period (1:00-7:00pm on weekdays from June through August). EcoMetric happened to calculate zero peak demand savings for the project, but the estimate is based on a regression analysis. The fact that it is the same as the ex-ante value is a coincidence. | A2 | The technical reviewer should always strive to calculate demand savings for the summer peak period defined by the IESO, regardless of the time of year that the performance data comes from. If there is no data from the peak summer period, various methods could be employed to estimate peak summer demand savings, including:<br><br>- Weather variable-based (i.e., outside air temperature) regression<br>- If the measure is not weather-dependent, assume the peak summer demand savings are the same as the peak demand savings from the period that the performance data comes from. | Technical Reviewer |
| A4 | One project used the average demand savings as the reported summer peak demand savings for the project. | A3 | Peak demand savings should reflect the peak electric demand savings achieved by the project during the IESO summer peak period. | Technical Reviewer |
| A5 | Project documentation for one project did not contain hourly performance data for the baseline period. The savings were calculated using a regression analysis; however, since there was no hourly data for the baseline, a daily analysis was performed. Because of this, the calculated peak demand savings are likely conservative. | A4 | Obtain hourly trend data for projects, where relevant, possible, and effective to do so, so that an hourly analysis can be performed, and peak summer period hours can be isolated to calculate peak demand savings. | Technical Reviewer |
| A6 | The post-retrofit measurement period for one project extended through March 2020, i.e., around the time Covid-19 started quickly spreading throughout North America. The facility, a ski resort, was forced to shut down entirely at the beginning of March. The reported savings calculations simply and incorrectly removed the month of March from both the baseline and post-retrofit periods. | A5 | In the case of missing data, energy consumption and savings should be estimated based on informed assumptions, extrapolation, or an identified dependent variable. | Technical Reviewer |

# Appendix A Project Specific Findings and Recommendations

This appendix includes project-specific findings and recommendations from the PY2020 impact evaluation.

**Finding #A1**: Project documentation for one project did not clearly show how ex-ante calculations were performed. The energy (MWh) savings realization rate for the project is 115%. EcoMetric concluded that part of the savings discrepancy between reported and verified is the voltage value used (575 volts versus 460 volts), but this does not account for the entire discrepancy.

**Finding #A2**: One project used a weather regression analysis to calculate ex-ante savings. The regression coefficients were included in project documentation, but the tabular analysis that presumably yielded the regression coefficients was not included. EcoMetric attempted to recreate the regression analysis based on the method presented in the M&V plan but was unable to do so.

**Recommendation #A1: Project documentation should include not only a spreadsheet-based savings analysis but a clear and logical explanation for how the ex-ante savings were calculated and rationale for any assumptions involved.**

**Finding #A3**: Ex-ante peak summer demand savings for one project were not calculated due to a lack of performance data from the peak summer period (1:00-7:00pm on weekdays from June through August). EcoMetric also calculated zero peak demand savings for the project, but the estimate is based on a regression analysis. The fact that it is the same as the ex-ante value is a coincidence.

**Recommendation #A2: The technical reviewer should always strive to calculate peak demand savings, regardless of the time of year that the performance data comes from. If there is no data from the peak summer period, various methods could be employed to estimate peak summer demand savings, including:**

- **Weather variable-based (i.e., outside air temperature) regression**
- **If the measure is not weather-dependent, assume the peak summer demand savings are the same as the peak demand savings from the period that the performance data comes from.**

**Finding #A4**: One project used the average demand savings as the reported summer peak demand savings for the project.

**Recommendation #A3: Peak demand savings should reflect the peak electric demand savings achieved by the project during the IESO summer peak period.**

**Finding #A5**: Project documentation for one project did not contain hourly performance data for the baseline period. The savings were calculated using a regression analysis; however, since there was no hourly data for the baseline, a daily analysis was performed. Because of this, the calculated peak demand savings are likely conservative.

**Recommendation #A4: Obtain hourly trend data for projects, where relevant, so that an hourly analysis can be performed, and peak summer period hours can be isolated for the purposes of calculating peak demand savings.**

**Finding #A6**: The post-retrofit measurement period for one project extended through March 2020, i.e., around the time COVID-19 started quickly spreading throughout North America. The facility, a ski resort, was forced to shut down completely at the beginning of March. The reported savings calculations simply and incorrectly removed the month of March from both the baseline and post-retrofit periods.

**Recommendation #A5: In the case of missing data, energy consumption and savings should be estimated based on informed assumptions, extrapolation, or an identified dependent variable.**

# Appendix B Select Methodology Details

## B.1 GROSS SAVINGS ANALYSIS

### B.1.1 Data Sources

Table 27 contains a list of the data sources used for verifying gross savings.

*Table 27: Data & Information Sources Used for Impact Evaluation*

| Item | Description | Source |
|---|---|---|
| Reported (Ex-Ante) participation & savings | Savings by program, project, & measure | Technical Reviewer |
| Participant contact information | For project-specific interviews and site visit coordination | Technical Reviewer & IESO |
| Project files | Including M&V data & documentation | Technical Reviewer & IESO |
| Reporting template(s) | For impact reporting | IESO |
| Cost-effectiveness parameters | Avoided costs, admin costs, discount rate | IESO |

EcoMetric used several distinct data-collection techniques to fulfill evaluation objectives, explained below.

### B.1.2 Gross Savings Verification Methods

**Project Documentation Review**

Project documentation was provided mainly by the IESO's technical reviewer, and in some cases, by the customer or IESO program staff. Project files utilized for the review and analysis include project incentive applications, engineering workbooks, equipment cut sheets, invoices, email exchanges, technical drawings, M&V plans and reports, and digital photos.

**Project Audits**

Project audits verify the accuracy of savings calculations, assumptions, and M&V conducted by the technical reviewer, contractors, customers, and any other parties involved in the application, implementation, and technical review process. EcoMetric performed audits for each project in the sample, utilizing technology-specific methods and tools and testing the calculations and assumptions used to estimate reported savings for each project.

Level 1 audits consist of a desk review of project documentation and supporting calculations, including applications, savings worksheets, M&V plans, M&V reports, engineering studies, metered data, invoices, and any other documents made available.

Level 2 audits expand upon the work conducted in the Level 1 audits, and as stated above, in many cases, include a virtual review of the equipment installation and operating parameters.

Data collected from the Level 1 and Level 2 audit activities enabled EcoMetric to verify energy and demand savings for each PSUP project.

Ratios of gross verified to reported savings are realization rates. EcoMetric analyzed a census of PSUP projects in PY2020, resulting in a unique realization rate, or adjustment factor, for each project. In these cases, program-level realization rates are equal to total verified savings divided by total reported savings. Program-level realization rates can be found in detail in Section 3.1.

## B.2 NET SAVINGS ANALYSIS

### B.2.1 Net Savings Data Collection

For PY2020 projects, EcoMetric implemented the NTG questionnaire originally developed for the Conservation First Framework to provide consistency in the evaluation approach across program frameworks. The traditional free ridership approach first establishes a gross baseline (e.g., industry standard practice) and conducts a free ridership interview to determine the degree of influence the program had in moving the customers from the gross baseline to the high-efficiency alternative that was installed. This is an excellent approach for straightforward measures, for those where only two efficiency options are available (the binary choice of the high or low-efficiency options), and when the questionnaire must be written to cover diverse technologies. All measures in the IESO program fit this approach.

The primary data collection method for NTG data was through in-depth self-report interviews. This approach was consistent with the CFF approach and is allowed by the IESO's Evaluation, Measurement, and Verification Protocol v4.0. The general NTG process is as follows:

- The NTG surveys addressed the free ridership component of net savings analysis, calculating both a direct free ridership score and an indirect score that incorporates questions about program influence and any other factors that possibly influenced the decision to implement the project. Spillover was not assessed during the PY2020 evaluation.
- Prior to the 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

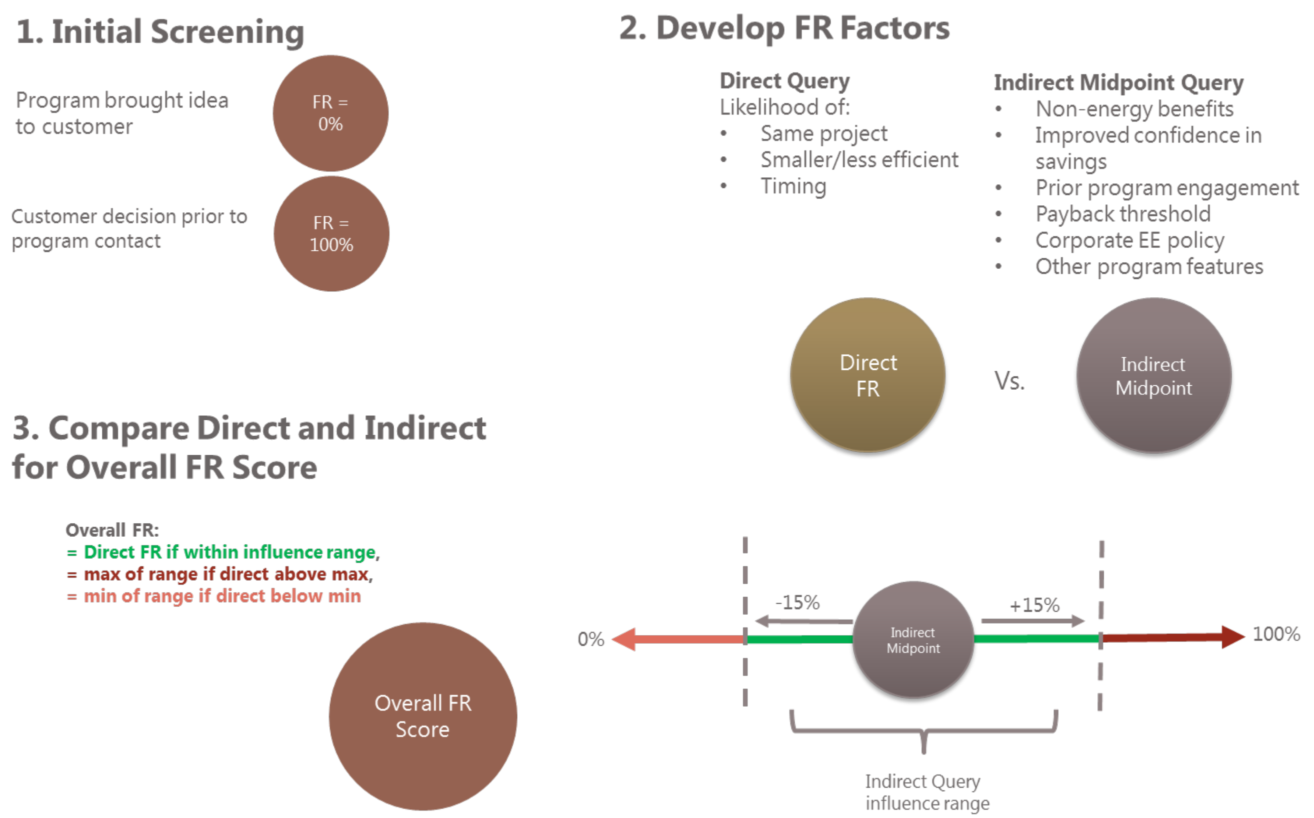
management, avoiding leading questions, and pre-tests of interview scripts and pilot testing with initial recruited participants.

- EcoMetric takes 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 works with the 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, the IESO sends personalized recruitment emails to these contacts notifying them of the upcoming interview. EcoMetric then contacts 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. EcoMetric leverages 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. EcoMetric worked with the IESO to conduct another contact attempt for any sites that were not responsive to initial recruitment efforts.
- In preparation for the interviews, the EcoMetric staff reviewed the project files for each customer to understand the projects completed, timelines, and any other unique characteristics of each customer. For customers that implemented multiple projects during the study year, EcoMetric investigated the two projects with the largest electricity savings to capture the most savings without creating an excessive burden on the interviewee.
- After completing each interview, the interviewer reviewed and clarified notes and submitted the interview results for quality control (QC). During the QC, results were reviewed for completeness and consistency.

### B.2.2 Net Savings Data Analysis

The collected free ridership data was analyzed first by computing a direct query-based free ridership from responses on the likelihood of implementing the project absent the program, and likely size, efficiency, and timing of implementation. After estimating free ridership using this direct method, EcoMetric analysts calculated a probable free ridership range based on a series of questions about program influence and other factors that possibly influenced the decision to implement the project. The final project free ridership was then computed by considering the direct query and the range. Figure 8 presents a graphical representation of the calculation approach.

*Figure 8: Free Ridership Methodology*




EcoMetric computed the free-rider (FR) factors to estimate net savings as shown in the following formula:

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

For example, an individual project with 1,000,000 kWh/year of tracking savings, a 95% realization rate, and 10% free ridership would have verified gross savings of 950,000 kWh/year, an NTG ratio of 0.90 (1-FR = 1 - 0.10), and verified net savings of 855,000 kWh/yr.

## B.3 COST EFFECTIVENESS ASSUMPTIONS

- Project costs and benefits are included for projects in-service starting in 2019 and included in the PY2019 true up and PY2020 reported impacts.
- Engineering study costs are included for all 2020 studies listed in the IF I&A Database.
- Engineering Study costs are the sum of "Project Incentive ($)" from the IF I&A Database where Program equals Process & Systems Upgrades and IESO Reporting Period equals 2020.
- Program admin costs (CE Tool Budget Inputs) were provided by the IESO Evaluation Team for PY2019 and PY2020.

- EcoMetric sourced PSUP incremental project costs from technical reviewer's M&V reports and verified costs using supporting project documentation when available.
- Per-unit incentive amounts are the actual incentive amounts paid for each project in the IF I&A Database. Each project is entered as a custom measure in the CE tool; therefore, each measured quantity is equal to 1, and the incentive is only included once.
- EcoMetric developed and utilized custom measure-specific load shapes for PSUP cost effectiveness analysis to improve the accuracy of the avoided cost calculations.

## B.4 JOB IMPACTS ASSUMPTIONS

- Project costs and incentives match the values used for the cost effectiveness analysis described in Section B.3.
- As the job impacts analysis focused on jobs created in 2019 and 2020, first year costs and benefits were used as inputs into the input/output model.