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2015 Evaluation Report for the Aboriginal Conservation Program FINAL

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Table of Abbreviations

AAPOR	American Association for Public Opinion Research
ACP	Aboriginal Conservation Program
FAST	Field Audit Support Tool
FNESL	First Nations Engineering Services Ltd.
FR	Free-Ridership
HAP	Home Assistance Program
IESO	Independent Electricity System Operator
ISR	In-Service Rate
LDC	Local Distribution Company
NTGR	Net-to-Gross Ratio
PAC	Program Administrator Cost
RR	Response Rate
SO	Spillover
TRC	Total Resource Cost

1. Executive Summary

The Independent Electricity System Operator (IESO) contracted Opinion Dynamics Corporation (evaluation team) to conduct impact and process evaluations of the Aboriginal Conservation Program (ACP). This report presents the evaluation results covering the period from January 1, 2015 to December 31, 2015 (2015 program year).

The purpose of the ACP is to provide customized conservation services to First Nations communities to reduce their electricity use and lower their monthly utility bills. The program delivers the same suite of energy conservation measures as the Home Assistance Program (HAP), but differs in that it focuses on specific preselected First Nations communities.

1.1 Summary of Evaluation Goals and Objectives

The 2015 ACP evaluation had the following objectives:

- Determine gross and net energy savings and peak demand reductions achieved in 2015
- Complete a process evaluation that identifies opportunities for improvement of the ACP and assess any gaps in the program's design and delivery
- Assess presence and influence of energy-saving education and materials provided by the ACP

1.2 Summary of Impact Evaluation Results

The evaluation team verified the gross energy and demand savings claimed in the ACP participant database for projects completed in 2015. Income-qualified direct-install programs similar to the ACP typically assume a net-to-gross ratio (NTGR) of 1.0, as free-ridership (FR) and spillover (SO) are characteristically low. As such, net verified savings are equal to gross verified savings in 2015.

Based on participant data records provided by the IESO, the evaluation team estimates that the ACP resulted in 625kW of peak demand reduction and 3,627,223 kWh of energy savings in 2015, as shown in Table 1-1.

Table 1-1. Summary of 2015 Impact Evaluation Results

Component	Value
Number of Participants	1,586
Net Verified Demand Savings (kW)	625
Net Verified Annual Energy Savings (kWh)	3,627,223
Peak Demand Savings Realization Rate	84%
Energy Savings Realization Rate	75%

For the 2015 ACP impact evaluation, the evaluation team conducted a comprehensive review of program deemed savings assumptions for non-weatherization measures.¹ We reviewed each measure savings assumption and compared it to the latest relevant literature and research. For several measures, we made recommendations for using revised values, which we applied in calculating our evaluated savings results.

Also, as part of the 2015 impact evaluation, the evaluation team researched and calculated measure-specific in-service rates (ISRs). The installation rate for each measure is the ratio of the quantity still installed at the time of the participant survey² to the quantity reported by the program. Table 1-2 provides the impacts of deemed savings adjustments and ISRs on program-wide savings, along with the NTGR, which is 1.0, or 100%.

Table 1-2. Summary of 2015 ACP Savings Adjustment Factors

Factor	Energy Savings Adjustment
Deemed Demand Savings Adjustment	96%
Deemed Energy Savings Adjustment	86%
ISR Demand Savings Adjustment	88%
ISR Energy Savings Adjustment	86%
NTGR	100%

Impact evaluation key findings:

- The ACP verified savings per project were considerably higher than the similar HAP offering. On average, ACP participants saved 2,287 kWh of energy and reduced their peak demand by 0.394 kW in 2015, compared with 971 kWh and 0.147 kW in savings for HAP customers over the same period. Driving these substantial differences is the greater share of ACP participants who received weatherization measures: 30% of ACP participants receive insulation and draft proofing, compared with only 6% of HAP participants.
- Weatherization measures were responsible for the largest share of kW savings for the ACP in 2015 (55%) and 24% of estimated kWh savings, followed by refrigeration measures, which provided 25% of the overall demand savings and 34% of energy savings. On average, projects with weatherization measures reduced participants’ energy usage by 1,292 kWh and peak demand by 0.5 kW more than projects without weatherization.

¹ In 2015, the ACP used project-specific building energy models to determine weatherization savings and is transitioning to estimating weatherization savings using a simplified set of assumptions and algorithms in the future as part of the Field Audit Support Tool (FAST).

² Through a telephone survey, a sample of 2015 participants verified quantities of each measure received and installed through the program. Respondents were also asked to verify the number of each measure that remained installed at the time of the survey (May 2016).

1.3 Summary of Process Evaluation Results

The process evaluation involved interviews with program and implementation staff; an analysis of program-tracking data; a telephone survey of program participants; and a review of program documentation, such as program protocols and data collection tools.

Process evaluation key findings:

- Program participation increased by 41% from 2014 to 2015 (from 1,125 to 1,586), and the program provided more units of every individual measure offered across the program. In particular, the number of window air conditioners, dehumidifiers, refrigerators, and freezers provided by the program each increased by more than 200% from 2014 to 2015.
- Few participants recalled receiving the window air conditioners or block heater timers reported in the program-tracking data. For a small and seasonal measure like a block heater timer, this finding could indicate a lack of participant awareness, possibly resulting from lack of communication on the part of program field staff. For larger measures like window air conditioners, the low installation rate may point to a delivery issue. First Nations Engineering Services Ltd. (FNESL) staff indicated that the vendor contracted to deliver the room air conditioners was also instructed to install the units, but may have done so inconsistently.
- FNESL has maintained a relatively uniform service delivery structure among all program participants. In comparison, the HAP employs at least four different delivery agents, some holding many differing contracts with the local distribution companies (LDCs) that they serve. Program offerings, therefore, can vary between delivery agents, and even between LDCs served by the same delivery agent. The single implementer structure of the ACP allows for more consistent audits, measure delivery, participant education, and data collection.
- Another challenge faced by the ACP, particularly regarding the installation of weatherization measures, stems from the range and quality of housing stock present in First Nations communities throughout Ontario. The housing stock in targeted communities ranges from brand new homes to those that are far older and in very poor condition, where installing additional insulation either may be impractical or could lead to health and safety risks. For example, in some instances, program staff found a considerable amount of mold at prospective ACP homes, and additional insulation or air sealing measures could pose serious health threats to their occupants. Further, some properties are in such disrepair that simply adding more insulation is an ineffective solution to a much more extensive problem.

1.4 Conclusions and Recommendations

The evaluation team provides several recommendations below, based on the evaluation results and findings discussed throughout this report.

- **Provide consistent information and educational materials to all participants to maximize the ACP's behavioural impact.**

Most participants reported receiving some form of educational information—either verbal or written—in 2015, but most did not recall receiving both. Research conducted as part of the HAP evaluations in 2014 and 2015 indicates that comprehensive and consistent educational offerings can result in behaviour change and produce measureable program-attributable savings. Consistent delivery of both written and verbal information to participants may increase the program’s influence on customer behaviour.

- **Update deemed savings values in the FAST to be consistent with the latest evaluated values.**

A comprehensive engineering review of non-weatherization deemed savings assumptions resulted in recommended adjustments to per-unit deemed savings values for 19 of the 21 non-weatherization measures offered by the ACP in 2015. Adopting these recommendations and incorporating them into the FAST for future program years will improve the accuracy of reported savings and make them more consistent with evaluated savings.

- **The program-tracking data should include savings estimates for all reported projects, with particular emphasis on weatherization projects.**

None of the savings information for ACP projects was included in the program-tracking data provided to evaluators despite the apparent emphasis on ensuring that these data are to be included when the LDC reports progress to the IESO. It is unclear whether the data are not being transmitted properly to the IESO or are only not being relayed to program evaluators.

- **Provide all participants with clear explanations of the measures that they receive, and emphasize verification of air conditioning unit installation.**

Our research on measure-specific ISRs found that few participants recalled receiving and installing certain measures, most notably block heater timers and window air conditioners. Many participants reportedly provided block heater timers denied receipt, indicating that they did not receive the measure, were not made aware of the measure upon its delivery, or had forgotten that they received the measure. Additionally, fewer than half of those who reported receiving a block heater timer confirmed that it was installed and programmed. While participants confirmed that they received all air conditioners, fewer than one-third reported that the units were installed, pointing to a possible issue with the service hired to deliver and install them. Clear explanation of equipment and confirmation of participant interest along with verification of installation for extended measures should help improve ISRs.

- **As part of the application, obtain permission from participants to provide their electric billing data to program evaluators.**

This data will allow evaluators to more accurately estimate program energy savings by analyzing electricity usage data before and after program participation for the purpose of estimating program energy savings through billing analyses.

2. Introduction

This report presents the results of the evaluation of the 2015 Aboriginal Conservation Program (ACP). The remainder of this section present the objectives of the evaluation, followed by an overview of the purpose of the ACP, the program's goals, and the structure and content of this evaluation report.

2.1 Evaluation Objectives

The 2015 ACP evaluation had the following objectives:

- Determine gross and net energy savings and peak demand reductions achieved in 2015
- Complete a process evaluation that identifies opportunities for improvement of the ACP and assess any gaps in the program's design and delivery
- Assess presence and influence of energy-saving education and materials provided by the ACP

2.2 Program Purpose

The purpose of the ACP is to provide customized conservation services to First Nations communities to reduce their electricity use and lower their monthly utility bills. The program delivers the same suite of energy conservation measures as the Home Assistance Program (HAP), but differs in that it focuses on specific preselected First Nations communities.

Implemented by First Nations Engineering Services Ltd. (FNESL), an Aboriginal-owned engineering company, the delivery strategy for this program is to reach the entire community, as opposed to individual residential customers. As such, for each community, FNESL organizes a community launch event where eligible residents are introduced to the program, given some background on the different energy-saving technologies that they may be eligible for, and are provided with information about how to sign up. Gaining the trust of the community and providing energy education are critical components of the ACP. The community launch events provide an important setting for program implementation staff to meet with community members, explain why the program is valuable, and inform the community about the most effective ways to reduce their energy consumption.

Additionally, the ACP employs a single delivery agent, FNESL, to implement the program. This strategy contributes to both the program's efficient delivery and its consistency. In comparison, the HAP employs at least four different delivery agents, some holding many contracts with the local distribution companies (LDCs) that they serve. Program offerings, therefore, can vary between delivery agents, and even between contracts held by the same delivery agent. With a single implementer, the program administrator is ensured similar installation practices, data collection, and delivery of educational content, across the entire program.

2.3 Program Goals

The ACP expects to realize the following goals:

- Improvements to the electric efficiency of the housing stock within First Nations communities throughout Ontario
- Electricity demand reductions and energy savings

- Adoption of conservation behaviours by participating First Nations households
- Improvements in the knowledge of First Nations Ontarians on how to effectively manage electricity costs
- Support for utility service continuity

The Independent Electricity System Operator (IESO) funds Hydro One Networks, a LDC, to administer the ACP through FNESL. Eligible participants receive the following measures and their installation at no charge:

- Basic measures: screw-in CFL bulbs, block heater timers, smart power bars, efficient shower heads, faucet aerators, and hot water pipe wrap/tank insulation
- Extended measures: ENERGY STAR® refrigerators, freezers, window air conditioning units, dehumidifiers, and programmable thermostats
- Weatherization measures: draft proofing, attic insulation, wall insulation, and basement insulation

Eligibility for the program is based on residential customers living within preselected First Nations communities targeted by the ACP for a given program year.

2.4 Report Overview

The remainder of this report contains the impact and process evaluation of the ACP. Sections describing each measure include a methodology, results, and a recommendations subsection.

The 2015 impact evaluation contained the following components:

- Program-tracking data review: The evaluation team checked listed projects against those reported in previous years, confirmed project audit completion dates, and reconciled discrepancies between measure units and associated savings and costs.
- Updated ISRs: Through a survey of participants, the evaluation team quantified the percentage of each type of measure received through the program, the portion installed, and the portion still installed at the time of the survey.
- Revised deemed savings values: The evaluation team completed a comprehensive review of the underlying measure-specific savings as recommended by the 2014 program evaluation, updating values where necessary to reflect the latest available data.

The 2015 process evaluation of the ACP included the following areas of research:

- In-depth interviews with program administration and implementation staff, including representatives from IESO and FNESL
- A review of program documents, such as the program's schedule and implementation protocols
- A telephone survey of 2015 ACP participants about their program participation, awareness, and satisfaction
- Program-tracking data review of participation and data quality and completeness

3. Impact Evaluation

In this section, the evaluation team presents the methods, results, and recommendations from the impact evaluation of the ACP for the 2015 program year. This section includes a comparison of demand and energy savings determined through the evaluation (verified savings) to the impacts listed in the program-tracking data. The evaluation team used the most detailed measure-level data available from the program-tracking systems as the basis for estimating verified savings and measure-level savings estimates.

3.1 Methodology

The evaluation team's determination of 2015 verified savings involved several steps. First, we reviewed program-tracking data, cleaning it of erroneous records. Next, because the program-tracking data were missing actual energy savings for each reported measure, we applied deemed savings values used by the current Field Audit Support Tool (FAST) to determine "reported" energy and demand savings. The evaluation team then reviewed, researched, and revised measure-specific deemed savings assumptions and in-service rates (ISRs). Finally, we applied these updated values to determine evaluated gross impacts. A net-to-gross ratio (NTGR) of 1.0 was applied at the program level as is customary for low-income programs.

3.1.1 Program-Tracking Data Review

The evaluation team reviewed the reported program participation data, checking listed projects against those reported in previous years, confirming project audit completion dates, and reconciling discrepancies between measure units and associated savings and costs.

Files provided by the program administrator, in Microsoft Excel format, containing 88,726 ACP and HAP projects were the basis of the program-tracking data review. After comparison with HAP and ACP project lists from prior years and confirming missing project dates where possible, 60,854 were attributable to completion dates prior to 2014 and excluded from analysis. After resubmitting the remaining 27,872 projects to individual LDCs for date verification, 27,185 unique projects were confirmed as completed in 2014 or 2015 and unaccounted for in previous evaluations. Of these, 1,586 were completed in 2015 as part of the ACP.

Over the course of the data-cleaning process, the evaluation team identified and removed or combined duplicate records based on a number of different criteria, including FAST file IDs, installed measures, measure costs, audit costs, audit completion dates, and participant contact information. Audit dates and other formatting conventions used in the participant database were standardized.

None of the 2015 ACP projects in the supplied program-tracking data had associated energy or demand savings for the measures installed. The evaluation team therefore applied measure-specific per-unit deemed savings values used in the current FAST to represent reported savings for non-weatherization measures. For weatherization measures, the evaluation team applied historical averages of measure-specific per-unit savings values recorded for ACP and HAP since the inception of the programs.

3.1.2 Measure In-Service Rates

ISRs represent the self-reported quantity of measures still installed relative to quantities reported in the program-tracking data. The evaluation team used participant survey responses to determine the ISRs. Each survey respondent was asked a battery of questions to verify the quantity of measures received, the number of received measures that were installed, and the number of those installed measures still installed at the time of the survey.

For recipients of programmable measures (i.e., thermostats and block heater timers), the survey included an additional question asking whether the measure had been programmed. Measures reported never to have been programmed were treated as uninstalled. The survey verified receipt but not installation of refrigerators, freezers, hot water tank and pipe wrap, and weatherization measures.

3.1.3 Engineering Review of Savings Assumptions

The evaluation team completed an engineering review of the underlying assumptions of measure-specific deemed savings values used as recommended by the 2014 evaluation of the HAP. Based on a comprehensive review of available information, including technical resource manuals, previous program evaluations, and participant survey responses, we updated deemed savings values for 19 of the 21 non-weatherization measures offered during the 2015 program year.

3.1.4 Net-to-Gross Ratio

Typically, income-qualified direct-install programs like the ACP do not apply a researched NTGR, given the assumption that free-ridership (FR) and spillover (SO) rates are very low for such programs. FR represents the percentage of savings that would have been achieved in the absence of the program. SO represents the percentage of the total savings achieved without program rebates that would not have occurred in the absence of the program.

To test these assumptions, in 2013, the evaluation team conducted NTGR research based on a participant survey of participants in the HAP. The evaluation team conducted NTGR research through a survey of program participants and found both FR and SO rates to be very low. For this reason, for the 2015 ACP impact evaluation, a NTGR of 1.0 is assumed when reporting net savings values. Details on the methods and results of the 2013 NTGR research can be found in the 2013 HAP Evaluation Report.

3.2 Results

Using the methods described above, the evaluation team calculated the net verified energy and demand savings for the 1,586 ACP projects completed in 2015. The evaluation team compared verified savings to the measure- and project-level reported savings to calculate the realization rates at the project and program levels. Table 3-1 summarizes the program-level results.

Table 3-1. ACP Verified Net Savings (2015)

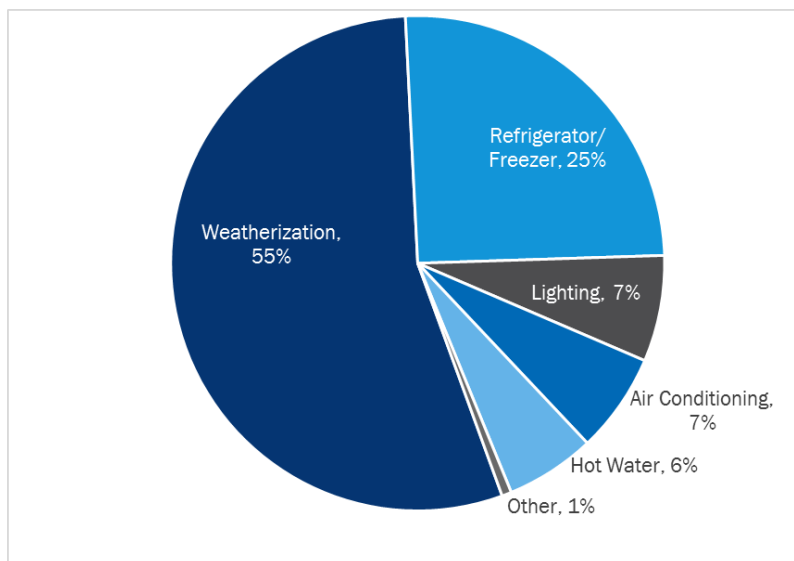
Savings Type	Reported Savings*	Verified Savings	Realization Rate
kW	744	625	84%
kWh	4,866,583	3,627,223	75%

* These values are based on the reported measures in the dataset cleaned by the evaluation team and application of deemed savings values from the FAST where savings were not in tracking data.

Realization rates for peak demand increased from 15% in 2014 to 84% in 2015.³ The realization rate for energy savings decreased from 97% in 2014 to 75% in 2015. These shifts predominantly reflect the introduction of measure-specific ISRs not used in the previous evaluation. A combination of other factors, including changes to measure mix, deemed savings assumptions, and the method for determining reported savings, also contributed to the difference in realization rates. While the 2014 realization rate reflected a comparison of verified savings to those savings included in the raw data, the 2015 realization rate predominately reflects changes made to 2014 savings assumptions based on 2015 evaluation findings.

More than 80% of energy and demand savings are attributable to weatherization, refrigeration, and lighting measures. As shown in Figure 3-1, weatherization measures were responsible for 55% of the program’s estimated demand reduction; attic, basement, and wall insulation alone accounted for roughly 46% of the ACP’s demand savings. Refrigerators and freezers accounted for 25% of demand savings and 34% of energy savings (see Figure 3-2). While lighting measures are credited with nearly one-quarter of energy savings (23%), they represent only 7% of demand savings.

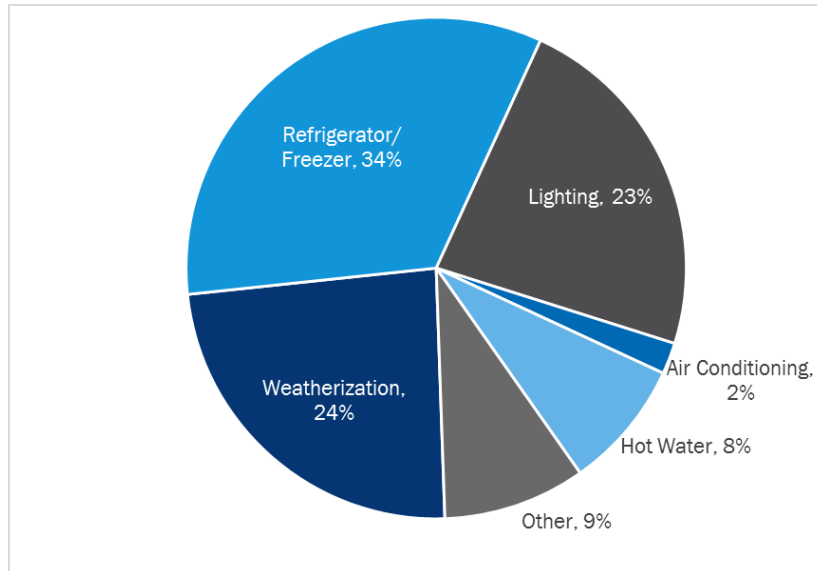
Figure 3-1. Percent of Verified kW Savings by Measure Group



* “Other” includes programmable thermostats, block heater timers, and power bars.

³ The low realization rate for demand savings in 2014 resulted from the use of an outdated version of the FAST that overestimated demand savings for weatherization measures in particular.

Figure 3-2. Percent of Verified kWh Savings by Measure Group



* "Other" includes programmable thermostats, block heater timers, and power bars

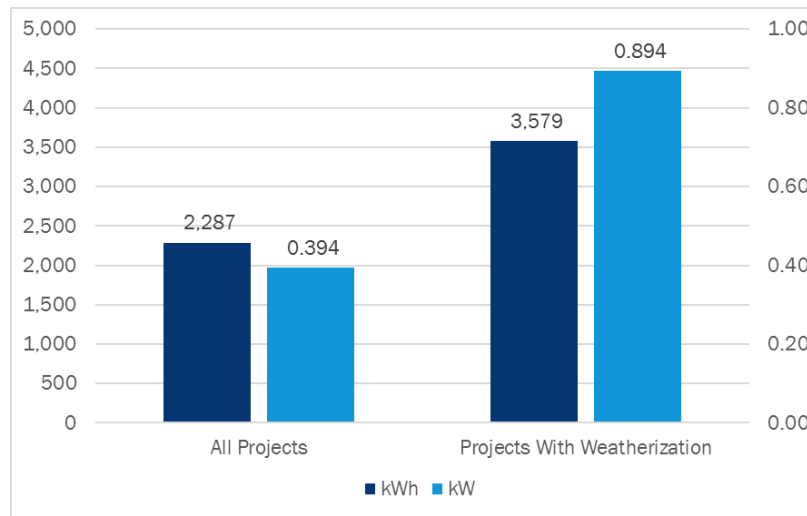
Table 3-2 shows the 10 individual measures responsible for the largest portion of demand savings and the share of participants who received them.

Table 3-2. Top 10 Demand Reduction (kW) Measures in 2015

ACP Measure	kW	kWh	Unique Participants	Percent of Participants Who Received	Measure Quantity
Attic Insulation	162	409,831	424	27%	399,629 (sq. ft.)
Basement Insulation	105	266,169	76	5%	48,146 (sq. ft.)
Refrigerator Replacement (ENERGY STAR Qualified 17.0–18.4 cu. ft.)	73	569,754	616	39%	616
Comprehensive Draft Proofing	54	136,972	216	14%	29,444 (sq. ft.)
Refrigerator Replacement (ENERGY STAR Qualified 15.5–16.9 cu. ft.)	38	299,339	339	21%	339
ENERGY STAR Qualified CFL Twister (60W)	33	639,186	1,171	74%	16,176
Freezer Replacement (ENERGY STAR Qualified 14.5–16.0 cu. ft.)	29	212,598	366	23%	366
Wall Insulation	21	53,158	143	9%	18,349 (sq. ft.)
Freezer Replacement (ENERGY STAR Qualified 12.0–14.4 cu. ft.)	18	134,601	286	18%	286
Window Air Conditioner Replacement (ENERGY STAR Qualified 8,000–9,999 BTU/hr)	15	14,138	295	19%	295

Per-project savings for the ACP were substantially higher than those for the HAP, a similar program offering the same suite of measures to income-qualified residential customers. On average, HAP participants saved approximately 971 kWh and reduced their peak demand by 0.147 kW in 2015, compared with 2,287 kWh and 0.394 kW for ACP participants. This is due largely to a much higher proportion of ACP projects that included multiple weatherization measures (30%), compared with only 6% of HAP projects. As illustrated in Figure 3-3, projects that installed weatherization measures saved an average of 1,292 kWh and 0.5 kW more than the average ACP participant.

Figure 3-3. Per-Project Savings Comparisons



3.2.1 Measure In-Service Rates

This section discusses the installation rates for each ACP measure category. For the benefit of program administrators, Table 3-3 breaks the final installation rates into three different components: the rate of tracked equipment that participants received, the rate of received equipment that was installed, and the rate of installed equipment still installed at the time of the survey. The final installation rates are the product of these three components (i.e., the portion of equipment in the tracking data that was installed at the time of the survey).

Table 3-3. ACP Measure ISRs by Measure Group

Simplified Measure Name	Rate Received	Rate Installed	Rate Still Installed	Final Installation Rate
Screw-In CFLs	97%	93%	95%	87%
Faucet Aerator/Efficient Shower Head	88%	100%	99%	87%
Dehumidifier	81%	91%	100%	73%
Programmable Thermostat	75%	92%	100%	69%
Power Bar	88%	85%	94%	70%
Block Heater Timer	62%	43%	100%	26%
Window Air Conditioners	100%	29%	100%	29%
Refrigerator/Freezer	98%	100%	100%	98%
Hot Water Tank/Pipe Insulation*	100%	100%	100%	100%
Weatherization Measures*	100%	100%	100%	100%

* These measures were defaulted to 100%, as many participants were often unable to verify installation.

Several measures were found to have lower-than-expected ISRs, the most notable examples being block heater timers and window air conditioners, which received ISRs of 26% and 29%, respectively. Only 62% of block heater timers in the program-tracking data were received according to survey participants. This could mean that the measures were not received, or that participants were unaware that they received them, or some combination. Additionally, only 43% of those who acknowledged receiving a block heater timer confirmed that it was installed and programmed. The seasonal nature of this measure may have contributed

to people being unaware that they had received it and did not install it, given that most audits were not completed during the winter months when block heaters are in use. For air conditioners, all participants reported receiving the units; however, only 29% were installed. The program implementation team reported that the vendor delivering the units has been directed to also install them. However, these survey results indicate that the installation of the units was not being carried out.

3.2.2 Engineering Review of Savings Assumptions

Based on a review of technical resource manuals, other program evaluations, and participant survey responses, we updated deemed savings values for 19 of the 21 non-weatherization measures offered during the 2015 program year. These revisions are outlined below and are more fully specified and explained in Appendix E.

Per-unit energy and demand savings dropped most substantially for block heater timers, hot water tank pipe wrap, dehumidifiers, shower heads, and faucet aerators. However, an increase in per-unit savings for refrigerators, which made up a large portion of overall savings, helped offset the combined effect of the deemed savings adjustments. Deemed savings values remained relatively consistent across lighting measures, which made up nearly 25% of the program's energy savings in both 2014 and 2015. While there were significant increases and decreases in savings estimates for several individual measures, the adjustments to deemed savings values had only a moderate effect on overall program savings in 2015, given the overall measure mix and relative savings across measures.

3.3 Recommendations

Based on the findings discussed above, the evaluation team makes the following recommendations.

- **Update deemed savings values in the FAST to be consistent with latest evaluated values.**

A comprehensive engineering review of non-weatherization deemed savings assumptions resulted in recommended adjustments to per-unit deemed savings values for 25 of the 30 non-weatherization measures offered by the ACP in 2015. Adopting these recommendations and incorporating them into the FAST for future program years will improve the accuracy of reported savings and make them more consistent with evaluated savings.

- **The program-tracking data should include savings estimates for all reported projects, with particular emphasis on weatherization projects.**

None of the savings information for ACP projects was included in the program-tracking data provided to evaluators despite the apparent emphasis on ensuring that these data are to be included when the LDC reports progress to the IESO. It is unclear whether the data are not being transmitted properly to the IESO or are only not being relayed to program evaluators.

4. Process Evaluation

4.1 Methodology

The process evaluation involved the collection of both primary and secondary data. Primary data were gathered through interviews with program staff, the ACP’s implementation contractor, and program participants, as summarized in Table 4-1. In addition to these primary data collection efforts, this section also describes the review of a variety of program materials.

Table 4-1. 2014 Primary Data Collection Efforts

	In-Depth Interviews with Program Staff	Participant Telephone Survey
Completes	2	58

4.1.1 Program Staff Interviews

The evaluation team conducted interviews with program staff from January to July 2015. This consisted of interviews with the ACP program lead at the IESO and the program leads at FNESL. The interviews were used to gather information on program design, delivery, and participation, and served five primary purposes:

1. To develop an understanding of all goals and delivery strategies used to gain participation, and the staff’s and stakeholders’ perspective on the effectiveness of each strategy
2. To better understand the training and educational component that may drive behavioural changes
3. To better understand the program-tracking systems, quality assurance procedures, and audit process and documentation
4. To obtain contacts for each of the First Nations served in 2015 to inform them of the upcoming participant survey and obtain their assistance in providing advance notice to participants, as necessary

4.1.2 Review of Program Materials and Data

The evaluation team conducted a review of program materials, including program databases, materials provided to participating customers, and customer outreach and marketing materials. These activities informed various components of the process assessment. The program materials reviewed included:

- FAST Version 5.5
- Eligibility Intake and Service Guidelines
- Audit and Retrofit Protocols
- OPA Evaluation, Measurement, & Verification Protocols for 2011–2014

4.1.3 Initiative Database Analysis

Examining the ACP participation data tracked by the program provided us with an understanding of participation and measure uptake, basic participant characteristics, and reported savings. In addition, this analysis characterized data quality and completeness by identifying duplicate records, missing data, and outliers. The findings from this analysis also helped inform survey sample design parameters and sample design strata. More specifically, this analysis allows us to:

- **Characterize Participation:** The evaluation team used the results of the database analysis to help characterize ACP participation and savings and to identify annual trends. This review documented participant and measure counts, measure uptake, reported savings, and attributed savings according to their respective measures.
- **Document Data Inconsistencies and Provide Recommendations for Future Tracking:** Through this effort, the evaluation team assessed the integrity of the program-tracking data, identifying and reconciling duplicative, missing, and erroneous data. This was a necessary first step in determining gross savings prior to verification efforts (i.e., analyzing a sample of projects and verifying measure installations through participant surveys described in subsequent tasks).
- **Build Sample Frames:** In developing the participant survey sample, the evaluation team assessed participant characteristics, measure counts, and other factors to determine the most appropriate sampling approach and to take inventory of the availability and completeness of customer contact information. As part of the gross impacts calculations, the evaluation team conducted a basic inventory and analysis of available participant data, which included the removal of duplicates and identification of missing data. The corrected data set was used to build sample frames for the surveys.

The database analysis of 2015 participants is based on a final extract from the HAP and ACP participant database accessed on March 16, 2016, and augmented with additional batches pulled May 12, 2016 and June 10, 2016. These data were used to develop a representative sample of 2015 ACP participants for the participant survey.

4.1.4 Participant Survey

The evaluation team administered a telephone survey of 2015 ACP participants. Interviews were completed with 58 customers between May 3 and May 10, 2016. The following section discusses the survey instrument and sample design methodologies.

Survey Instrument Design

Participant surveys are a key component of assessing program impacts and effectiveness. The 2015 ACP participant survey was developed to estimate ISRs, gauge participant satisfaction and perception, and better understand possible behavioural impacts of program participation. The participant survey was developed in accordance with the 2015–2020 Conservation First EM&V Protocols, which cover requirements for market effects research and analysis. The survey includes questions that explore the following topics:

- Impact-related analysis:
 - Verified receipt, installation, and persistence of measures

- Collected home specifications to inform deemed savings review
- Process-related analysis:
 - Measure satisfaction
 - Reasons for not installing or removing measures
 - Behavioural changes directly attributable to the program's training and education efforts
 - Source of program awareness and method of enrollment
 - Non-energy benefits realized by participants

The full survey instrument is provided as Appendix D of this report.

Participant Survey Sample Design

For the 2015 participant survey, all respondents were asked about each type of measure that they reportedly received, according to the ACP participant data. Each of the 25 ACP measures was assigned to 1 of 10 measure categories, based on equipment type and analogous end-use. For example, the survey grouped all screw-in CFLs together and did not differentiate between refrigerators and freezers. Appendix A provides a complete list of measures and their associated categories.

We submitted requests for participant phone numbers, and received the necessary contact information for 1,369⁴ customers. Table 4-2 shows the survey dispositions for all numbers that were loaded for calling. The survey response rate was 5.3%, which is somewhat low for a telephone survey of low-income efficiency program participants. As shown in the equation below, this response rate includes all samples made available to interviewers, including numbers that were never dialed, as part of the potentially valid base. Excluding numbers that were never actually dialed would produce a response rate more typical for this type of survey of 12.0%.

⁴ The sample for the 2015 participant survey was based on the initial extract of 87,488 customers from the HAP and ACP participant database, supplied in March of 2015. Final participant counts provided throughout this report are based on several updated extracts from the HAP and ACP participant database.

Table 4-2. Survey Dispositions and Response Rate Inputs

Disposition	Value
Complete (I)	58
Completed interviews	58
Eligible incomplete interview (N)	6
Callback to complete	3
Mid-interview terminate - DO NOT CALLBACK	3
Household with undetermined survey eligibility (UH)	811
Not dialed	761
No answer	43
Busy	3
Call blocked	4
Undetermined if a household (U0)	379
Answering machine	233
Not available	84
Refusal	20
Language problems	2
Respondent scheduled appointment	19
Non-specific callback	20
Not available callback	1
Survey-ineligible household (X1)	0
Not a household (X2)	115
Disconnected phone	91

Business phone	12
Computer tone	2
Wrong number	10
Total	1,369

The response rate was calculated using the standards and formulas set forth by the American Association for Public Opinion Research (AAPOR),⁵ specifically, AAPOR Response Rate 3 (RR3). RR3 includes an estimate of eligibility for these unknown sample units. The formula used to calculate RR3 is presented below:

$$RR3 = I / ((I + N) + e_1(UH + e_2 \times UO))$$

- e_1 = $(I + N) / (I + N + X1)$
- e_2 = $(I + N + X1 + U1) / (I + N + X1 + U1 + X2)$
- I = Completed interview
- N = Eligible incomplete interview
- UH = Household with undetermined survey eligibility
- UO = Undetermined if a household
- $X1$ = Survey-ineligible household
- $X2$ = Not a household

4.2 Results

The following subsections discuss the results of the various components of the 2015 process evaluation.

4.2.1 Communities Served

The number of First Nations communities served by the ACP decreased by one, from 17 in 2014 to 16 in 2015, as shown in Table 4-3. By the end of the 2015 program year, residents of 36% of the 126 First Nations communities in Ontario had the opportunity to participate in the ACP.

Table 4-3. ACP Participation Year over Year

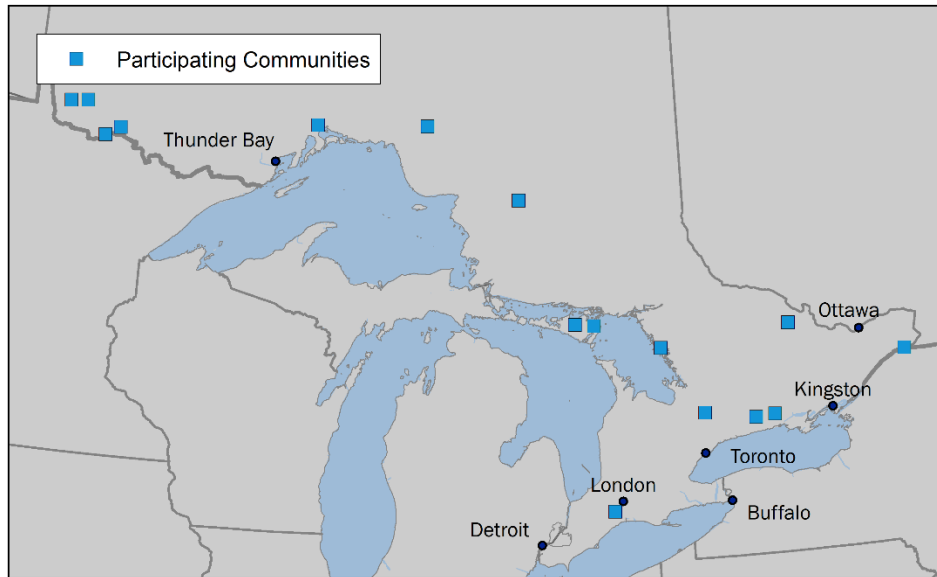
Program Year	Calendar Year	Number of Communities (total = 126)*	Percent per Year	Cumulative Percent of Communities Reached
1	2013	12	10%	10%
2	2014	17	13%	23%
3	2015	16	13%	36%

* Source: Interview with ACP implementation contractor FNESL, on July 7, 2015.

⁵ AAPOR. *Standard Definitions: Final Dispositions of Case Codes and Outcome Rates for Surveys*, 2009. http://www.aapor.org/Standard_Definitions/1818.htm.

Figure 4-1 shows the 16 communities served by the ACP in 2015. The communities are distributed throughout the province and many are located far from population centers. The distances between communities and the distance from population centers pose logistical challenges unique to the ACP.

Figure 4-1. 2015 Participating ACP Communities



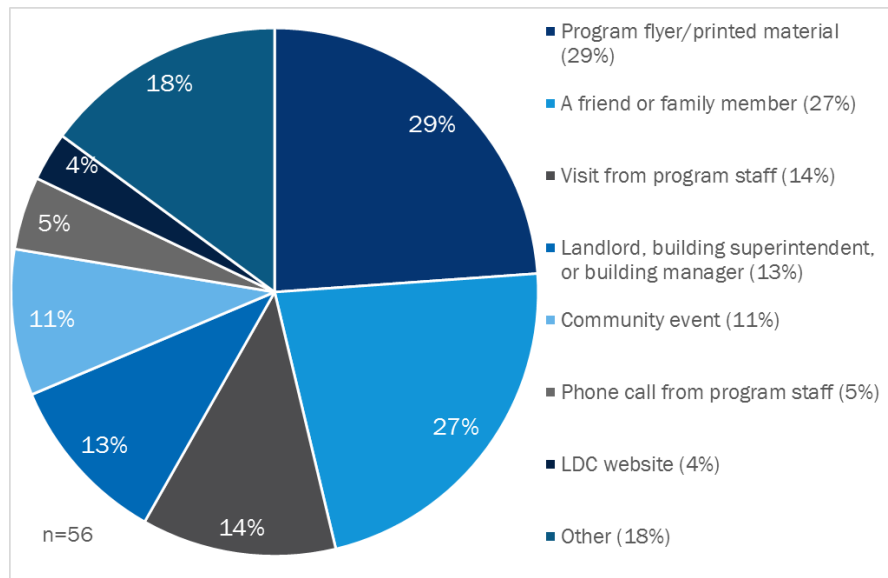
4.2.2 Program Participation and Marketing

Program participation increased by 41% from 2014 to 2015 (from 1,125 to 1,586), and the program provided more units of every individual measure. In particular, the number of window air conditioners, dehumidifiers, refrigerators, and freezers provided by the program increased by more than 200% from 2014 to 2015 respectively.

In the 2015 participant survey, respondents were asked both how they first heard about the ACP (Figure 4-2) and how they signed up for the program (Figure 4-3). Printed materials (29%) and word of mouth (27%) are the most common sources of awareness among ACP participants. When it came time to sign up for the program, most (60%) of program participants reported that they submitted a paper application. Program staff also played a significant role in catalyzing participation, by either informing them in person or by telephone or helping participants sign up (39%).

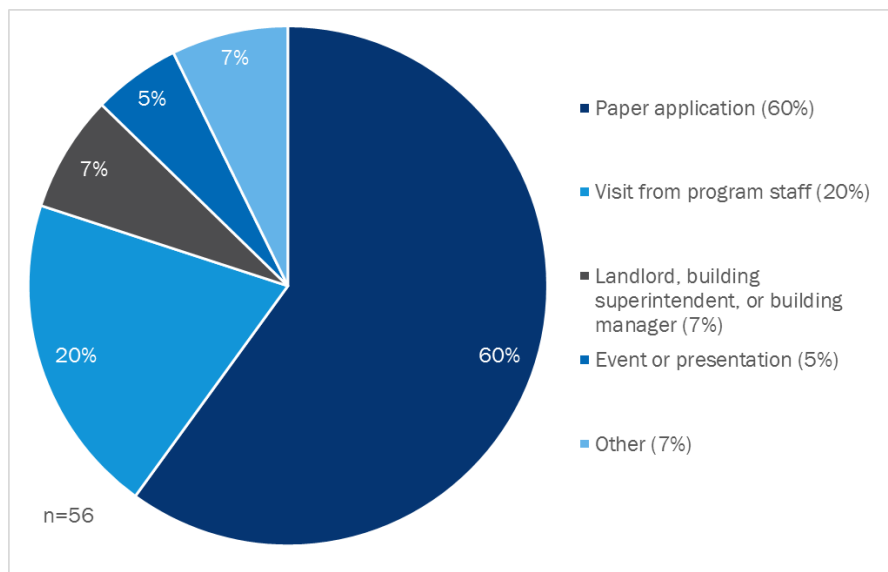
Web-based resources were not often utilized. Only 4% of customers learned about the program from the LDC website, and even fewer signed up online.

Figure 4-2. How Participants Heard about the Program



* “Other” includes respondents who heard about the program by calling their hydro provider, by email, or on the radio.

Figure 4-3. How Participants Signed Up for the Program



4.2.3 Measure Satisfaction

Overall measure satisfaction was very high. On a 1 to 7 scale, with 1 being “extremely dissatisfied” and 7 representing “extremely satisfied,” the mean rating provided for installed measures was 6.3. Satisfaction with individual measures did vary slightly, but was no lower than 5.6 out of 7 or each. We found that thermostats (64%) and aerators/shower heads (65%) were the measures with the lowest percentage of

satisfaction.⁶ These measures were also the only ones to have a mean rating of less than 6. Insulation/air sealing, hot water tank/pipe wrap, and power bars received the highest mean ratings. Table 4-4 provides mean satisfaction ratings for each measure group.

Table 4-4. Mean Satisfaction with Measures among Participants

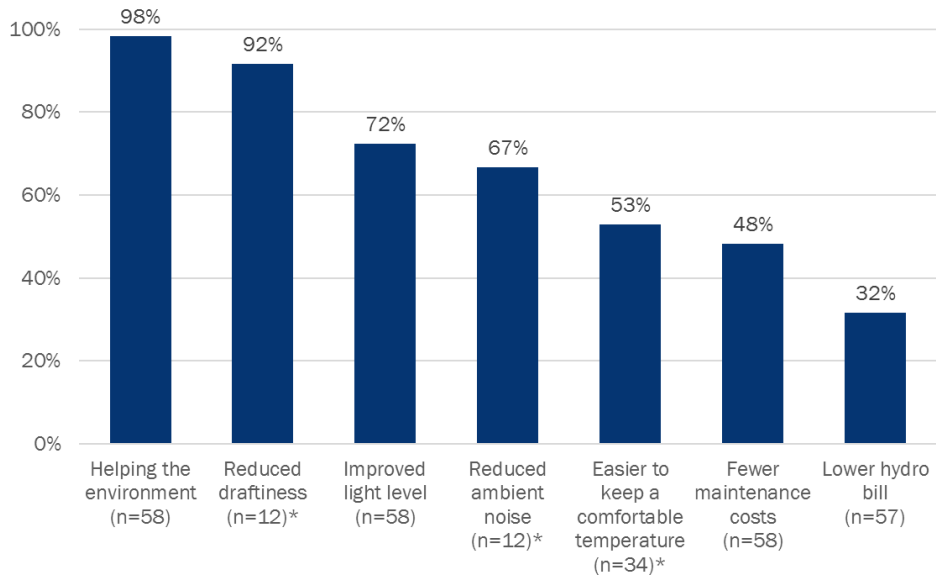
Measure	% of Participants with Measure	Mean Satisfaction	n
Hot Water Tank/Pipe Wrap	14%	6.75	8
Power Bar	55%	6.63	32
Insulation/Air Sealing	21%	6.58	12
Dehumidifier	17%	6.50	10
Window Air Conditioner	17%	6.40	10
Refrigerator/Freezer	74%	6.28	43
CFL	79%	6.17	46
Block Heater Timer	33%	6.16	19
Aerator/Shower Head	64%	5.97	37
Thermostat	19%	5.64	11

4.2.4 Non-Energy Benefits of Participation

Participants in the ACP experienced a number of benefits in addition to energy savings. Nearly all respondents reported that they felt that they were doing something good for the environment (98%), and many noticed improvements to the light level in their home (72%). Nearly half reported having fewer maintenance costs (48%), and nearly a third of customers noticed a reduction in their electric bills (32%). Customers who received insulation reported that their home was less drafty (92%) and quieter (67%), and more than half (53%) of customers who received weatherization measures or window air conditioners said that it had become easier to maintain a comfortable temperature in their home. Figure 4-4 includes a breakdown of reported non-energy benefits.

⁶ Customers who rated their satisfaction with the measure at a 6 or 7 on a 1-7 scale, where 1 represents “extremely dissatisfied” and 7 represents “extremely satisfied,” are considered to be highly satisfied.

Figure 4-4. Non-Energy Benefits Experienced by ACP Participants



* Asked only of those who received relevant measure (e.g., window AC and/or insulation)

4.2.5 Educational Component

One of the goals of the 2015 process evaluation was to assess the potential behavioural change resulting from the program’s educational component. Our analysis confirmed that nearly three-quarters of program participants received some form of education through the program, primarily in the form of a discussion between the participant and the program representative: 71% percent of participants stated that the representative discussed energy-saving tips with them, and 40% reported receiving leave-behind materials.

Most survey respondents (74%) noted that they had received some form of education through the program. That is, they discussed energy efficiency with the program representative or received leave-behind educational materials. However, only 29% of all respondents received the “full educational component,” including discussion of energy efficiency with program staff, receipt of educational leave-behind materials, and verbal explanation of the materials.

In an effort to see if the ACP’s educational component drove customers to take additional energy-saving actions, we asked respondents about appliances in their home, and whether or not they had activated the energy-saving settings. Only 24% of respondents had activated the settings, of which only 10% did so after participating in the ACP. Only those respondents who reported receiving some form of education said that they activated the energy-saving settings on their appliances after participating in the ACP. Because 5% or fewer respondents reported changing settings following program participation, the evaluation team determined that the attributable savings were negligible, especially after accounting for degree of reported program influence.

4.3 Recommendations

The evaluation team provides recommendations below based on the findings discussed in Section 4.2.

- **Provide consistent information and educational materials to all participants to maximize the ACP's behavioural impact.**

Most participants reported receiving some form of educational information—either verbal or written—in 2015, but most did not recall receiving both. Research conducted as part of the HAP evaluations in 2014 and 2015 indicates that comprehensive (including both written and verbal materials) and consistent educational offerings can result in behaviour change and produce measureable program-attributable savings.

- **Provide all participants with clear explanations of the measures they receive, and emphasize verification of air conditioning unit installation.**

Our research on measure-specific ISRs found that few participants recalled receiving and installing certain measures, most notably block heater timers and window air conditioners. Many participants reportedly provided block heater timers denied receipt, indicating that they did not receive the measure, were not made aware of the measure upon its delivery, or had forgotten that they received the measure. Additionally, fewer than half of those who reported receiving a block heater timer confirmed that it was installed and programmed. While participants confirmed that they received all air conditioners, fewer than one-third reported that units were installed, pointing to a possible issue with the service hired to deliver and install them. Clear explanation of equipment and confirmation of participant interest, along with verification of installation for extended measures, should improve ISRs.

- **As part of the application, obtain permission from participants to provide their electric billing data to program evaluators.**

These data will allow evaluators to more accurately estimate program energy savings by analyzing electricity usage data before and after program participation for the purpose of estimating program energy savings through billing analyses.

Appendix A. Measures and Measure Categories

Measure Number	Measure Category	Simplified Measure Name	ACP Measure
1	Lighting	Screw-in CFL	ENERGY STAR qualified CFL twister (60w)
3	Lighting	Screw-in CFL	ENERGY STAR qualified CFL twister (100w)
9	Block Heater Timer	Block Heater Timer	Block Heater Timer (just timer)
10	Power Bar	Power Bar	Power Bar with integrated timer
11	Hot Water	Hot Water Tank/Pipe Insulation	Hot Water Tank Pipe Insulation - ½" (per foot)
13	Hot Water	Hot Water Tank/Pipe Insulation	Hot Water Tank Insulation - Fiberglass R10
14	Hot Water	Efficient Shower Head/ Faucet Aerator	Efficient Shower Head (standard) < 4.8 L/min
15	Hot Water	Efficient Shower Head/ Faucet Aerator	Efficient Shower Head (hand-held) < 4.8 L/min
16	Hot Water	Efficient Shower Head/ Faucet Aerator	Low-Flow Aerator (kitchen) < 5.7 L/min
17	Hot Water	Efficient Shower Head/ Faucet Aerator	Low-Flow Aerator (bathroom) < 3.8 L/min
18	Refrigerator/Freezer	Refrigerator	Refrigerator Replacement (ENERGY STAR Qualified 15.5–16.9 cu. ft.)
19	Refrigerator/Freezer	Refrigerator	Refrigerator Replacement (ENERGY STAR Qualified 17.0–18.4 cu. ft.)
21	Refrigerator/Freezer	Freezer	Freezer Replacement (ENERGY STAR Qualified 12.0–14.4 cu. ft.)
22	Refrigerator/Freezer	Freezer	Freezer Replacement (ENERGY STAR Qualified 14.5–16.0 cu. ft.)
23	Air Conditioning	Window Air Conditioner	Window Air Conditioner Replacement (ENERGY STAR qualified 6,000–7,999 BTU/hr)
24	Air Conditioning	Window Air Conditioner	Window Air Conditioner Replacement (ENERGY STAR qualified 8,000–9,999 BTU/hr)
25	Air Conditioning	Window Air Conditioner	Window Air Conditioner Replacement (ENERGY STAR qualified 10,000–12,000 BTU/hr)
26	Air Conditioning	Dehumidifier	Dehumidifier Replacement (ENERGY STAR qualified 14.2–21.2 L/day)
28	Air Conditioning	Dehumidifier	Dehumidifier Replacement (ENERGY STAR qualified 25.5–35.5 L/day)
29	Programmable Thermostat	Programmable Thermostat	Programmable Thermostat – Line Voltage
30	Programmable Thermostat	Programmable Thermostat	Programmable Thermostat – Low Voltage
31	Weatherization	Weatherization Measure	Comprehensive Draft Proofing

32	Weatherization	Weatherization Measure	Attic Insulation
33	Weatherization	Weatherization Measure	Wall Insulation
34	Weatherization	Weatherization Measure	Basement Insulation

Appendix B. Verified Savings by Measure

ACP Measure	kW	kWh	Unique Participants	Measure Quantity
Attic Insulation (Per Linear Foot)	162	409,831	424	399,629
Basement Insulation (Per Linear Foot)	105	266,169	76	48,146
Block Heater Timer (Just Timer)	0	83,188	1,182	1,182
Comprehensive Draft Proofing (Per Linear Foot)	54	136,972	216	29,444
Dehumidifier Replacement (ENERGY STAR Qualified 14.2–21.2 L/day)	13	43,868	223	223
Dehumidifier Replacement (ENERGY STAR Qualified 25.5–35.5 L/day)	2	5,422	29	29
Efficient Aerator (Bathroom) < 3.8 L/min	3	25,228	652	731
Efficient Aerator (Kitchen) < 5.7 L/min	6	53,419	812	813
Efficient Shower Head (Hand-held) < 4.8 L/min	9	70,269	435	440
Efficient Shower Head (Standard) < 4.8 L/min	11	93,107	570	583
ENERGY STAR Qualified CFL Twister (100W)	10	195,331	851	3,992
ENERGY STAR Qualified CFL Twister (60W)	33	639,186	1,171	16,176
Freezer Replacement (ENERGY STAR Qualified 12.0–14.4 cu. ft.)	18	134,601	286	286
Freezer Replacement (ENERGY STAR Qualified 14.5–16.0 cu. ft.)	29	212,598	366	366
Hot Water Tank Insulation - Fiberglass R10	2	19,455	108	108
Hot Water Tank Pipe Insulation - ½" (Per Linear Foot)	5	41,152	328	3,000
Power Bar with Integrated Timer	3	64,707	1,174	1,175
Programmable Thermostat - Line Voltage	0	99,708	411	1,760
Programmable Thermostat - Low Voltage	1	86,602	48	48
Refrigerator Replacement (ENERGY STAR Qualified 15.5–16.9 cu. ft.)	38	299,339	339	339
Refrigerator Replacement (ENERGY STAR Qualified 17.0–18.4 cu. ft.)	73	569,754	616	616
Wall Insulation (Per Linear Foot)	21	53,158	143	18,349
Window Air Conditioner Replacement (ENERGY STAR Qualified 10,000–12,000 BTU/hr)	8	7,674	131	131
Window Air Conditioner Replacement (ENERGY STAR Qualified 6,000–7,999 BTU/hr)	3	2,348	63	63
Window Air Conditioner Replacement (ENERGY STAR Qualified 8,000–9,999 BTU/hr)	15	14,138	295	295

Appendix C. Program Staff Interview Guides

Low Income Initiative/ACP FNESL Interview Guide FINAL – January 2016

Purpose

This interview guide will be used to support the process evaluation of the Aboriginal Conservation Program (ACP). The interviews will be conducted by telephone by Opinion Dynamics staff. We will complete in-depth interviews with FNESL managers implementing the program.

These interviews will serve four primary purposes:

- (1) to develop an understanding of goals and delivery strategies used to gain participation and the staff and stakeholders' perspective on the effectiveness of each strategy
- (2) to better understand the implementation and effectiveness of participant outreach and education component of the Initiative
- (3) to better understand the flow of tracking data, quality assurance procedures, and audit process and documentation
- (4) to identify potential alternative program offerings and implementation strategies

Background

1. Have either of your roles changed since we last spoke? (IF YES) Does that affect how you interact with the ACP? Did this/these change(s) take affect during the 2015 program year?
2. How many communities did you do in 2015?
 - a. Did you have any of the same difficulties serving extremely remote communities in 2015?

Organization Relationships

3. We understand things are changing in 2016, but did anything change with how you interact with Hydro One or the IESO in 2015?
 - a. How do you anticipate this will change this year and moving forward?
4. Did you worked with the gas utilities to deliver the ACP in 2015?
 - a. How will this change moving forward?

Program Marketing/Outreach

5. Has anything changed with how you recruit participants?

6. Do you have any marketing materials that you provide to participants, either when they sign-up or provided during the energy assessment?
7. Will the standard education or training component of the program change at all in 2016?
8. Has there been any request for additional measure types? Specify. Are any additional measures or incentives being considered, or a restructuring of existing ones?

Conclusion

9. Are there specific questions, or research areas, that you think might be worth looking into during the 2015 evaluation? What would be most valuable?
10. Also, as we mentioned, we will be doing a participant survey. We'd like to get the list of staff that were involved in delivering the program to each community. Is that something that you would be able to share with us?

ACP—Project Lead Discussion Points

The purpose of this guide is to introduce the 2015 ACP Program Evaluation to the group of Project Leads contracted with by First Nations Engineering Services Ltd. (FNESL) to assist in the implementation of the Aboriginal Conservation Program (ACP). The goal of these introductory conversations is to familiarize the 2015 ACP project leads with the Opinion Dynamics in an effort to leverage their existing relationships with program participants to improve response rates for the 2015 participant survey.

- Help the program improve and serve more people
- Confidential
- Participant survey
- Independent Evaluator
- Advice on how best to reach participants

Appendix D. Participant Survey

IESO Low Income Initiative/Aboriginal Conservation Program Participant Survey FINAL – April 2016

SAMPLE FIELDS

NAME: Customer name

LDC: Local distribution company

MEAS: The measure the customer received, per the program tracking data

QTY_A-L: Quantity listed in the program tracking data specific to each measure

Introduction

Hello, my name is ____ and I'm calling from Opinion Dynamics, an independent research company. May I please speak with <NAME> or whoever in your household is the most familiar with the free energy upgrades you received during a recent energy audit?

We're speaking with customers who have received free energy upgrades from First Nations Engineering Services Limited to learn about their experience and satisfaction with the program. This is not a sales call, and all of your responses will be kept confidential.

[IF NEEDED: During this audit a contractor would have come into your home and installed free upgrades, such as CFL light bulbs, insulation, or other appliances]

[IF THE PERSON WHO RECEIVED THE AUDIT IS NO LONGER THERE, THANK AND TERMINATE]. Is now a convenient time to speak with you? [IF NEEDED: THIS SURVEY USUALLY TAKES ABOUT 15 MINUTES.] [IF NO, SCHEDULE A CALLBACK TIME.]

Screener

- C1. Are you currently talking to me on a regular landline phone or a cell phone?
1. (Regular landline phone)
 2. (Cell Phone)
 8. (Don't know)
 9. (Refused)

[ASK IF C1 = 2, 8, 9; ELSE GO TO CV1]

- C2. Are you currently in a place where you can talk safely and answer my questions?
1. (Yes)
 2. (No) [Schedule call back]
 8. (Don't know) [Schedule call back]
 9. (Refused) [Schedule call back]

Customer Verification

CV1. According to our records, your household received a free energy efficiency audit, where one or two program representatives assessed your home's energy use, talked to you about ways to save energy, and gave you energy saving products to help save energy in your home. Is that correct?

1. (Yes)
2. (No)
3. (No, I'm the Property Manager, Building Manager, or Landlord) [THANK AND TERMINATE]
8. (Don't know)
9. (Refused) [THANK AND TERMINATE]

[ASK IF CV1 = 2 OR 8]

CV2. Is it possible that someone else in your home was present when the program representatives installed the energy saving products?

1. (Yes)
2. (No) [THANK AND TERMINATE]
8. (Don't know) [THANK AND TERMINATE]
9. (Refused) [THANK AND TERMINATE]

[ASK IF CV2 = 1]

CV3. Is that person available at this time to speak about the energy upgrades that were installed?

1. (Yes) [IF YES, ASK TO SPEAK TO THAT PERSON]
2. (No) [IF NO, ASK FOR NAME/PHONE OF THAT CONTACT, SCHEDULE CALLBACK]
8. (Don't know) [THANK AND TERMINATE]
9. (Refused) [THANK AND TERMINATE]

Program Participation

First, I would like to ask you about your participation in the program.

P1. Did you hear about the program through... [MULTIPLE RESPONSE; UP TO 3, READ EACH]

01. <LDC>'s website
02. A telephone call from program staff
03. A community event or seminar
04. My landlord, building superintendent, or building manager
05. Someone coming to your door
06. A program flyer or any other printed material
07. A friend or family member told you
00. (Other, specify)
98. (Don't know)
99. (Refused)

[ASK IF P1 <> 98]

P2. Which of the following best describes how you signed up for the program? [READ EACH]

01. You filled out a paper application
02. You signed up at an event or presentation
03. You signed up online
04. A member of the program staff visited your home
05. Landlord, building manager, or building superintendent signed you up
00. (Other, specify)
98. (Don't know)
99. (Refused)

Measure Verification

[CFL DESCRIPTION: Compact fluorescent light bulbs, or CFLs usually do not look like regular incandescent light bulbs. The most common type of CFL is made with a glass tube bent into a spiral, resembling soft-serve ice cream, and fits in a regular light bulb socket.]

[FAUCET AERATOR/SHOWERHEAD DESCRIPTION: Faucet aerators are small devices that fit on the end of a sink faucet. Efficient showerheads replace less efficient showerheads. Both devices change the flow-rate of water to help reduce the amount of water and energy used in your home.]

[DEHUMIDIFIER DESCRIPTION: A dehumidifier is a piece of equipment that plugs into the wall and removes moisture from the air. It typically has a tank that gets filled with water and will need to be emptied periodically.]

[PROGRAMMABLE THERMOSTAT DESCRIPTION: The program sometimes provides digital thermostats that can be programmed to adjust the temperature in your home automatically throughout the day. These devices are usually small, will have a digital display, and will replace an older traditional dial thermostat.]

[POWER BAR DESCRIPTION: The program may offer a timer-controlled power bar that has four timer-controlled outlets and four switch controlled outlets. Whatever is plugged into an outlet controlled by the timer will be turned off when the timer is set to go off.]

[BLOCK HEATER TIMER DESCRIPTION: The program may offer a timer-controlled block heater for warming your car engine in extremely cold weather.]

[WINDOW AC DESCRIPTION: A window air conditioning unit usually sits in an open window in the summer months and typically can cool a single room or a small space.]

[REFRIGERATOR/FREEZER DESCRIPTION: The program may offer an efficient refrigerator and/or freezer, in place of an existing less efficient model.]

[HOT WATER TANK OR PIPE WRAP DESCRIPTION: The program offers insulation for your hot water tank and the pipes that move hot water to the rest of your home.]

[INSULATION OR AIR SEALING DESCRIPTION: The program sometimes provides additional insulation, which is typically installed in either the basement or the attic. Also, the program sometimes helps limit the draftiness of a home by sealing holes and cracks.]

Measure Delivery

V1. Now I would like to ask you some questions about the free energy efficiency upgrades that the program representative installed in your home. To start, I'd like to confirm some information in the <LDC>'s database. Our records show you received the following. Is this correct? [ROTATE]

- a. [ASK IF QTY_A>0] <QTY_A> CFL(s)
[1=YES, 2=Yes, different number, 3=NO, none, 8=DON'T KNOW, 9=REFUSED]
- c. [ASK IF QTY_C>0] <QTY_C> faucet aerator(s) or efficient showerhead(s)
[1=YES, 2=Yes, different number, 3=NO, none, 8=DON'T KNOW, 9=REFUSED]
- d. [ASK IF QTY_D>0] <QTY_D> dehumidifier(s)
[1=YES, 2=Yes, different number, 3=NO, none, 8=DON'T KNOW, 9=REFUSED]
- e. [ASK IF QTY_E>0] <QTY_E> programmable thermostat(s)
[1=YES, 2=Yes, different number, 3=NO, none, 8=DON'T KNOW, 9=REFUSED]
- f. [ASK IF QTY_F>0] <QTY_F> power bar(s)
[1=YES, 2=Yes, different number, 3=NO, none, 8=DON'T KNOW, 9=REFUSED]
- g. [ASK IF QTY_G>0] A block heater timer
[1=YES, 2=NO, 8=DON'T KNOW, 9=REFUSED]
- h. [ASK IF QTY_H>0] A window air conditioning unit
[1=YES, 2=NO, 8=DON'T KNOW, 9=REFUSED]
- i. [ASK IF QTY_I>0] A refrigerator and/or freezer
[1=YES, 2=NO, 8=DON'T KNOW, 9=REFUSED]
- k. [ASK IF QTY_K>0] Hot water tank or pipe wrap
[1=YES, 2=NO, 8=DON'T KNOW, 9=REFUSED]
- l. [ASK IF QTY_L>0] Insulation or air sealing
[1=YES, 2=NO, 8=DON'T KNOW, 9=REFUSED]

[For each V1X=3 (measures A to F), 2 (measures G to L), 8]:

- V2X. You said you [IF V1X=3 (A-F), 2 (G-L) "didn't receive <MEAS>", IF V1X=8, "don't know if you received <MEAS>"]. [READ MEAS DESCRIPTION]. Does that sound like something that you received through the program?
- 1. (Yes)
 - 2. (No)
 - 8. (Don't know)
 - 9. (Refused)

[For each V1X=2 or V2X=1 (measures A to F)]:

- V3X How many <MEAS> did you receive?
[NUMERIC 1-100]
- 8 (Don't know)
 - 9. (Refused)

For each measure X (measures A to F):

GEN V_QTY_X=QTY_X IF V1X=1
GEN V_QTY_X=V3X IF V3X=1-100
OTHERWISE SET V_QTY_X=0

For each measure X (measures G to L):

GEN V_QTY_X = 1 IF V1X=1 OR V2X=1
OTHERWISE SET V_QTY_X=0

[THANK AND TERMINATE IF ALL V_QTY_X = 0]

Measure Installation (Program Rep)

[For each measure X (measures A to H)]:

[ASK V4X IF V_QTY_X > 0]

V4X. Did the program representative install the <V_QTY_X> <MEAS>(s) you received through the program?

1. (Yes - All)
2. (Yes - Some)
3. (No - None)
- 8 (Don't know)
9. (Refused)

[For each measure X (measures A to H)]:

[ASK IF V4X=2]

V5X. How many of the <V_QTY_X> <MEAS>(s) did the program representative install? [DO NOT ALLOW ZERO; INSTEAD, RETURN TO V4X AND SELECT NONE]

[NUMERIC 1 - V_QTY_X]

998. (Don't know)
999. (Refused)

GEN PROG_QTY_X = V_QTY_X IF V4X = 1
GEN PROG_QTY_X = V5X IF V5X = 1-100
OTHERWISE SET PROG_QTY_X = 0

GEN REM_QTY_X = V_QTY_X - PROG_QTY_X

Measure Installation (Self)

[For each measure X (measures A to H)]:

[ASK IF V4X=2,3,8,9]

V6X. Did you or someone else in your home install the [READ IF V4X=2: "remaining"] <REM_QTY_X> <MEAS>(s) you received through the program?

1. (Yes - All)
2. (Yes - Some)

- 3. (No – None)
- 8 (Don't know)
- 9. (Refused)

[ASK IF V6X=2]

V7X. How many of the <MEAS>(s) did you install? [DO NOT ALLOW ZERO; INSTEAD, RETURN TO V6X AND SELECT NONE]

[NUMERIC OPEN END 1- <REM_QTY_X>]

- 998. Don't know
- 999. Refused

GEN SELF_QTY_X = REM_QTY_X IF V6X = 1
GEN SELF_QTY_X = V7X IF V7X = 1-100
OTHERWISE SET SELF_QTY_X = 0

GEN INST_QTY_X = PROG_QTY_X + SELF_QTY_X

[For each measure X (measures E,G)]:

V8X. [IF INST_QTY_X > 1 READ: "Have"] [IF INST_QTY_X = 1 READ: "Has"] the <MEAS> been programmed? [IF NEEDED, "by program, I mean did you set up your <MEAS> to automatically adjust at different times of the day and night]

- 1. (Yes)
- 2. (No)
- 8 (Don't know)
- 9. (Refused)

Measure Persistence

[For each measure X (measures A,B,C,E,F)]:

[ASK V9X IF INST_QTY_X > 0]

V9X. [IF INST_QTY_X=1 READ: "Is the <MEAS>"] [IF INST_QTY_X>1, "Are the <MEAS>s"] you received through the program still installed?

- 1. (Yes – All)
- 2. (Yes – Some)
- 3. (No – None)
- 8 (Don't know)
- 9. (Refused)

[ASK IF V9X=2]

V10X. How many of the <MEAS>s are still installed?

[NUMERIC 1 - INST_QTY_X]

- 998. Don't know
- 999. Refused

GEN CUR_INST_X = INST_QTY_X IF V9X=1
GEN CUR_INST_X = 0 IF V9X=3
GEN CUR_INST_X = V10X IF V10X=1 -100

[ASK IF V9X=2,3]

V11X. Why did you decide to remove the [MEAS] you received through the program?
[OPEN ENDED RESPONSE]

Measure Satisfaction

V12X. On a scale from 1 to 7, where 1 is “extremely dissatisfied” and 7 is “extremely satisfied”, how would you rate your overall satisfaction with the <MEAS> you received? [1-7, 8=DON'T KNOW, 9=REFUSED]

[ASK IF V12X=1,2,6,7]

V13X. Why did you give this rating?

- 00. [OPEN END]
- 98. (Don't know)
- 99. (Refused)

Education

E1. On a scale from 1 to 7, where 1 is “not at all knowledgeable” and 7 is “very knowledgeable,” how would you rate your knowledge of ways to reduce your home’s energy use **BEFORE** you participated in the program? [1-7, 98=DON'T KNOW, 99=REFUSED]

E2. Did the program representative discuss energy efficiency, and ways you could save energy in your home?

- 1. (Yes)
- 2. (No)
- 8. (Don't know)
- 9. (Refused)

E4. Did they leave behind any written materials with recommendations on ways to save energy? (PROBE FOR EDUCATIONAL MATERIALS RECEIVED. INSTRUCTIONS FOR EQUIPMENT SHOULD BE CODED AS “NO.”)

- 1. (Yes)
- 2. (No)
- 8. (Don't know)
- 9. (Refused)

[ASK IF E4=1, ELSE SKIP TO E8]

E5. Did they discuss the recommendations in the written materials with you?

- 1. (Yes)
- 2. (No)
- 8. (Don't know)
- 9. (Refused)

[ASK IF E5=1]

E5a. Was any of this information new to you?

- 1. (Yes)

- 2. (No)
- 8. (Don't know)
- 9. (Refused)

[ASK IF E5a=1]

E5b. What information? [OPEN END]

- 98. (Don't know)
- 99. (Refused)

E8. For each of the following statements regarding the impact of [IF E2=1 OR E4=1: "the information you received from the program representative"] [IF E2<>1 AND E4<>1: "your participation in this program"] on your understanding of your energy use.

A. Since participating in the program, I have a better idea of how to lower my energy use. Do you strongly disagree, somewhat disagree, somewhat agree, strongly agree or are neutral?

- 1. Strongly disagree
- 2. Somewhat disagree
- 3. Neutral
- 4. Somewhat agree
- 5. Strongly agree
- 8. (Don't Know)
- 9. (Refused)

B. Since participating in the program, I feel like I have more control of my energy use. Do you strongly disagree, somewhat disagree, somewhat agree, strongly agree or are neutral?

- 1. Strongly disagree
- 2. Somewhat disagree
- 3. Neutral
- 4. Somewhat agree
- 5. Strongly agree
- 8. (Don't Know)
- 9. (Refused)

Behavior Change

B1. Which of the following devices do you have in your home?

- A. A television? [1 = YES, 2 = NO, 8 = DON'T KNOW, 9 = REFUSED]
- B. A computer? [1 = YES, 2 = NO, 8 = DON'T KNOW, 9 = REFUSED]
- C. A dishwasher? [1 = YES, 2 = NO, 8 = DON'T KNOW, 9 = REFUSED]
- D. A clothes washer? [1 = YES, 2 = NO, 8 = DON'T KNOW, 9 = REFUSED]
- E. An electric clothes dryer? [1 = YES, 2 = NO, 8 = DON'T KNOW, 9 = REFUSED]
- F. An electric hot water heater?

B2. Many appliances and devices like the ones I just mentioned may have energy saving settings on them that can be manually activated. Since participating in the program, have you or has someone in your household activated energy savings settings on any of your appliances?

[1 = YES, 2 = NO, 8 = DON'T KNOW, 9 = REFUSED]

[ASK IF B2 = 1]

B2A. Just to confirm, did you activate those energy-saving settings **AFTER** participating in the program?

[1 = YES, 2 = NO, 8 = DON'T KNOW, 9 = REFUSED]

B3. Did you...?

[ASK IF B1A=1 & B2A=1]

A. Turn on your energy-saving setting on your TV? [1=YES, 2=NO, 8=DON'T KNOW, 9=REFUSED]

[ASK IF B1B =1 & B2A=1]

B. Turn you computer on "power-saving mode"?[1=YES, 2=NO, 8=DON'T KNOW, 9=REFUSED]

[ASK IF B1C =1 & B2A=1]

C. Turn off the "heated dry" setting on your dishwasher? [1=YES, 2=NO, 8=DON'T KNOW, 9=REFUSED]

[ASK IF B1D=1 & B2A=1]

D. Regularly wash your clothes in cold water?[1=YES, 2=NO, 8=DON'T KNOW, 9=REFUSED]

[ASK IF B1E=1 & B2A=1]

E. Regularly air-dry clothing? [1 = YES, 2 = NO, 8 = DON'T KNOW, 9 = REFUSED]

[ASK IF B1F=1 & B2A=1]

F. Turn the temperature down on your hot water tank? [1=YES, 2=NO, 8=DON'T KNOW, 9=REFUSED]

[ASK IF B2A=1]

G. Activate energy-saving settings on any other appliances? [1=YES, 2=NO, 8=DON'T KNOW, 9=REFUSED]

[ASK IF B3G=1]

B4. What other appliances did you activate energy-saving settings on? [OPEN END]

[ASK IF B2A = 1]

B5. On a scale from 1 to 7, where 1 is "not influential at all" and 7 is "extremely influential" how would you rate the influence of the program on your decision to activate those energy savings settings? [IF NEEDED: PLEASE CONSIDER ALL OF THE ENERGY SAVINGS SETTINGS YOU JUST MENTIONED] [1-7, 8=DON'T KNOW, 9=REFUSED]

[ASK IF B2A = 1]

B6. On a scale from 1 to 7, where 1 is "not at all likely" and 7 is "extremely likely" what is the likelihood that you would activate those energy savings settings had the program not been available to you? [IF NEEDED: PLEASE CONSIDER ALL OF THE ENERGY SAVINGS SETTINGS YOU JUST MENTIONED] [1-7, 8=DON'T KNOW, 9=REFUSED]

B7. Since participating in the program, have you or has someone in your household taken any other energy saving actions that we have not yet discussed? [1 = YES, 2 = NO, 8 = DON'T KNOW, 9 = REFUSED]

[ASK IF B7 = 1]

B7A. What other actions have you taken to save energy in your home? [OPEN END]

[ASK IF B7 = 1]

B7B. Did you take any of those actions **BEFORE** participating in the program? [1 = YES, 2 = NO, 8 = DON'T KNOW, 9 = REFUSED]

[ASK IF B7B = 2]

B7C. On a scale from 1 to 7, where 1 is “not influential at all” and 7 is “extremely influential” how would you rate the influence of the program on your decision to take additional energy-saving actions? [1-7, 8=DON'T KNOW, 9=REFUSED]

[ASK IF B7B = 2]

B7D. On a scale from 1 to 7, where 1 is “not at all likely” and 7 is “extremely likely” what is the likelihood that you would have taken those additional energy-saving actions had the program not been available to you? [1-7, 8=DON'T KNOW, 9=REFUSED]

Non-Energy Benefits

[ASK IF V_QTY_E, H, OR L > 0]

NE1. Since the free upgrades were made to your home, would you say keeping a comfortable temperature in your home is...

1. Easier
2. Harder, or
3. The same as before the upgrades were installed
8. (Don't know)
9. (Refused)

NE2. In terms of the hydro that you use in your home, which of the following statements is more accurate:

01. You or someone in your household is responsible for paying the hydro bill
02. The cost of the hydro that you use is included in your rent or other fees
00. Other (Specify)
98. (Don't know)
99. (Refused)

[ASK IF NE2 = 2]

NE2A. Who pays the hydro bill? [OPEN END, RECORD RESPONSE]

[ASK IF NE2 = 1,2]

NE2B. Which of the following sentences best describes how your HYDRO bill has changed because of the free upgrades installed during your home energy audit? [WE'RE ONLY INTERESTED IN HYDRO BILL, NOT GAS OR OTHER TYPES OF ENERGY]

1. My hydro bill has stayed the same
2. My hydro bill has gone down
3. My hydro bill has gone up
8. (Don't know)
9. (Refused)

NE3. I am now going to read a list of some other potential benefits you may have noticed since participating in the program. Tell me which of the following are true... [ROTATE, Yes=1, NO=2, 8=Don't Know, 9= Refused]

- a) I like the light level in my home better
- b) I feel like I am doing something good for the environment
- c) [ASK IF V_QTY_L>0] My home is less drafty
- d) [ASK IF V_QTY_L>0] My home is quieter, I hear less noise from the outside
- e) I have fewer maintenance costs
- f) [FIXED POSITION] Are there any other benefits you have noticed [OPEN END]

[ASK IF ANY NE3a-f =1 OR NE1=1 OR NE2B=2]

NE6. Have you talked about any of these benefits with friends, family, or coworkers?

- 1. (Yes)
- 2. (No)
- 8. (Don't know)
- 9. (Refused)

Demographics

We're almost finished. I just have a few questions about your household for our analysis. All of your information will be kept confidential.

D1. Do you or someone in your household own this home or do you rent?

- 1. Own
- 2. Rent
- 3. (Other - Specify)
- 8. (Don't know)
- 9. (Refused)

D2. What type of residence do you live in? (LIST CATEGORIES)

- 1. Single-family
- 2. Duplex or two-family
- 3. Apartment/condo in a 2-4 unit building
- 4. Apartment/condo in a >4 unit building
- 5. Townhouse or row house (adjacent walls to another house)
- 6. Mobile home, house trailer
- 7. (Other, please specify)

D3. Approximately, when was this home first built? (READ LIST IF NEEDED)

- 01. (Before 1950)
- 02. (Between 1950 and 1959)
- 03. (Between 1960 and 1969)
- 04. (Between 1970 and 1978)

- 05. (Between 1979 and 1988)
- 06. (Between 1989 and 2001)
- 07. (Between 2002 and 2007)
- 08. (2008 or later)
- 98. (Don't Know)
- 99. (Refused)

D5. What type of fuel do you use primarily to heat your home? [\[IF NEEDED: Read list\]](#)

- 1. (Natural gas)
- 2. (Bottled, tank or LP gas)
- 3. (Hydro / Electricity)
- 4. (Oil, kerosene)
- 5. (Coal (coke))
- 6. (Wood)
- 7. (Solar)
- 00. (Other, specify)
- 96. (No fuel)
- 98. (Don't know)
- 99. (Refused)

D6. What type of fuel do you use to heat water in your home? [\[IF NEEDED: Read list\]](#)

- 1. (Natural gas)
- 2. (Bottled, tank or LP gas)
- 3. (Hydro / Electricity)
- 4. (Oil, kerosene)
- 5. (Solar)
- 00. (Other, specify)
- 96. (No fuel)
- 98. (Don't know)
- 99. (Refused)

- D8. Do you have a Central Air Conditioning System? [1=YES, 2=NO, 98 = DON'T KNOW, 99 = REFUSED]
- D9. How many bathrooms do you have in your home? [NUMERIC OPEN END 1-10, 98 = DON'T KNOW, 99 = REFUSED]
- D10. How many showers do you have in your home? [NUMERIC OPEN END 1-10, 98 = DON'T KNOW, 99 = REFUSED]
- D11. How many kitchen faucets do you have in your home? [NUMERIC OPEN END 1-10, 98 = DON'T KNOW, 99 = REFUSED]
- D12. Including yourself, how many people currently live in your home year-round?
_____ [RECORD NUMBER OF PEOPLE]
98. (Don't know)
99. (Refused)
- D13. How long have you lived in this home?
1. Less than 1 year
 2. 1-3 years
 3. 4-10 years
 4. 11-20 years
 5. More than 20 years
 8. (Don't know)
 9. (Refused)

Appendix E. Savings Assumptions

The following table shows the results of our review of program savings assumptions for both energy and demand savings.

#	Measure Description	Ex Post Per-unit Savings		Ex Ante Per-unit Savings		Realization Rate		Differences in Savings
		kWh/Unit	kW/Unit	kWh/Unit	kW/Unit	kWh	kW	
1	ENERGY STAR Qualified CFL Twister (60W)	46.14	0.002	46.00	0.002	100%	100%	<ul style="list-style-type: none"> Ex ante assumptions unknown Slight differences due to rounding
3	ENERGY STAR Qualified CFL Twister (100W)	57.14	0.003	74.00	0.004	77%	77%	<ul style="list-style-type: none"> Ex ante assumptions unknown Differences may be due to variations in assumed mix of halogen and incandescent baseline wattages
9	Block Heater Timer (Just Timer)	266.15	-	653.00	-	41%	N/A	<ul style="list-style-type: none"> Changed assumed average wattage from 1,500W to 500W. This decreases ex post savings Updated annual usage from 90 days/year to 106 days/year (number of days where temperatures fell below freezing). This increases ex post savings slightly
10	Power Bar With Integrated Timer	81.27	0.004	53.00	0.002	153%	153%	<ul style="list-style-type: none"> Ex ante assumptions unknown Used average of deemed savings assumptions from 10 different TRMs
11	Hot Water Tank Pipe Insulation - ½" (Per Linear Foot)	13.72	0.002	38.00	0.005	36%	36%	<ul style="list-style-type: none"> Ex ante is provided in units of per 3 feet (per meter) whereas ex post is provided in units of linear foot (the kWh RR is 1.08 and 1.62 for 1/2" and 3/4", respectively, when ex ante and ex post are compared in like units). Ex post uses ASHRAE Fundamentals and assumptions from the Illinois TRM to estimate savings.

#	Measure Description	Ex Post Per-unit Savings		Ex Ante Per-unit Savings		Realization Rate		Differences in Savings
		kWh/Unit	kW/Unit	kWh/Unit	kW/Unit	kWh	kW	
13	Hot Water Tank Blanket - Fiberglass R10 (Per Tank)	180.14	0.022	270.00	0.033	67%	66%	<ul style="list-style-type: none"> • Unable to identify variables contributing to differences in savings as two different methods were used between ex ante and ex post • Used the method outlined in the Illinois TRM
14	Efficient Showerheads (Standard) < 4.8 Lpm	194.63	0.024	377.00	0.046	52%	52%	<ul style="list-style-type: none"> • Ex ante assumptions unknown • Used PY2015 participant survey data to update the number of showerheads per household and percentage of participants with electric water heating
15	Efficient Showerhead (handheld) < 4.8 Lpm	194.63	0.024	377.00	0.046	52%	52%	<ul style="list-style-type: none"> • Used metering study data to update usage rate and mixed water temperature
16	Efficient Aerators (Kitchen) < 5.7 Lpm	80.07	0.010	140.00	0.017	57%	57%	<ul style="list-style-type: none"> • Ex ante assumptions unknown • Used PY2015 participant survey data to update the number of faucets per household and percentage of participants with electric water heating
17	Efficient Aerators (Bathroom) < 3.8 Lpm	42.06	0.005	79.94	0.010	53%	53%	<ul style="list-style-type: none"> • Used metering study data to update usage rate and mixed water temperature
18	Refrigerator Replacement (ENERGY STAR Qualified 15.5 - 16.9 cu ft)	899.06	0.115	675.00	0.086	133%	133%	<ul style="list-style-type: none"> • Ex ante assumptions unknown, however same ex ante deemed value applied regardless of refrigerator volume (cu. ft.)
19	Refrigerator Replacement (ENERGY STAR Qualified 17.0 - 18.4 cu ft)	941.74	0.120	675.00	0.086	140%	140%	<ul style="list-style-type: none"> • Used ENERGY STAR calculator to determine kWh consumption for efficient refrigerator based on volume • Used data from existing Appliance Recycling Program in Midwest US state and applied algorithm from the IN TRM V2.2 to determine the kWh consumption of the existing refrigerator based on volume

#	Measure Description	Ex Post Per-unit Savings		Ex Ante Per-unit Savings		Realization Rate		Differences in Savings
		kWh/Unit	kW/Unit	kWh/Unit	kW/Unit	kWh	kW	
21	Freezer Replacement (ENERGY STAR Qualified 12 - 14.4 cu ft)	479.19	0.065	633.00	0.086	76%	76%	<ul style="list-style-type: none"> Used ENERGY STAR calculator to determine kWh consumption for efficient freezer based on volume Used data from existing Appliance Recycling Program in Midwest US state and applied algorithm from the IN TRM V2.2 to determine the kWh consumption of the existing freezer based on volume
22	Freezer Replacement (ENERGY STAR Qualified 14.5 - 16.0 cu ft)	591.43	0.080	633.00	0.086	93%	93%	
23	Window Air Conditioner Replacement (ENERGY STAR Qualified 6,000 – 7,999 BTU/hr)	130.46	0.140	122.00	0.131	107%	107%	<ul style="list-style-type: none"> Ex ante assumptions unknown Applied average EFLHcool across Michigan, Minnesota, Ohio, and New York (EPA, 2002)
24	Window Air Conditioner Replacement (ENERGY STAR Qualified 8,000 – 9,999 BTU/hr)	167.74	0.180	154.00	0.165	109%	109%	
25	Window Air Conditioner Replacement (ENERGY STAR Qualified 10,000 – 12,000 BTU/hr)	205.03	0.220	195.00	0.209	105%	105%	
26	Dehumidifier Replacement (ENERGY STAR Qualified 14.2 - 21.2 l/day)	273.13	0.082	485.00	0.146	56%	56%	<ul style="list-style-type: none"> Increased energy usage per liter for baseline. This decreases ex post savings Increased energy usage per liter for ENERGY STAR model. This increases ex post savings slightly Increased annual hours of use. This increases ex post savings slightly
28	Dehumidifier Replacement (ENERGY STAR Qualified 25.5 - 35.5 l/day)	259.57	0.078	934.00	0.281	28%	28%	
29	Programmable Thermostat – Baseboard	63.15	0.000	63.00	0.000	100%	100%	<ul style="list-style-type: none"> No adjustment applied Slight differences due to rounding

		Ex Post Per-unit Savings		Ex Ante Per-unit Savings		Realization Rate		
#	Measure Description	kWh/Unit	kW/Unit	kWh/Unit	kW/Unit	kWh	kW	Differences in Savings
30	Programmable Thermostat – Electric Furnace	2,011.25	0.021	2,151.00	0.076	94%	28%	<ul style="list-style-type: none"> • Disallowed cooling savings for the portion of participants who do not have cooling based on PY2015 HAP participant survey data. This decreases ex post savings

Appendix F. Cost-Effectiveness Results

Opinion Dynamics calculated three cost-effectiveness metrics: the Program Administrator Cost (PAC) test, the Total Resource Cost (TRC) test, and the levelized cost of capacity and energy. The results incorporated avoided costs provided by the IESO for each season and time of use period with measure load shapes to obtain program benefits. The 2015 program expenditures, discount rate, inflation rate, and line losses provided by the IESO were used for this analysis.

Overall Cost-Effectiveness Results:

Benefit/Cost Ratios		Lifetime Levelized Cost	
PAC	TRC	(\$/MW)	(\$/MWh)
0.86	0.75	\$516,868	\$105.28

Measure-Specific Cost-Effectiveness Results (TRC Test):

Measure Number	Measure Category	Measure	TRC Test
1	Lighting	ENERGY STAR qualified CFL twister (60w)	4.71
3	Lighting	ENERGY STAR qualified CFL twister (100w)	1.91
9	Block Heater Timer	Block Heater Timer (just timer)	1.22
10	Power Bar	Power Bar with integrated timer	0.54
11	Hot Water	Hot Water Tank Pipe Insulation - ½" (per foot)	53.6
13	Hot Water	Hot Water Tank Insulation - Fiberglass R10	7.08
14	Hot Water	Efficient Shower Head (standard) < 4.8 L/min	5.87
15	Hot Water	Efficient Shower Head (hand-held) < 4.8 L/min	5.87
16	Hot Water	Low-Flow Aerator (kitchen) < 5.7 L/min	2.41
17	Hot Water	Low-Flow Aerator (bathroom) < 3.8 L/min	1.73
18	Refrigerator/Freezer	Refrigerator Replacement (ENERGY STAR Qualified 15.5–16.9 cu. ft.)	0.94
19	Refrigerator/Freezer	Refrigerator Replacement (ENERGY STAR Qualified 17.0–18.4 cu. ft.)	0.92
21	Refrigerator/Freezer	Freezer Replacement (ENERGY STAR Qualified 12.0–14.4 cu. ft.)	0.97
22	Refrigerator/Freezer	Freezer Replacement (ENERGY STAR Qualified 14.5–16.0 cu. ft.)	1.09
23	Air Conditioning	Window Air Conditioner Replacement (ENERGY STAR qualified 6,000–7,999 BTU/hr)	0.31
24	Air Conditioning	Window Air Conditioner Replacement (ENERGY STAR qualified 8,000–9,999 BTU/hr)	0.32
25	Air Conditioning	Window Air Conditioner Replacement (ENERGY STAR qualified 10,000–12,000 BTU/hr)	0.30
26	Air Conditioning	Dehumidifier Replacement (ENERGY STAR qualified 14.2–21.2 L/day)	0.77
28	Air Conditioning	Dehumidifier Replacement (ENERGY STAR qualified 25.5–35.5 L/day)	0.56
29	Programmable Thermostat	Programmable Thermostat – Line Voltage	0.28
30	Programmable Thermostat	Programmable Thermostat – Low Voltage	9.32

Measure Number	Measure Category	Measure	TRC Test
31	Weatherization	Comprehensive Draft Proofing	2.57
32	Weatherization	Attic Insulation	0.97
33	Weatherization	Wall Insulation	1.20
34	Weatherization	Basement Insulation	2.29

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