

HOME ENERGY REPORT

2014 DSM EVALUATION

EFFICIENCY NOVA SCOTIA CORPORATION

Final Report

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ABBREVIATIONS

CATI	Computer-assisted Telephone Interviewing
CBSM	Community-based Social Marketing
CSA	Canadian Standard Association
CRA	Corporate Research Associates
DA	Delivery Agent
DSM	Demand-side Management
EER	Energy Efficiency Ratio
ENSC	Efficiency Nova Scotia Corporation
HER	Home Energy Report
MEF	Modified Energy Factor
PM	Program Manager
OPA	Ontario Power Authority
RCT	Randomized Controlled Trial
RDI	Residential Direct Install
SEE Action	State and Local Energy Efficiency Action Network

DEFINITIONS

Accuracy	Reflects the proximity of measurements to the true value.
Bias	Systematic deviations of measurements from the true value.
Confidence interval	The estimated range of values which is likely to include the unknown population parameters.
Base case	A base case details the information on how assumed gross savings used in the tracking sheet have been established. Usually, these savings are calculated with a series of variables such as hours of operation, wattage or base consumption.
Distortion effects	A variety of effects that affect the energy savings generated by a program. Distortion effects may be of different natures, e.g., behavioral or market-related. The most frequently considered distortion effects are free-ridership and internal spillover.
Evaluated savings	Gross and net savings calculated by the Evaluator using the parameters (unitary savings values, installation rates, distortion effects, interactive effects, etc.) validated or measured during the evaluation process.
Evaluation plan	The evaluation plan summarizes the program description, objectives, base cases, documentation, evaluation methodology, budget and schedule.
Free-ridership	Percentage of savings attributable to participants who would have implemented the same or similar energy efficiency measures, with no change in timing, in the absence of the program.
Internal spillover	Savings attributable to participants who continue to implement the energy efficiency measures introduced by a program after participating in it once, without participating in the program a second time.
Line loss factor	Percentage of the electrical energy losses occurring in the transmission and distribution system between the utility generator and the customer meter.
Margin of error	The amount of random sampling error.
Net energy savings	Energy savings generated by energy efficiency measures after applying interactive effects and distortion effects.
Non-sampling error	Errors arising during the course of all survey activities other than sampling. Non-sampling errors tend to lead to bias in measurements and are very difficult to quantify.
Peak demand savings	The demand savings that coincide (in time) with the peak demand of the electricity system.
Precision	The extent to which repeated measures agree with one another.
Random sampling error	The error in measurement due to the fact that measures are taken from a subset of the population and not the entire population.
Sample size	The number of observations or replicates included in a statistical sample.
Unitary savings	Energy or demand savings established on a unitary basis. This unit can either be a product (e.g., an 8-watt LED lamp), a capacity (e.g., one-ton capacity of an air-source heat pump) or a participant (e.g., one participant taking part in a behaviour-based program).

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EXECUTIVE SUMMARY

This report presents the results of the 2014 process, market and impact evaluation of Home Energy Report (HER), also known as the Energy Savings Actions program. The 2014 evaluation was based on the data and information collected from the interviews with the Program Manager (PM) and Opower, an annual telephone survey with a total of 340 participants in the web-based component of HER, a billing analysis review and a unitary savings review.

Program Component Overview

The purpose of HER is to enable participating households to compare their energy usage with similar neighbouring homes by mailing to participating households periodic reports illustrating their energy usage patterns and providing personalized energy efficiency tips to help them reduce their energy consumption.

In April 2013, Opower, the delivery agent (DA), selected a total of 98,000 households to receive their mail-out energy reports. A web portal was made available to these participants, and then to all Nova Scotians by October 2013.

HER aimed to achieve net electrical energy savings of 15.4 GWh and net electrical demand savings of 3.6 MW for 2014.

Evaluation Approach for the Paper-based Component

In 2012, the State and Local Energy Efficiency Action Network (SEE Action), facilitated by the U.S. Department of Energy and U.S. Environmental Protection Agency, developed a guideline on how to evaluate a behaviour-based program entitled “Evaluation, Measurement and Verification of Residential Behavior-Based Energy Efficiency Program”. This report presents guidance and recommendations on methodologies that can be used to evaluate the savings impact of such a program. The main recommended approach is the use of a randomized controlled trial (RCT) and a panel data analysis method. This is exactly what Opower is using to quantify the savings from HER. However, the SEE Action-recommended approach also advises that an independent evaluator assign households to control or treatment groups, and conduct data cleaning (see Q9 in Chart M of the guideline).¹ This approach was not followed for HER—Opower estimated the savings impact. Indeed, the contract with Opower was signed before the SEE Action report was made public, which means this methodology was unknown to ENSC then. In addition, some confidentiality issues arose when Econoler started the HER evaluation, and prevented Econoler from receiving the full data set from Opower until those issues had been resolved towards the end of the evaluation timeframe. Hence, Econoler’s evaluation

¹ SEE Action, Evaluation, Measurement and Verification of Residential Behavior-Based Energy Efficiency Program, May 2012, p. 51.

had a focus on verifying that Opower carried out the impact estimation correctly by (1) comparing the treatment and control groups to make sure that they had similar characteristics, and (2) running a simple regression model to validate the savings range obtained by Opower with their panel data regression model.

Key Findings

Since its inception in 2013, a total of 93,119 participants have taken part in the paper-based component of HER, and 10,669 participants have taken part in the web-based component. In terms of net energy savings for 2014, the HER paper-based component achieved 25.336 GWh and the web-based component achieved 0.100 GWh. Hence, HER's total net energy savings amounted to 25.437 GWh in 2014. In addition, 2.892 MW of peak demand savings was achieved in 2014.

Influence of HER on Behavioural Changes

Participants in the web-based component of HER were first asked a number of survey questions about energy efficiency behaviours to find out whether they had adopted one or more of them in the 12 months prior to the survey. These energy efficiency behaviours included purchasing energy-efficient appliances, such as air-conditioners, clothes washers and refrigerators, reducing their shower time, turning off their computers at night, hanging their laundry to dry, installing heat-shrink film and washing clothes in cold water. When asked about the level of influence HER had on their decisions to adopt these energy efficiency behaviours, participants generally provided low ratings, varying from 1.6 to 4.3 on a scale from 1 to 10, where 1 means that HER had no influence at all on their behaviour and 10 means that HER was extremely influential on their behaviour. Therefore, the majority of respondents mentioned it would have been likely for them to undertake these energy efficiency behaviours without HER.

That said, when comparing specific behaviours prior to and after participation in HER, it was found that there had been changes in behaviour following participation in HER. For example, on average, participants hung their laundry to dry more often, did more loads of laundry in cold water, turned off their computers at night more often and reduced their shower time.

Satisfaction

Close to 80 percent of web-based participants said they were satisfied with HER. Participants provided high satisfaction ratings to specific aspects of HER including the appearance and the clarity of the report, the ease of creating and updating the account, and the usefulness of tips provided. The most important reasons for participants' dissatisfaction were that they felt the report was not accurate and that they did not like the comparisons made with other houses in the area. A smaller proportion of the participants also mentioned that there was not enough information in the report and they did not find the tips relevant, and that energy consumption did not decrease after they started to follow the tips. Therefore, it is not surprising that the participants' main recommendations on improvement called

for providing more detailed information in the report, particularly more information based on the specifics of the house, and improving the energy consumption comparisons with neighbouring houses.

Energy Savings

To calculate the net savings of HER in 2014, the Econoler team first reviewed the methodology used by Opower for calculating the paper-based component savings. The energy savings achieved by the paper-based component are considered net savings, since they have already included the program's influence on participants' decisions, by using a control group comparison. As for the web-based component, the Econoler team defined the unitary savings values for seven specific tips provided on the web portal. The web-based participant survey was used to estimate how many participants put the suggested tips into practice and questions were asked to determine the level of influence that HER had on participants' decisions to implement the suggested tips. These questions regarding the level of HER's influence were part of the self-declared approach used to calculate net energy savings for the web-based component.

The evaluation has revealed that HER generated net energy savings of 34.711 GWh and demand savings of 3.938 MW at the generator for the first 21 months of its implementation (from April 2013 through December 2014).

Recommendations

Overall, the Econoler team finds that the paper-based component of HER has succeeded in achieving the expected results in terms of changing participants' electricity consumption behaviour. The impact of the web-based component, however, has been more difficult to evaluate; the evaluation has not established a significant amount of savings associated with this component. In addition to the general recommendations presented for all ENSC program components in the overall executive summary of the 2014 demand-side management (DSM) programs, the team makes specific recommendations throughout the report aimed at optimizing HER. The most important recommendations are summarized as follows:

2014 HER-R1. Explain in greater detail the characteristics of HER in the program documentation. Designed to influence and change participants' electricity use behaviour, HER is different from other program components undertaken by ENSC. The specific and particular challenges and characteristics of this component should be clearly made known to program staff and the Evaluator. The program manual and the evaluation plan should be used to document and present all this information. Therefore, the Evaluator recommends that the program manual and the evaluation plan explain in greater detail the following elements of HER:

- › The number of selected participants. The program manual explains how participating households were selected, but the number does not correspond to the number of those finally selected by Opower.
- › The process for selecting the tips recommended to participants.

- › All the program documents available or developed when designing HER. It is of crucial importance that Opower help develop a comprehensive evaluation plan by listing all the data available, including methodologies, databases, and any data-collection tools available or program documents so that the Evaluator knows how to evaluate the program and what other data to be collected.

2014 HER-R2. Review the raw and treated databases from Opower. Some confidentiality issues could not be solved within the evaluation timeframe and it was impossible for the Evaluator to review the raw data that Opower received and the treated data upon which it had applied the adjustments. For this evaluation, the Evaluator reviewed the adjustment methodology provided by Opower and considered the logic underlying this methodology to be sound. However, it is recommended that both databases be reviewed to validate whether the adjustments were applied as defined in the methodology. This review should be conducted in the next evaluation now that the confidentiality issues have been solved.

2014 HER-R3. Conduct a billing analysis to compare the pre-participation electricity consumption of the treatment and control groups. Socio-demographic data were analyzed and statistical tests were conducted to validate whether the control group selected was comparable to the treatment group (participants). An additional interesting test could be to analyze past electricity consumption from both groups. This analysis would help determine whether the savings observed through the billing analysis are attributable to HER and not to any other trend that could be observed with the treatment group, but not with the control group. An analysis of the electricity consumption trend for a five-year period should be conducted as part of the next evaluation.

1 PROGRAM DESCRIPTION

Home Energy Report (HER) helps Nova Scotian households reduce their energy consumption by changing their behaviours. More specifically, HER compares participating households' energy usage with similar neighbouring homes by mailing them periodic reports illustrating their energy usage patterns and providing personalized energy efficiency tips to help them reduce their energy consumption.

HER delivery is based on a tripartite agreement among Efficiency Nova Scotia Corporation (ENSC), Opower (the delivery agent (DA)), and Nova Scotia Power.

HER was first launched in 2013 as a three-year pilot. By April 2013, Opower selected a total of 98,000 households to receive their mail-out energy reports. A web portal was made available to these participants, and then to all Nova Scotians by October 2013.

ENSC receives two-thirds of the funds for HER from electricity rate-payers and the remaining one-third from Nova Scotian tax-payers. Rate-payer funds are used for electricity savings while tax-payer funds are used to provide services to non-electrically heated and low-income households.

HER aimed to achieve net electrical energy savings of 15.4 GWh and net electrical demand savings of 3.6 MW for 2014. Savings generated by HER are accounted for under the Energy Savings Actions program.

2 METHODOLOGY

This section presents the Econoler team, the methodology used and the activities carried out for the HER evaluation.

2.1 Presentation of the Team

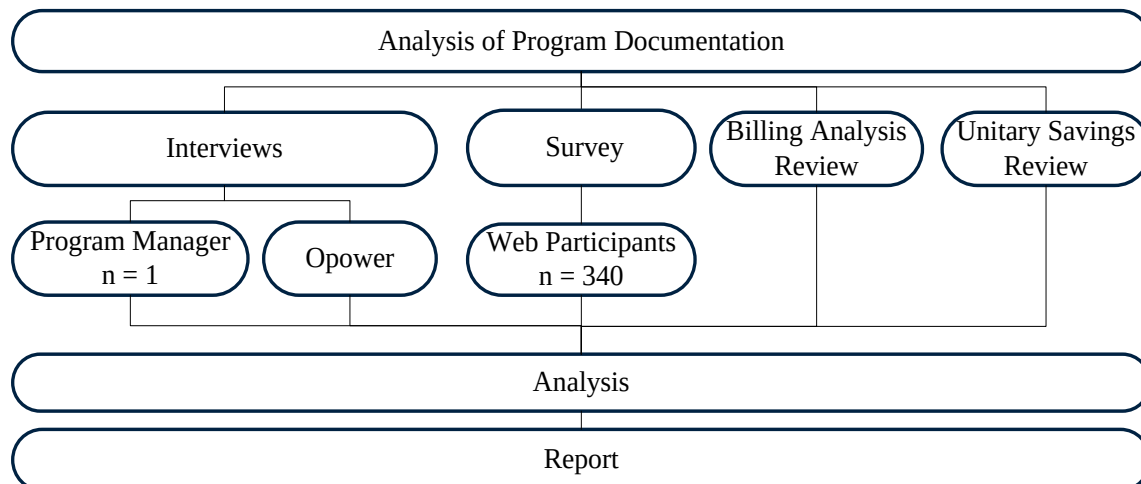
To carry out the 2014 evaluation, Econoler collaborated with Corporate Research Associates (CRA). Tasks were divided as follows:

- › Econoler acted as the team leader and was responsible for coordinating all evaluation activities, as well as preparing and reviewing all the deliverables.
- › CRA performed the telephone survey with participants in HER's web-based component and also analyzed and reported on the data collected from this activity.

2.2 Evaluation Activities

Figure 1 illustrates the research strategy and data collection activities used for the 2014 evaluation.

Figure 1: Methodological Model



Each step of this methodological model is further described in the following sub-sections.

2.2.1 Interview with Program Manager

The Econoler team conducted one interview with the PM in September 2014 to gain a basic understanding of the program's mechanisms and delivery. Based on the information obtained from this interview, a list of questions and topics to be included in the data collection tools was prepared.

2.2.2 Interviews with Opower

During the evaluation process, Econoler conducted various interviews with Opower to collect information required to conduct the impact evaluation and, more precisely, to better understand the program design, the selection of participants in the treatment group and the control group, and the billing analysis conducted by Opower to track the program savings.

2.2.3 Survey

In November 2014, CRA staff conducted a survey, using computer-assisted telephone interviewing (CATI) technology, with a total of 340 participants in HER's web-based component. The average length of the survey was 11.5 minutes.

The survey was meant to collect feedback on the following aspects of HER:

- › Behavioural changes
- › Energy efficiency tips implemented
- › Participation motivations
- › Participation in other ENSC programs
- › Satisfaction with the program
- › Recommendations for improvement

The questionnaire and complete survey results are presented in Appendix II and Appendix III respectively. The table below shows the population and sample sizes, as well as the corresponding margin of error at a 90 percent confidence level.

Table 1: Survey Sample Size and Margin of Error

Annual Survey	Population	<i>Sample Size (n)</i>	Margin of Error at 90% Confidence Interval
2014 Participants	10,669 ²	340	±4.5%

The margin of error is used to determine the level of precision³ of the measurement, and its associated confidence level indicates the probability for a measure to fall within this margin of error. As part of this evaluation, the confidence level and margin of error only take random sampling errors into account; they do not reflect non-sampling errors or biases, such as data entry errors, respondents providing inaccurate responses or people who could not be contacted.

² The population of participants for the survey included paper-based participants who also logged into the web portal.

³ Precision refers to how close the measured values are to each other. However, it does not take into consideration how close the measured value is to the true value, which refers to accuracy.

Call Disposition

The following table presents the record of calls for this study. A total of 810 participants were asked to complete the survey. This total represents 66 percent of all the numbers called for this study (1,219). The response rate is calculated as the number of completed interviews (340) divided by the number of eligible numbers (1,120), for a response rate of 30 percent.

Table 2: Call Disposition

Call Disposition	2014
Total Numbers Called	1,219
Disconnected/Not in Service	76
Fax/Modem	7
Non-Residential Number	12
Blocked Number	1
Duplicate Number	3
Eligible Numbers	1,120
Busy/Answering Machine	170
No Answer	28
Scheduled Call Back/Mid Call Back	21
Illness/Incapable/Language Problem	9
Qualified Not Available	82
Total Asked	810
Gatekeeper Refusal/Respondent Refusal	271
Mid-terminate	11
Never Call List	25
Hang Up	157
Co-operative Contacts	346
Did Not Qualify – Refused at Intro	6
Completed Interviews	340

2.2.4 Billing Analysis Review

Econoler reviewed the methodology used by Opower to establish the energy savings of the paper-based participants by making an analysis of the billing data of the treatment group and the control group. First, Econoler reviewed the selection process for placing participants into the treatment group and the control group and then looked at the process used to determine the energy savings based on a regression analysis.

2.2.5 Unitary Savings Review

Econoler established the unitary savings values for seven tips selected to quantify the savings associated with the web-based component. To choose the most recent and accurate data sources for establishing the unitary savings value for each tip, the team conducted a literature review of technical reference manuals, studies and public evaluation reports. When no reliable or representative source was found in the literature, engineering calculations were used to estimate savings.

3 PROCESS EVALUATION

This section presents the findings from the process evaluation of HER, which has been carried out on the basis of the information gathered from the documentation and an interview with the PM.

3.1 Program Design

Participants in the paper-based component are provided with paper reports that illustrate their energy usage patterns, compare their energy usage to an anonymous group of similar neighbouring homes and offer tips on how to reduce energy use. HER also has a web portal where new participants can consult a library of energy efficiency tips and also compare their energy usage to an anonymous group of similar neighbouring homes, but they are not provided with full reports like those received by participants in the paper-based component. The program objective is to encourage participants in both the paper-based and web-based components to change their behaviours and reduce their energy consumption. Comparing participants' energy usage and patterns to similar homes is used as a motivating factor for them to change their behaviours.

Participants can take various actions after receiving their paper reports or after browsing the library of tips online. Participants are very likely to change their behaviours and start adopting energy-wise habits right after seeing these energy efficiency tips provided. However, behavioural changes are subject to erosion over time, hence affecting sustainability. Other types of action recommended through HER, such as buying energy-efficient products, will result in more persistence than behavioural changes. In other words, a portion of the savings observed in a given evaluation period can be lost after a certain period, while other savings will stay throughout the entire useful life of the product installed.

3.2 Program Documentation

As part of the evaluation, the Evaluator analyzed the program documentation and worked together with the PM to improve and revise the content of certain program documents. A number of changes have already been made by the PM to the program documents. However, upon completing the process evaluation, the Evaluator made new findings, as summarized below.

Firstly, the Evaluator is of the opinion that certain characteristics of HER should be explained in greater detail in the program manual, including:

- › The number of selected participants should be updated. The Evaluator discovered during the verification process that the information provided in the program manual does not correspond to the final selection made by Opower.
- › The program manual mentions that Opower follows a set of criteria when creating both the treatment and the control groups. The Evaluator recommends that ENSC consider adding the

age of the home to this set of criteria to indicate the particular building code according to which a house was built.

- › The process for selecting the tips should be described in the program manual.

The Evaluator also thinks that certain changes should be made in the next version of the evaluation plan by giving consideration to the following:

- › The calculation of gross savings does not apply to HER and should therefore be removed from the evaluation plan.
- › The evaluation plan should mention all the program documents available or developed when designing HER. Opower may have more data than that presented in the evaluation plan. It is of crucial importance that Opower help develop a comprehensive evaluation plan by listing all the data available, including methodologies, databases, and any data-collection tools available or program documents so that the Evaluator knows how to evaluate the program and what other data to be collected.

The Evaluator was provided with an example of a home energy report to better understand how HER works and the content of the report itself. The Evaluator is satisfied with the overall quality of the report and its content. The bar chart used for tracking changes in energy consumption is a good visual tool and its evolution over time is a good indicator of the results of any effort undertaken by the participant to reduce consumption. The Evaluator noticed that some of the tips provided refer to other ENSC programs. This is a good way of promoting other programs and increasing overall awareness about energy efficiency.

In addition, the Evaluator has reviewed the complete tip library and has the following recommendation to make:

- › The latest version of the tip library has 92 pages. To allow for easier navigation throughout the tip library, the Evaluator suggests creating and placing an index at the beginning of the library to group similar tips under a number of more general topic areas, thereby making it easier for the reader to locate particular groups of tips in the library. For instance, several tips regarding heating, lighting, and hot water can be grouped under the topic area of “electricity end-use”. To better organize the tip library, another option is to divide the tips into two categories: behavioural change and resource acquisition.

3.3 Tracking System

Opower is in charge of tracking the savings of the paper-based component and submits savings summary reports to ENSC every month. ENSC has created its own internal tracking system using some of the data provided in these monthly reports. Since the web-based component’s savings are not tracked, it has no tracking documents.

Each monthly summary report provided by Opower for the paper-based component includes a summary of the electricity savings established for each month based on a billing analysis. Other information, such as the number of opt-outs in a given month, is also provided in the reports. In addition, the reports include statistics on the web-based component (the number of accounts created, the total number of visitors, the average time on site, average page views and the percentage of new visits).

Opower also provides the Evaluator with a database of the customers who logged in. This database includes information such as the account number, a treatment status (which identifies whether the paper-based participant is included in the treatment or the control group), the name and site address of the participant and the login duration. The phone numbers of the web-based participants were essential to conducting the telephone survey planned as part of this evaluation. Opower did not have these phone numbers and therefore the phone numbers could not be provided to the Evaluator. CRA was commissioned to search and attribute phone numbers to as many participants as possible.

In addition to this database of customers, Opower produces a summary of tip actions. The tip actions file includes the tip name and the type of action with their associated number of customers who chose that action. However, the database and the tip actions file could not be compared to see which participant selected which tip.

4 MARKET EVALUATION

This section presents the findings of the 2014 HER market evaluation from the web-based participants' perspectives. The survey included paper-based participants who also logged into the web portal. Questions were specifically asked to focus on their interaction with the web portal and the information provided by it.

4.1 Participant Perspectives

A participant survey was conducted as part of the HER evaluation. In addition to the questions designed for impact evaluation purposes, survey participants were asked questions related to behaviour change, awareness and satisfaction.

4.1.1 Energy Efficiency Appliance Purchases and Behaviours

Nearly four in ten participants (38%) purchased an energy-efficient appliance in the last year, with most of these being clothes washers (31%), dishwashers (25%), and refrigerators (24%). Meanwhile, participants adopted various energy-efficient behaviours, with 80 percent of them changing their behaviour in some way. The table below details the specific behaviours adopted by respondents.

Table 3: Energy-efficient Behaviours Adopted

Energy-efficient Behaviours Adopted **	2014
<i>Sample Size*</i>	313
Turn off lights when not needed	72%
Wash clothes in cold water	57%
Turn off computer at night	53%
Hang laundry to dry	50%
Use a ceiling fan rather than air-conditioning	44%
Reduce shower time	43%
Turn off water heater when away	31%
Reduce refrigerator's temperature set point	17%
Adjust the television display by reducing the brightness and contrast	17%
Insulate windows with heat-shrink film	8%
Use a home power monitor to have real-time feedback on electricity consumption	6%
*Base: All respondents except those who purchased an energy-efficient appliance and those who did not take steps to reduce home energy use. **Percentage saying "yes".	

4.1.2 Usage of HER Report

Three-quarters of the participants recalled signing up for HER on the ENSC website (74%). The remaining survey questions, with the exception of demographics-related questions, were posed only to this group (n=250). Energy cost savings was the primary reason identified for signing up for HER (46%), followed by improving home energy use efficiency rankings compared with other houses (24%). Participants are generally interested in the information provided by HER, with the majority reading at least some of the website's content, as highlighted in the table below.

Table 4: HER Report

Uses of the HER Report	2014
Sample Size*	250
Read the website content thoroughly	38%
Read some of the website's content	34%
Skim some of the website's content	13%
Glance at the pictures, graphs or headlines	6%
Others	5%
Don't know/refused	4%
*Base: Respondents who recalled signing up for HER	

When asked about the level of influence HER had on respondents' decisions to undertake various energy-efficient activities, influence ratings were generally low, as highlighted in the table below.

Table 5: Importance of HER in Influencing Decisions

Importance of HER		2014	
Base	Question	Sample Size	Mean Score*
Average rating: 10= "Extremely influential", 0= "No influence at all"			
Respondents who purchased air-conditioners	HER influence on purchase decision of energy-efficient air-conditioner	14	4.3
Respondents who reduced shower time	HER influence on decision to reduce shower time	97	3.5
Respondents who purchased dishwashers	HER influence on purchase decision of energy-efficient dishwasher	24	3.1
Respondents who turned off computer at night	HER influence on decision to turn off computer at night	119	2.5
Respondents who hung laundry to dry	HER influence on decision to hang laundry to dry	110	2.3
Respondents who installed shrink wrap film	HER influence on decision to install shrink wrap film	18	1.8
Respondents who washed clothes in cold water	HER influence on decision to wash in cold water	118	1.6
**"Don't know/refused" responses have been removed from calculation.			

The majority of respondents reported it would have been likely for them to adopt the specific energy-efficient behaviour without HER, as highlighted in the table below.

Table 6: Likelihood of Purchasing/Undertaking Activity without HER

Influence of HER		2014	
Base	Question	Sample Size	Definitely/ Probably*
Respondents who purchased air-conditioners	Likelihood of purchasing energy-efficient air-conditioner without HER	14	86%
Respondents who reduced shower time	Likelihood of reducing shower time without HER	97	75%
Respondents who purchased dishwashers	Likelihood of purchasing energy-efficient dishwasher without HER	25	100%
Respondents who turned off computer at night	Likelihood of turning off computer at night without HER	121	81%
Respondents who hung laundry to dry	Likelihood of hanging laundry to dry without HER	109	94%
Respondents who installed shrink wrap film	Likelihood of insulating windows without HER	18	94%
Respondents who washed clothes in cold water	Likelihood of washing clothes in cold water without HER	118	94%
**"Don't know/refused" responses have been removed from calculation.			

While the respondents were not likely to attribute their behaviour changes to HER's influences, it is evident that there have been changes in their behaviours following their participation in HER. For example, respondents who hung clothes to dry did so to an average of 4.3 loads in a typical week. Prior to their participation in HER, these respondents hung an average of 2.7 loads of laundry to dry per week, whereas following their participation in HER, the average increased to 3.2.

Similarly, there was a slight change in the number of loads of laundry washed in cold water following their participation in HER. Specifically, an average of 4.4 loads of laundry were done in a typical week by those who reported washing clothes in cold water, and an average of 3.3 loads were washed in cold water prior to HER, and 3.7 loads after HER.

Finally, there was an increase in turning off computers at night and a reduction in shower time following participation in HER. Prior to their participation in HER, respondents turned off their computers at night on average 4.9 times per week, while following HER, respondents turned off their computers at night on average 6.4 times per week. Shower time was reduced from an average of 10 minutes prior to HER to 6.6 minutes following participation in HER.

4.1.3 Awareness of and Satisfaction with HER

Respondents found out about HER in a number of ways, including media advertising, through the mail and word of mouth. The following table details sources of awareness of HER.

Table 7: Sources of Awareness

Sources of Awareness*	2014 (%)
<i>Sample Size</i>	250
Media advertising	26%
Through the mail/Bill insert	21%
Word of mouth	14%
Internet (general)	6%
Contacted directly by ENSC	6%
ENSC website	5%
Facebook or other social media	3%
Booth at community centre/event	2%
Through Nova Scotia Power	2%
Email/Email from ENSC	2%
Air Miles promotion	1%
Through the HER report received in the mail	1%
Through third-party contractor or service provider	1%
Others	6%
Don't know	12%
*Multiple responses	

The level of satisfaction with HER was high, with 79 percent of participants reporting satisfaction. High levels of satisfaction were reported regarding specific aspects of HER, including the appearance of the report (98%), the clarity of the report (93%), the ease of creating and updating the account (88%), and the usefulness of the tips provided (84%). Those who were not satisfied indicated that the report was not accurate (38%), they did not like the comparisons made with other houses in the area (25%), there was not enough information (15%), they did not find the tips relevant (10%), and energy consumption did not decrease after they started to follow the tips (10%).

Only a minority of HER participants spoke with ENSC contact centre representatives (26%). Among this minority of participants, there were high levels of satisfaction with various aspects of service, including the service attitude (92%), knowledge of programs available (89%), the overall level of service provided (84%), and the ability to provide advice (82%).

The majority of HER participants are likely to recommend the programs offered by ENSC to others, and a similar number would participate in other ENSC programs, as highlighted in the table below. Although the majority of participants did not offer any recommendations to improve HER, a small number mentioned the need for more detailed information (6%), improving house comparisons (5%), the need for more information based on the specifics about the house, such as how it is heated (4%), or improving the content of the report (4%).

Table 8: Willingness to Recommend Programs

	2014	
	Would Recommend ENSC Programs to Others	Would Participate in Other ENSC Programs
<i>Sample Size*</i>	247	244
Definitely	53%	51%
Probably	39%	43%
Probably not	5%	4%
Definitely not	3%	1%
**"Don't know/refused" responses have been removed from calculation.		

5 IMPACT EVALUATION FOR PAPER-BASED COMPONENT

The objective of the 2014 impact evaluation of HER's paper-based component was to determine the net energy savings. In 2012, the State and Local Energy Efficiency Action Network (SEE Action), facilitated by the U.S. Department of Energy and U.S. Environmental Protection Agency, developed a guideline on how to evaluate a behaviour-based program entitled "Evaluation, Measurement and Verification of Residential Behavior-Based Energy Efficiency Program". This report presents guidance and recommendations on methodologies that can be used to evaluate the savings impact of such a program. The main recommended approach is the use of a randomized controlled trial (RCT) and a panel data analysis method. This is exactly what Opower is using to quantify the savings from HER. However, the SEE Action-recommended approach also advises that an independent evaluator assign households to control or treatment groups, and conduct data cleaning (see Q9 in Chart M of the guideline)⁴. This approach was not followed for HER—Opower estimated the savings impact. Indeed, the contract with Opower was signed before the SEE Action report was made public, which means this methodology was unknown to ENSC then. In addition, some confidentiality issues arose when Econoler started the HER evaluation, and prevented Econoler from receiving the full data set from Opower until those issues had been resolved towards the end of the evaluation timeframe. Hence, Econoler's evaluation had a focus on verifying that Opower carried out the impact estimation correctly by (1) comparing the treatment and control groups to make sure that they had similar characteristics, and (2) running a simple regression model to validate the savings range obtained by Opower with their panel data regression model.

From then on, both electrical energy and demand savings were estimated by analyzing the savings calculation methodology of Opower. Since the methodology used establishes savings that can be accepted as "net", no free-ridership effect is considered for this component.

The following sub-sections present the activities conducted as part of the impact evaluation, and the resulting net energy and demand savings for HER's paper-based component.

5.1 Methodology Review

The approach to the impact evaluation involved reviewing the billing analyses performed by Opower. The savings are established by comparing the consumption of a group of participants (treatment group) to that of a group with similar attributes (control group).

Selection of Participants

First, Econoler reviewed the process used to build the two groups. A smaller group was selected by Opower to represent a random sample of the Nova Scotian population, while the other bigger group

⁴ SEE Action, Evaluation, Measurement and Verification of Residential Behavior-Based Energy Efficiency Program, May 2012, Q9 in Chart M, p. 51.

represented high electricity users, who were expected to achieve higher potential savings. The objective of this approach was to ensure the highest possible savings for the first program year (as represented by the high electricity users) and to estimate the amount of savings to be expected if the program is expanded to cover the whole provincial population (as represented by the random sample).

Hence, Opower first randomly selected 20,000 eligible households across Nova Scotia Power's entire customer base. Then, it used a randomized controlled trial (RCT) to place 10,000 of these households into the treatment group and the other 10,000 households into the control group. As a result, the treatment group and the control group were expected to be comparable to each other in terms of their usage, social and demographic characteristics, appliance characteristics, etc. In addition, Opower made an analysis by looking at the following criteria to ensure that both groups shared similar attributes:

- › Average annual usage for the previous year
- › Summer usage
- › Winter usage
- › Tenure of occupancy
- › Square footage
- › Heat type
- › AC type
- › Single/Multi family home
- › Has email

After selecting the random sample, Opower selected the high electricity users. It selected the 110,000 biggest users from the eligible population and used an RCT to place 88,000 households into the treatment group and 23,000 households into the control group. Afterwards, it made an analysis of both groups' attributes against the same set of criteria as listed above to ensure that the two groups were similar and comparable. A summary of the attributes analysis is presented in the following table.

Table 9: Comparison of the Treatment Group and the Control Group

Parameter	High-user Group Results			Random Group Results		
	Mean		T-statistic	Mean		T-statistic
	Treatment	Control		Treatment	Control	
Avg. Daily kWh	38.73	38.79	-0.55	28.30	28.15	0.62
Avg. Daily Summer kWh	28.44	28.32	1.32	21.90	21.82	0.48
Avg. Daily Winter kWh	54.66	54.94	-1.39	38.39	38.10	0.69
Tenure	6,161.31	6,163.97	-0.1	6,335.92	6,349.93	-0.25
Type of Dwelling	Chi squared: 3.82			Chi squared: 0.81		
Heat Type	Chi squared: 0.0			Chi squared: 0.0		

As shown in Table 9, the t-statistic was never above 2 or below -2, which means that the treatment group and the control group were not significantly different from each other, although small differences (statistically insignificant) between these two groups were observed. Furthermore, after conducting its own analysis on the average daily, summer and winter consumption levels, Econoler has come to the same conclusion.

Moreover, to increase the accuracy of the analysis, some adjustments were made, including the following:

- › Removing estimated readings: Since estimated meter readings were corrected on the following true-up reading, these estimated readings were combined with their true-up readings to remove any error from the estimated ones.
- › Prorating readings: Meter readings were prorated into calendar months.
- › Removing outliers: Only the readings with extreme values were dropped for customers and not all the readings for a customer were dropped. Data was dropped if:
 - Any meter reading with duration longer than 90 days
 - Electricity meter reading with a usage less than 2 kWh/day or greater than 300 kWh/day

The initial methodology would have involved analyzing the raw database received by Opower and the subsequent treated database, once all the adjustments previously mentioned had been made. However, the confidentiality issues among the parties involved (Nova Scotia Power, Opower, ENSC, Service Nova Scotia and Econoler) made it impossible for the Evaluator to receive said databases within the timeframe of this evaluation.

After making a careful analysis of the methodology and the statistical results, the Evaluator considers that the participants were properly selected. Nonetheless, further analysis of the treatment and control groups should be conducted in 2015, since all the confidentiality issues were solved in early 2015 and the entire databases (raw and treated) have been transferred to the Evaluator.

Billing Analysis

Opower estimated the savings using a panel data regression model, which involved following and comparing the same individuals over time, as well as comparing different individuals at a given point in time through regression models. A literature review showed that compared to other models, panel regression analysis increases the efficiency and precision of the estimates by using repeated measures on each program participant and by accounting for time-invariant unobservable variables⁵.

Furthermore, Opower used a “post-only” panel data estimator model, which used one year of pre-treatment data to construct control variables capturing the principal parameters of a household’s

⁵ The Brattle Group, *Measurement and Verification Principles for Behaviour-Based Efficiency Programs*, May 2011, Sanem Sergici, Ph. D., Ahmad Faruqui, Ph.D.

energy usage. This method is more effective in correcting small, statistically insignificant differences between the treatment group and the control group in pre-treatment and can result in a more accurate post-treatment savings estimate.

To validate the savings calculated, Econoler conducted its own regression modeling using Opower's net database covering six months (three winter months and three summer months). For a given month, a simple regression was used to predict the actual consumption for that month, using the "PRE" consumption related to the same season as that of the month being analyzed and the variable identified as "treatment". The following regression was used to estimate the electrical consumption changes in usage, resulting from participating in the HER paper-based component:

$$ADC_{it} = C_{it} + S_{it}\beta$$

Where for each customer "i" and calendar month "t":

ADC_{it} = Average daily kWh consumption for customer "i" in period "t"

C_{it} = Constant representing the baseload electricity consumption for customer "i" in period "t", occurring without the program influence

S_{it} = Dummy variable = 1 if customer "i" in period "t" is in the treatment group; =0 if in the control group

β = Estimated coefficient

For each of the six months, Econoler re-established the savings value within a range smaller than the 95 percent confidence interval. Table 10 presents the results obtained from Econoler's simple regression model and compares them with Opower savings for the same months. As shown, no statistical difference can be observed for the six months analyzed. Econoler considers hereafter that Opower's approach is acceptable and that the monthly savings reported to ENSC can be directly used to calculate the total annual net savings.

Table 10: Comparison of Opower's Regression Model with a Simple Regression Model

Month		Opower Savings	Savings from Simple Regression Model
Winter 2014	January	1.35%	1.53%
	February	1.40%	1.61%
	March	1.67%	1.86%
Summer 2014	July	1.78%	1.84%
	August	1.84%	1.88%
	September	1.88%	1.97%

5.2 Net Savings

This section presents the net savings associated with HER's paper-based component.

Energy Savings

Opower makes a billing analysis every month to determine the amount of savings achieved by the participants for that month. The results of these billing analyses are presented to ENSC in a monthly report, detailing the energy savings and the average savings percentage achieved. Since HER was evaluated for the first time in 2014, the savings calculation has covered all the monthly savings results from April 2013 (when HER was launched) to the end of 2014. During that period, the savings percentage achieved ranged from 0 percent to 2 percent, with an average of 1.3 percent. The annual net savings for the paper-based component are presented in Table 11. Overall, the total net energy savings amounted to 31.362 GWh at the meter.

The net savings at the generator are also estimated in Table 11, using a line loss factor of 1.100 between the meter and the generator. This value was provided by Nova Scotia Power for residential customers. As a result, the net energy savings at the generator have been established at 34.498 GWh.

Table 11: Paper-based Component Evaluation Results – Total Net Energy Savings

Energy Savings	2013	2014	Total
Number of Participants	93,119		93,119
Total Net Energy Savings – at Meter (GWh)	8.329	23.033	31.362
Line Loss Factor	1.100	1.100	1.100
Total Net Energy Savings – at Generator (GWh)	9.162	25.336	34.498

Peak Demand Savings

The information provided by Opower's billing analysis did not allow calculating the peak demand savings associated with the paper-based participants. However, the paper-based component report's observations regarding the measures taken and the behaviour changes suggest that a certain level of peak demand savings should be looked at and determined.

The Evaluator conducted some secondary research to identify similar programs in other jurisdictions and find out how the peak demand savings were estimated. Only one program evaluation that included demand savings was found (the evaluation of the Home Performance Program in Ohio). Conducted by ADM Associates, this evaluation assumed that demand reductions achieved by the program have a flat hourly profile⁶. Based on this assumption, peak demand savings can be determined by dividing the annual energy savings by 8,760. Using this approach, the net peak demand savings at the meter and at the generator have been established (as summarized below in Table 12) using the line loss factor for the energy savings described previously. Overall, the net peak demand savings amount to 3.580 MW at the meter and 3.938 MW at the generator.

Table 12: Paper-based Component Evaluation Results – Total Net Peak Demand Savings

Peak Demand Savings	2013	2014	Total
Number of Participants	93,119		93,119
Total Net Peak Demand Savings – at meter (MW)	0.951	2.629	3.580
Line Loss Factor	1.100	1.100	1.100
Total Net Peak Demand Savings – at generator (MW)	1.046	2.892	3.938

⁶ ADM Associates, "Home Performance Program Evaluation, Measurement, and Verification Report", 2013.

6 IMPACT EVALUATION FOR WEB-BASED COMPONENT

The Econoler team conducted a survey with customers who signed up on the HER web portal to look at specific tips that they could have implemented because of the report.

When selecting the list of tips to include in the survey, the Evaluator first checked whether the measure was already covered by another ENSC program, to avoid the possibility of double-counting the savings as regular participation or spillovers. Then, the Evaluator filtered out the tips whose amounts of electricity savings were too small. Finally, the Evaluator also excluded those tips that very few people could implement them, and thus had low overall saving potential; these tips were mostly related to pool maintenance and specific heating systems.

Based on these criteria, the Evaluator included the following list of tips in the survey:

- › Energy-efficient dishwasher
- › Energy-efficient room air-conditioner
- › Insulate windows with heat-shrink film
- › Shave a minute off shower time
- › Turn off the computer at night
- › Wash clothes with cold water
- › Hang laundry to dry

The following sub-sections present the unitary savings value calculated for each of the above tips.

6.1 Unitary Savings Values

The unitary savings values were calculated using engineering formulas, as well as the data obtained from the literature and the survey with participants of the web-based component. The implementation ratio associated with each tip was also calculated based on the survey results.

6.1.1 Energy-efficient Dishwasher

The average consumption of all available ENERGY STAR model in 2014 is 269 kWh/year⁷, while the US Federal Standard is 307 kWh/year⁷. Therefore, the average annual savings are established at 38 kWh/year.

In the survey, participants were asked if they had bought an energy-efficient appliance in the preceding 12 months; if they had, they were asked to specify how they knew this appliance was

⁷ ENERGY STAR, *ENERGY STAR Certified Residential Dishwashers database*,
<<http://www.energystar.gov/productfinder/product/certified-residential-dishwashers/results>> (Last accessed October 24, 2014)

energy-efficient. The survey results showed that a total of 32 participants each bought an energy-efficient dishwasher instead of a standard one, which translates into an implementation ratio of 9.4 percent.

6.1.2 Energy-efficient Room Air-conditioner

In 2014, for Appliance Retirement, the Evaluator reviewed the estimated annual energy consumption and the unitary savings value for retired room air-conditioners. The average annual usage was 310.6 hours as most participants used air-conditioners during the summer months when they needed them. The average capacity of the retired units collected last year was 7,185 Btu/h. It is assumed that the web-based population of HER required the same capacity and their usage pattern stayed the same.

Since 1995, room air-conditioners have been required to have an energy efficiency ratio (EER) of at least 8⁸. Today, window-mounting models are available with EER ratings between 12.0 and 8.0, and units intended for through-the-wall applications have EERs between 9.5 and 8.0⁹. It was therefore assumed that standard units had an EER of 8.

Using these parameters and the following equation, the annual-consumption average has been established at 279 kWh for standard room air-conditioners:

$$\text{Consumption of Retired AC unit} = \frac{7,185 \text{ Btu/hr}}{8.0 \frac{\text{Btu}}{\text{W} \cdot \text{hr}} \times \frac{1,000 \text{ W}}{\text{kW}}} \times 310.6 \frac{\text{hr}}{\text{year}} = 279 \text{ kWh}$$

Because the number of surveyed participants that implemented this tip was too small, no conclusion could be drawn regarding the type of equipment purchased. It is assumed that the units met the ENERGY STAR minimum level of energy efficiency, which is now EER 11.2 for units with a capacity below 8,000 Btu/hr¹⁰. This assumption is supported by the fact that the majority of participants declared that they had each bought a new high-efficiency model.

The same capacity and hours-of-operation values as those for retired room air-conditioners have been used, resulting in an annual energy consumption value of 199 kWh. Therefore, the average annual savings have been established at 80 kWh/year.

In the survey, participants were asked if they had bought an energy-efficient appliance in the preceding 12 months; if they had, they were asked to specify how they knew this appliance was energy-efficient. The survey results showed that a total of 16 participants each bought an

⁸ NRCAN's Office of Energy Efficiency. *Air Conditioning Your Home*, 2003, p. 15 available at: <http://publications.gc.ca/collections/Collection/M91-23-7-2003E.pdf>

⁹ Natural Resources Canada, *Air Conditioning Your Home*, <http://www.nrcan.gc.ca/energy/publications/efficiency/residential/air-conditioning/6051#room> (Last accessed November 07, 2014)

¹⁰ Energy Star. *Room Air Conditioners Key Product Criteria* https://www.energystar.gov/index.cfm?c=roomac.pr_crit_room_ac (Last accessed October 24, 2014)

energy-efficient air-conditioner instead of a standard one, which translates into an implementation ratio of 4.7 percent.

6.1.3 Insulate Windows with Heat-shrink Film

The methodology used to estimate the average savings per square meter of window due to the installation of heat-shrink film on windows is based on EC128 technical information¹¹. The methodology has been reviewed and adjusted to improve its accuracy, while trying to respect the theory and simplify the proposed method.

The objective is to calculate the energy ratio required to compensate the energy losses through the leaks in kWh/m² for a typical window on which the heat-shrink film was installed by the program participants and then determine an average energy ratio based on the statistical data gathered from the participant survey.

Methodology for Determining the Energy Ratio

The energy required to heat the air escaping through window cracks is calculated using the following formula. By inputting the reduction of air flow from the cracks in the formula (instead of the airflow Q), it is possible to calculate the energy savings resulting from installing a heat-shrink film.

$$E = Cp \times Q \times HDD \times 24 \quad (1)$$

Where:

E: Energy saved in kWh

Cp = 0.001208 in kJ/(l.°C) specific heat capacity of air

Q: Reduction of air flow entering through the cracks in l/s

HDD: Heating degree days in °C

24: Constant (24 hrs/day)

Then, by dividing the energy E by the window area, the energy ratio reduction attributable to the heat-shrink film in Nova Scotia can be estimated.

Heating Degree Days

A previous project undertaken by the Evaluator showed that the thermal balance point of a residential building usually ranged from 13°C to 17°C. So, the Evaluator recommends calculating the heating degree days with 15°C as a reference temperature. Environment Canada provides climate normal station data between 1981 and 2010 for numerous Canadian cities, including many in Nova Scotia¹².

¹¹ Standards and Guidelines Energy Conservation, Technical Information EC 128, Don Hampton, 1980.

¹² http://climate.weather.gc.ca/climate_normals/index_e.html

So, the degree days below 15°C from the normal station data of Environment Canada are used to determine the savings associated with heat-shrink film installed on windows.

Three major cities or areas in Nova Scotia have been selected to represent an average climate throughout the province: Halifax, Sydney and Truro. The degree days of these cities are presented in Table 13.

Table 13: Heating Degree Days below 15°C in Representative Cities in Nova Scotia

	Halifax	Truro	Sydney	Nova Scotia Average
Heating Degree Days (15°C.day)	3,071.8	3,536.9	3,573.1	3,393.9

The difference between the Nova Scotia average and the cities' degree days is less than 10 percent for each city, which means that this Nova Scotia degree-days average can be applied to the whole province.

Airflow Entering through the Cracks

The EC128 code defines the airflow entering through cracks in a building using the following equation:

$$Q = k \times A \times (\Delta p)^n \quad (2)$$

Where:

Q: Air flow entering through the cracks in l/s

k: Average air flow due to differential pressure between the exterior and the interior of the building for an area of 1 m² in l/(s.Pa.m²)

A: Area of the cracks in m²

Δp^n : Average pressure due to wind on a wall in Pa

This equation is used to define the heat-shrink film's usefulness in reducing the air flow entering through the cracks.

The EC128 technical information defines three values for the factor k, depending on the ratio of building volume in liters divided by the window area in m². The Evaluator calculated the ratio based on data gathered in HOT2000 files of HEA program and obtained a value between 10,000 and 20,000, which corresponds to a Type 2 building. For this type of building, the recommended value in the EC128 for the factor k is $400 \frac{\text{L}}{\text{s.Pa.m}^2}$.

The area of the cracks is defined for a typical window using effective air leakage area of building components from Chapter 25 of the 1997 ASHRAE Fundamental Handbook. The effective air leakage area of the window is determined in cm² per linear meter of crack (lmc) or frame (lmf), depending on the window type. For the purpose of this evaluation, since the window on which the heat-shrink film is

installed may have quite a few leaks, it is assumed that the length of the cracks is proportional to the perimeter of the frame.

The effective air leakage area of a window with a heat-shrink film is estimated at 0.018 cm²/lmf.

Based on its knowledge of Nova Scotia's residential building stock accumulated from numerous audits and energy simulations in HOT2000 conducted for ENSC and other institutions, the Evaluator has defined a typical window on which the heat-shrink film is installed. The technical data of this window are presented in Table 14.

Table 14: Technical Data of the Typical Window with Heat-shrink Film

Window Type	Average Frame Perimeter	Average Window Area	Average Effective Air Leakage Area	Air Leakage Reduction due to Heat-shrink Film
Casement, Wood Frame, Double Pane, Narrow Space	8.79 [m]	3.35 [m ²]	0.24 [cm ² /lmc]	0.222 [cm ² /lmc]

Finally, based on the statistical data provided by the survey, the average number of windows on which heat-shrink film was installed in each residential building was established at 3.9. Therefore, the area of cracks reduction to be used to calculate the airflow reduction in Equation (2) mentioned above is $A = 0.000761 \text{ m}^2$.

The average pressure due to wind on a wall is calculated using the following equation:

$$(\Delta_p)^n = (0.0134 \times v^2)^{0.65} \quad (3)$$

v : Average wind speed during heating period in km/h

0.65: Dimensionless constant¹³

0.0134: Constant value in kg/m³.¹⁴

¹³ Walker and al. (1997), Ashrae Fundamental 2009, 16.15.

¹⁴ This value has been calculated according to the Bernoulli equation, and the wind modification equation of ASHRAE fundamental 2009, 24.3 eq. 4 (given the fact that a meteorological station is situated in a flat area without obstacles and the buildings are usually situated in areas with higher urban density). The Cp coefficient applied to the Bernoulli equation from ASHRAE Fundamental 2009 illustrates the fact that the wind can enter into a crack through different angles.

Environment Canada provides climate station data collected between 1981 and 2010 for the average wind speeds at four airports in Nova Scotia: Halifax, Greenwood, Sydney and Yarmouth. The annual average wind speeds have been calculated for the heating period between January through May and September through December, as shown in the following table.

Table 15: Average Wind Speeds

Month	Jan.	Feb.	Mar.	Apr.	May	Sep.	Oct.	Nov.	Dec.	Annual Average
Halifax	17.7	18.3	18.5	18.3	16.5	14.4	16.0	17.5	18.3	17.3
Greenwood	16.5	16.1	16.3	15.9	14	11.7	13.5	15.2	16.4	15.1
Sydney	19.8	19.7	19.6	18.7	16.8	15.4	17.0	18.2	19.8	18.3
Yarmouth	20.7	20.4	19.9	19.3	16.8	14.8	17.2	19.0	20.6	18.7

The average wind speed during the heating period is 17.4 km/h. So, $(\Delta p)^n$ is equal to 2.48 Pa. The air flow reduction attributable to the heat-shrink film for the typical window is calculated as follows:

$$Q = k \times A \times (\Delta p)^n = 400 \times 0.000761 \times 2.48 = 0.75 \text{ l/s}$$

Energy Calculation

The average participant's energy savings associated with a typical window equipped with heat-shrink film in a residential building in Nova Scotia are calculated as follows:

$$\text{Energy kWh} = C_p \times Q \times HDD \times 24 = 0.001208 \times 0.75 \times 3,393.9 \times 24 = 74.2$$

In the survey, participants were asked whether they insulated their windows with heat-shrink film in the preceding 12 months. Twenty-five participants had implemented this tip, which translates into an implementation ratio of 7.4 percent.

6.1.4 Reduce Shower Time

The Econoler team calculated the unitary savings value by conducting a literature review to validate the assumptions used by the Ontario Power Authority (OPA) and by using the results from the survey. The OPA provides assumptions for the average temperature rise for domestic hot water. The value of 73 percent domestic hot water in showerhead flow was obtained from the CBEEDAC¹⁵ and the average showerhead flow rate (2.4 gpm) was obtained from a study of the 2014 Residential Direct Install (RDI) participants.

In the survey, participants were asked to specify the typical duration of their shower in minutes respectively for the period prior to their signing up online for HER and the period after their sign-up.

¹⁵ Canadian Building Energy End-Use Data & Analysis Centre, *Domestic Water Heating and Water Heater Energy Consumption in Canada*, April 2005, page 29.

The average participant shortened shower time from 10 minutes to 6.6 minutes, which can be translated into a decrease of 6 gpd of hot water use per person per day.

Table 16 lists the variables used to establish this unitary savings value.

Table 16: Revised Unitary Savings Value for Low-flow Showerheads¹⁶

Parameter	Unitary Savings (kWh/year)	Source
Number of People Whose Behavioural Change is Accounted for	1	
Flow Rate of the Showerhead (F)	2.4 gpm	2014 RDI Database
Average Shower Time Before Participating in HER (T _{bef})	10 min	2014 HER Survey
Average Shower Time After Participating in HER (T _{aft})	6.6 min	2014 HER Survey
Proportion of Hot Water in Showerhead Flow (p)	73%	CBEEDAC
Average Reduction in Hot Water Use (gpd)	6	Calculation
Specific Heat of Water (Cp)	1 Btu/lb°F	Convention
Density of Water (ρ)	62.426 lb/ft ³	Convention
Temperature Rise in Electric Water Heater (ΔT)	79°F	2011 OPA
Days per Year	365	2011 OPA
Unit Conversion #1 (UC1)	1 kWh/3,413 Btu	Convention
Unit Conversion #2 (UC2)	0.1337 ft ³ /gal	Convention
Electric Water Heater Efficiency (η)	97%	Pennsylvania Public Utility Commission TRM ¹⁷
Unitary Savings	433X kWh/year	

The following algorithm has been used to calculate this unitary savings value:

$$\Delta kWh = \frac{(T_{bef} - T_{aft}) \times F \times p \times Cp \times \rho \times \Delta T \times \frac{Days}{yr} \times UC1 \times UC2}{\eta}$$

$$\Delta kWh = \frac{(10 - 6.6) \times 2.4 \times 73\% \times 1 \times 62.426 \times 79 \times 365 \times \left(\frac{1}{3412}\right) \times 0.1337}{97\%}$$

$$\Delta kWh = 433 \text{ kWh per year}$$

¹⁶ Pennsylvania Public Utility Commission, *Technical Reference Manual*, State of Pennsylvania, June 2013, pages 45–48.

¹⁷ Pennsylvania Public Utility Commission, *Technical Reference Manual*, "State of Pennsylvania," June 2013, page 174.

An adjustment factor has to be applied to this number to reflect the share of electric water heating in Nova Scotia, which is 27 percent based on NRCAN's data.¹⁸

$$\Delta kWh\ electric = 117\ kWh\ per\ year$$

The survey showed that 135 participants had implemented this tip, which translates into an implementation ratio of 39.7 percent.

6.1.5 Turn Off the Computer at Night

It is a common knowledge that many households never turn off their computers when they are not used. Turning them off will yield energy savings. The following table shows the average off-mode and sleep-mode power consumption levels for both the basic desktop and the efficient desktop.

Table 17: Average Power Use of the “Off Mode”¹⁹

Mode	Basic Desktop	Efficient Desktop
Off	2.0 W	1.1 W
Sleep	4.0 W	2.4 W

In the survey, participants were asked to specify:

- › The number of times they turned off their computers at night each week for the period prior to their signing up online for HER and the period following their sign-up
- › Whether they had a laptop or a desktop
- › Whether the power-saving mode on their computers was in use; the wait time (in minutes) it took for their computers to go into the power-saving mode.

Based on the survey results and on the OPA Prescriptive Measures and Assumptions, Econoler has established the following averages:

- › The “off-mode power use average”: 1.7 W
- › The “sleep-mode power use average”: 3.5 W
- › The average increase in the number of days per week with the computer turned off: 1.5 days.

¹⁸ Natural Resources Canada, *Comprehensive Energy Use Database: Residential Sector – Nova Scotia – Table 10: Water Heating Secondary Energy Use and GHG Emissions by Energy Source*,
<http://oee.nrcan.gc.ca/corporate/statistics/neud/dpa/showTable.cfm?type=CP§or=res&juris=ns&m=10&page=4&CFID=31970021&CFTOKEN=fed6e0b3f51f8fc8-C05E90B0-B973-A582-25DA340381F0B679> (Last accessed December 3, 2014)

¹⁹ Ontario Power Authority (OPA), *2011 Prescriptive Measures and Assumptions*, Release Version 1, December 2010.

OPA also assigns a weighting of 55 percent to the time during which the computer is in the off-mode each day. The potential savings associated with turning off the computer instead of leaving it in the sleep-mode is represented in the following equation:

$$kWh = (1.7 W) \times 1.5 \frac{\text{days}}{\text{week}} \times 24 \frac{\text{hours}}{\text{days}} \times 52 \text{ weeks} \times 55\% = 1.75 kWh$$

The survey showed that 80 participants with desktop computers had implemented this tip, which translates into an implementation ratio of 23.5 percent.

6.1.6 Wash Clothes in Cold Water

To establish the average annual savings value per participant, the following method was used:

- › For both the control group and the treatment group: establishing their number of laundry loads done per week and their number of loads done in warm water, using the results of the annual phone survey
- › Estimating the energy required for water heating for each load of laundry done in warm water.

In the survey, participants were asked to specify the number of loads of clothes their households washed per week and the number of loads washed per week using cold water for the period prior to their signing up online for HER and the period after their sign-up. The following table shows the average numbers of laundry loads and cold-water laundry loads done per week per household.

Table 18: Average Number of Laundry Loads per Week

Tip Application	Total Loads per Week	Cold water Loads per Week	Proportion of Loads Done in Warm Water
Before	4.4	3.3	1.1
After	4.4	3.7	0.7

As shown in Table 18, participants' number of warm-water laundry loads had decreased by nine percent. Engineering calculations were made to evaluate the annual electricity consumption for water-heating for clothes washers. The nine percent of reduction can then be applied to this value to estimate the unitary savings value per participant.

Water-heating Energy Usage per Load

Econoler used the total energy consumption value for a clothes washer from the 2013 Instant Savings evaluation report; this value was established based on the average Modified Energy Factor (MEF) of all the non-compact non-ENERGY STAR clothes washers in the Energy Efficiency Ratings directory.²⁰

²⁰ Natural Resources Canada, *Energy Efficiency Ratings: Search – Clothes Washers*, < <http://oee.nrcan.gc.ca/pml-imp/index.cfm?action=app.search-recherche&appliance=CLOTHESWASHERS>> (Last accessed November 24, 2014)

By applying an MEF of 40.5 L/kWh/cycle and a capacity of 124.9 L, a consumption value of 3.08 kWh per load was established. This value represents the total energy used throughout the entire clothes-washing process, including the movement of the washing machine, water-heating and heat required to remove the remaining moisture in the wash load.

According to Hydro-Québec's efficient appliances program evaluation report²¹, the proportion of the total energy use for water-heating amounts to 24.8 percent. Therefore, the water-heating energy consumption can be established at 0.76 kWh per load.

However, a comprehensive survey on household energy usage conducted by Hydro-Québec²² in the province of Quebec showed that Quebecers used on average 33 percent less energy to heat water for clothes-washing than what is assumed in the Canadian Standard Association (CSA) test procedure. The Evaluator considers that there is no evidence showing that laundry behaviours in Nova Scotia are significantly different from those in Quebec. Therefore, this same factor value and the CSA-defined MEF have been applied to estimate the energy use, resulting in an adjusted water-heating energy consumption value of 0.51 kWh.

²¹ Ad Hoc Recherche, *Rapport d'évaluation, Programme : Produits Mieux Consommer – Électroménagers Energy Star (Années 2008 et 2009)*, p. 18, available at < http://www.regie-energie.qc.ca/audiences/Suivis/Suivi-R-3644-2007-ProcedurePGEE/HQD_RapportEvaluationPGEE_Electro_02fev2012.pdf >

²² Ad Hoc Recherche, *Rapport d'évaluation, Programme : Produits Mieux Consommer – Électroménagers Energy Star (Années 2008 et 2009)*, p. 19, available at < http://www.regie-energie.qc.ca/audiences/Suivis/Suivi-R-3644-2007-ProcedurePGEE/HQD_RapportEvaluationPGEE_Electro_02fev2012.pdf >

Water-heating Electricity per Load

The percentage of hot water produced with electricity was then determined. First, the percentage of the washing machines with their own electrical resistance to heat water was obtained from the ENERGY STAR database for the five most popular models sold through Instant Savings in 2013. This same percentage was applied to standard clothes washers, because the information was not available for standard washers. For washing machines with an internal heater, it is assumed that 100 percent of the water-heating is done with electricity. For clothes washers using a DHW tank as their heating source, the proportion of electric DHW tanks (as obtained from the Instant Savings tracking sheet) was used to calculate the overall proportion of electricity-heated water. This value is 37 percent (14 percent of internal electric heater + 23 percent of electric DHW tanks), as shown in the table below.

Table 19: Water-heating Sources for Clothes Washers²³

Source of Hot Water for Clothes Washers	Clothes Washer Water-heating	DHW Tank Type	Proportion	Clothes Washer Energy Source
Internal Electric Heater	14%	-	-	14%
DHW Tank	86%	Electric	27%	23%
		Non-electric	73%	63%

By multiplying this ratio of 37 percent by the total energy use for water-heating per laundry load (0.51 kWh), the electricity use for water-heating per laundry load has been established at 0.19 kWh.

Adjustment for the Age of Clothes Washers

Because the MEF and capacity were first extracted from currently available data on new clothes washers in 2013, an adjustment had to be made to account for the increased energy efficiency of clothes washers over time. To do so, the average water-usage data was obtained from Natural Resources Canada²⁴ for each year in the period of 2005 through 2010 (the last year with available data), as shown in the table below.

Table 20: Average Water Usage of Clothes Washers per Year of Purchase

	2005	2006	2007	2008	2009	2010
Liters per cycle	1.45	1.25	1.16	1.14	1.09	0.82

²³ Natural Resources Canada, *Comprehensive Energy Use Database: Residential Sector – Nova Scotia – Table 10: Water Heating Secondary Energy Use and GHG Emissions by Energy Source*,

<<http://oee.nrcan.gc.ca/corporate/statistics/neud/dpa/showTable.cfm?type=CP§or=res&juris=ns&rn=10&page=4&CFID=31970021&CFTOKEN=fed6e0b3f51f8fc8-C05E90B0-B973-A582-25DA340381F0B679>> (Last accessed December 3, 2014)

²⁴ Natural Resources Canada, *Energy Consumption of Major Household Appliances Shipped in Canada, Trends for 1990-2010*, <<http://www.nrcan.gc.ca/sites/oee.nrcan.gc.ca/files/pdf/publications/statistics/cama12/cama12.pdf>> (Last accessed December 3, 2014)

Based on the values in Table 20, the average increase of water consumption per additional year of clothes washer use has been established at 12 percent. The survey conducted with RDI Community Based Social Marketing (CBSM) Pilot participants showed that these participants' clothes washers were seven years old on average; therefore, the volume of water used by these washers has been estimated to be 2.2 times that of clothes washers purchased in 2013. Since water-heating energy use is directly proportional to the amount of water used by the washer, by multiplying the electricity use per load value (0.19 kWh) by this factor (2.2 times), the average water-heating energy use for old washers is estimated at 0.42 kWh/load.

Unitary Savings Value

As previously discussed, CBSM Pilot participants achieved an average warm-water-usage reduction of 9 percent in comparison to the control group. This reduction percentage, multiplied by the water heating electricity use per load, the average number of laundry loads/week and the number of weeks/year, results in an annual unitary savings value of 8.6 kWh/participant, as represented in the following equation:

$$\text{Annual unitary savings} = 0.42 \frac{\text{kWh}}{\text{load}} \times 9\% \times \frac{4.4 \text{ loads}}{\text{week}} \times 52 \frac{\text{weeks}}{\text{year}} = 8.6 \text{ kWh/year}$$

The survey showed that 178 participants implemented this tip, which translates into an implementation ratio of 52.4 percent.

6.1.7 Hang Laundry to Dry

To calculate the unitary savings value associated with this behaviour, the energy consumption of the clothes dryer was estimated for each laundry load.

Using the results of the 2014 annual survey for RDI, the average age of clothes washers was established at seven years. The Evaluator considers that a similar average age can be assumed for clothes dryers, since both types of appliances are normally purchased at the same time. Therefore, the average annual energy consumption value of the clothes dryer made in 2007 was used, namely 912 kWh/year (based on 416 operations per year).²⁵ This has resulted in a unitary energy consumption value of 2.214 kWh/load.

²⁵ Natural Resources Canada, *Energy Consumption of Major Household Appliances Shipped in Canada, Summary Report, Trends for 1900-2007*, December 2009, p. 43.

Survey participants were asked to specify the number of laundry loads their household did per week and the number of laundry loads that were hung to dry in a typical week prior to their signing up online for the HER and after their sign-up. The survey results showed that participants increased their loads hung to dry by 0.5 load on average. Therefore, the following equations were used to calculate the unitary savings value associated with the 0.5 increased hang-to-dry laundry load per week.

$$\text{Clothes dryer consumption per load} = \frac{912 \frac{\text{kWh}}{\text{year}}}{416 \frac{\text{loads}}{\text{year}}} = 2.214 \frac{\text{kWh}}{\text{load}}$$

$$\text{Unitary savings value} = 2.214 \frac{\text{kWh}}{\text{load}} \times 21 \frac{\text{loads}}{\text{year}} = 46.5 \frac{\text{kWh}}{\text{year}}$$

The Evaluator accounted for the proportion of electric clothes dryers in Nova Scotia to calculate electricity savings. Based on data from 2011, there were fewer than 100 natural gas clothes dryers in Nova Scotia, in contrast to over 322,000 electric clothes dryers²⁶. Therefore, it was considered that 100 percent of the savings were in electricity.

The survey showed that 157 participants implemented this tip, which translates into an implementation ratio of 46.2 percent.

6.2 Gross Savings

This section presents the gross savings associated with HER's web-based component.

Gross Energy Savings

The annual gross savings for each category of products installed through the program are presented in Table 21 for 2013 and in Table 22 for 2014. They were calculated using the number of unique visitors to the web portal (paper-based participants who also connected to the web portal were removed to ensure that savings were not double counted), the revised unitary savings values and the implementation ratios presented in the previous sections. Overall, the total gross energy savings amounted to 0.444 GWh at the meter.

The gross savings at the generator are also estimated in the following tables, using a line loss factor of 1.100 between the meter and the generator. This value was provided by Nova Scotia Power for residential customers. As a result, the gross energy savings at the generator have been established at 0.488 GWh.

²⁶ Natural Resources Canada, *Comprehensive Energy Use Database: Residential Sector – Nova Scotia – Table 31: Appliance Stock by Appliance Type and Energy Source*, <
<http://oee.nrcan.gc.ca/corporate/statistics/neud/dpa/showTable.cfm?type=CP§or=res&juris=ns&rn=31&page=4&CFID=34383841&CFTOKEN=79ae388119c57de9-F668F1E3-B327-DE62-173697CB9049C418>> (Last accessed December 3, 2014)

Table 21: Web-based Component Evaluation Results for 2013 – Total Gross Energy Savings

Category of Product	Energy-efficient Dishwasher	Energy-efficient Room Air-conditioner	Insulate Windows with Heat-shrink Film	Reducing Shower Time	Turn off the Computer at Night	Wash Clothes with Cold Water	Hang Laundry to Dry	Total
Tracking Sheet								
Number of Participants	2,739							
Evaluated Energy Savings								
Implementation Ratio	0.094	0.047	0.074	0.397	0.235	0.524	0.462	-
Unitary Savings Value (kWh)	38.00	80.00	74.20	117.00	1.75	8.60	46.50	-
Total Gross Energy Savings – at Meter (GWh)	0.010	0.010	0.015	0.127	0.001	0.012	0.059	0.235
Line Loss Factor	1.100	1.100	1.100	1.100	1.100	1.100	1.100	-
Total Gross Energy Savings – at Generator (GWh)	0.011	0.011	0.017	0.140	0.001	0.014	0.065	0.258

Table 22: Web-based Component Evaluation Results for 2014 – Total Gross Energy Savings

Category of Product	Energy-efficient Dishwasher	Energy-efficient Room Air-conditioner	Insulate Windows with Heat-shrink Film	Reducing Shower Time	Turn off the Computer at Night	Wash Clothes with Cold Water	Hang Laundry to Dry	Total
Tracking Sheet								
Number of Participants	2,441							
Evaluated Energy Savings								
Implementation Ratio	0.094	0.047	0.074	0.397	0.235	0.524	0.462	-
Unitary Savings Value (kWh)	38.00	80.00	74.20	117.00	1.75	8.60	46.50	-
Total Gross Energy Savings – at Meter (GWh)	0.009	0.009	0.013	0.113	0.001	0.011	0.052	0.209
Line Loss Factor	1.100	1.100	1.100	1.100	1.100	1.100	1.100	-
Total Gross Energy Savings – at Generator (GWh)	0.010	0.010	0.015	0.125	0.001	0.012	0.058	0.230

Gross Peak Demand Savings

Some of the tips selected to calculate energy savings might have also achieved a certain level of peak demand savings. However, additional information is required to estimate the demand savings attributable to each tip that contributed to reducing the peak demand on the electricity distribution system. Other ENSC components use an on-peak demand-to-energy ratio, which was calculated by Navigant from the modelled savings of specific measures involved in the 2013-2015 DSM Plan. Unfortunately, the HER component was not included in the DSM Plan. Since the set of measures used by HER were only applied to this component, it is not possible to use the on-peak demand-to-energy ratio of another program. Given that the impact of the web-based component is small, the Evaluator has decided that no peak demand savings are attributed to this component for 2014.

6.3 Net-to-gross Ratio

This section discusses HER web-based component's NTGR evaluation, which included the assessment of the free-ridership level associated with each product category.

6.3.1 Free-ridership

In HER's web-based component, free-ridership occurs when participants declare that they would still have implemented the energy-efficient measures in the absence of the program. The free-ridership level of each product category was assessed through a survey of web-based participants using questions designed to determine the level of influence that HER had on participants' decisions by trying to measure the following variables:

- › The probability that participants would still have adopted the same energy efficiency behavior if they had not visited the HER web portal.
- › The level of influence that the online home energy report had on the participants' decisions to adopt this behavior.

The responses to each question were then converted into a level of program attribution, which was used to calculate the overall free-ridership level of each product category.

6.3.2 NTGR Calculation

The NTGR value of each product category has been established by applying its free-ridership level established and the following equation:

$$NTGR = (1 - \% \text{ free-ridership})$$

The table below summarizes the results of these calculations.

Table 23: Net-to-gross Ratios

Product Category	Free-Ridership	NTGR
Energy-efficiency Dishwasher	73%	27%
Energy-efficiency Room Air-conditioner	54%	46%
Insulate Windows with Heat-shrink Film	83%	17%
Reducing Shower Time	41%	59%
Turn off the Computer at Night	51%	49%
Wash Clothes with Cold Water	82%	18%
Hang Laundry to Dry	75%	25%

6.4 Net Savings

The net energy savings were estimated by applying the NTGR to the gross energy savings value in the following equation.

$$\text{Net Energy Savings} = \text{Gross Energy Savings} \times \text{NTGR}$$

Since each product category's NTGR was different, the net energy savings were calculated separately for each of them. The tables below summarize the results of these calculations.

Overall, the total net energy savings amounted to 0.194 GWh at the meter and 0.213 GWh at the generator.

Table 24: Web-based Component Evaluation Results for 2013 – Total Net Energy Savings

Product Category	Energy-efficient Dishwasher	Energy-efficient Room Air-conditioner	Insulate Windows with Heat-shrink Film	Reducing Shower Time	Turn off the Computer at Night	Wash Clothes with Cold Water	Hang laundry to dry	Total
Energy Savings								
Gross Energy Savings – at Meter (GWh)	0.010	0.010	0.015	0.127	0.001	0.012	0.059	0.235
NTGR	27%	46%	17%	59%	49%	18%	25%	-
Net Energy Savings – at Meter (GWh)	0.003	0.005	0.003	0.075	0.001	0.002	0.015	0.102
Line Loss Factor	1.100	1.100	1.100	1.100	1.100	1.100	1.100	1.100
Net Energy Savings – at Generator (GWh)	0.003	0.005	0.003	0.083	0.001	0.002	0.016	0.113

Table 25: Web-based Component Evaluation Results for 2014 – Total Net Energy Savings

Product Category	Energy-efficient Dishwasher	Energy-efficient Room Air-conditioner	Insulate Windows with Heat-shrink Film	Reducing Shower Time	Turn off the Computer at Night	Wash Clothes with Cold Water	Hang laundry to dry	Total
Energy Savings								
Gross Energy Savings – at Meter (GWh)	0.009	0.009	0.013	0.113	0.001	0.011	0.052	0.209
NTGR	27%	46%	17%	59%	49%	18%	25%	-
Net Energy Savings – at Meter (GWh)	0.002	0.004	0.002	0.067	0.000	0.002	0.013	0.091
Line Loss Factor	1.100	1.100	1.100	1.100	1.100	1.100	1.100	1.100
Net Energy Savings – at Generator (GWh)	0.003	0.005	0.003	0.074	0.001	0.002	0.014	0.100

7 OVERALL HER RESULTS

This section summarizes the overall results of the impact evaluation of HER. With the net savings achieved by both the paper-based and web-based components combined, the total energy savings amounted to 34.711 GWh, and the peak demand savings amounted to 3.938 MW. The table below presents the total net savings established by the impact evaluation of HER.

Table 26: Total Evaluated Savings at the Generator for HER

	Net Savings		
	2013	2014	Total
Energy Savings			
Paper-based Participants (GWh)	9.162	25.336	34.498
Web-based Participants (GWh)	0.113	0.100	0.213
Total	9.275	25.437	34.711
Peak Demand Savings			
Report-based Participants (MW)	1.046	2.892	3.938

CONCLUSION

Launched in 2013, HER is an innovative program intended to promote behavioural changes towards greater energy efficiency. Since its inception, a total of 93,119 participants have taken part in the paper-based component of HER, and 10,662 participants in the web-based component. The 2014 evaluation revealed that three-quarters of the web-based participants recalled signing up for HER, and that the majority of them were satisfied with the program and the report they received. The Evaluator did review a sample report and was satisfied with its overall quality and content.

The 2014 evaluation of HER also demonstrated that the paper-based component seemed to be achieving the expected results in terms of changing participants' electricity consumption behaviour. The impact of the web-based component, however, has been more difficult to evaluate and the Evaluator has not been able to establish any significant level of savings associated with this component.

Participants in the web-based component of HER generally provided low ratings when asked about the influence that HER had on their adoption of energy-efficient behaviours, such as purchasing energy-efficient appliances, reducing their shower time, turning off their computers at night, hanging their laundry to dry, installing heat-shrink film and washing clothes in cold water. The majority of respondents mentioned that it would have been likely for them to adopt these energy-efficient behaviours without HER. That said, when comparing their specific behaviours prior to and after their participation in HER, it was found that there had been changes in their behaviours following their participation in HER. For example, the average participant hung their laundry to dry more often, did more loads of laundry in cold water, turned off their computers at night more often and reduced their shower time.

The evaluation revealed that the HER paper-based component generated net energy savings of 34.498 GWh and the web-based component generated net savings of 0.291 GWh; in total, HER has generated 34.789 GWh in net savings since its inception in 2013. To calculate the net savings of HER, the Econoler team first reviewed the methodology used by Opower for calculating the paper-based component savings. In addition, Econoler defined the unitary savings values for seven specific tips recommended to participants by the web-based component. The participant survey was used to estimate the number of participants who had implemented the identified tips and they were asked questions to determine the level of influence that HER had on the participant's decision to implement the seven tips recommended. The energy savings achieved by these two components are considered net savings, since they have already included the program's influence on the participant's decision, by using a control group comparison for the paper-based component and a self-declared approach for the web-based component.

APPENDIX I

2014 RECOMMENDATIONS

This Appendix summarizes all the recommendations made by the Evaluator throughout this report as well as the sections from which the recommendations originated.

Sections	Recommendations
Executive Summary	1 Explain in greater detail the characteristics of HER in the program documentation. Designed to influence and change participants' electricity use behaviour, HER is different from other program components undertaken by ENSC. The specific and particular challenges and characteristics of this component should be clearly made known to program staff and the Evaluator. The program manual and the evaluation plan should be used to document and present all this information. Therefore, the Evaluator recommends that the program manual and the evaluation plan explain in greater detail the following elements of HER: › The number of selected participants. The program manual explains how participating households were selected, but the number does not correspond to the number of those finally selected by Opower. › The process for selecting the tips recommended to participants. › All the program documents available or developed when designing HER. It is of crucial importance that Opower help develop a comprehensive evaluation plan by listing all the data available, including methodologies, databases, and any data-collection tools available or program documents so that the Evaluator knows how to evaluate the program and what other data to be collected.
	2 Review the raw and treated databases from Opower. Some confidentiality issues could not be solved within the evaluation timeframe and it was impossible for the Evaluator to review the raw data that Opower received and the treated data upon which it had applied the adjustments. For this evaluation, the Evaluator reviewed the adjustment methodology provided by Opower and considered the logic underlying this methodology to be sound. However, it is recommended that both databases be reviewed to validate whether the adjustments were applied as defined in the methodology. This review should be conducted in the next evaluation now that the confidentiality issues have been solved.
	3 Conduct a billing analysis to compare the pre-participation electricity consumption of the treatment and control groups. Socio-demographic data were analyzed and statistical tests were conducted to validate whether the control group selected was comparable to the treatment group (participants). An additional interesting test could be to analyze past electricity consumption from both groups. This analysis would help determine whether the savings observed through the billing analysis are attributable to HER and not to any other trend that could be observed with the treatment group, but not with the control group. An analysis of the electricity consumption trend for a five-year period should be conducted as part of the next evaluation.

Sections	Recommendations
Program Documentation	4 The program manual mentions that Opower follows a set of criteria when creating both the treatment and the control groups. The Evaluator recommends that ENSC consider adding the age of the home to this set of criteria to indicate the particular building code according to which a house was built.
	5 The latest version of the tip library has 92 pages. To allow for easier navigation throughout the tip library, the Evaluator suggests creating and placing an index at the beginning of the library to group similar tips under a number of more general topic areas, thereby making it easier for the reader to locate particular groups of tips in the library. For instance, several tips regarding heating, lighting, and hot water can be grouped under the topic area of “electricity end-use”. To better organize the tip library, another option is to divide the tips into two categories: behavioural change and resource acquisition.

APPENDIX II

PARTICIPANT SURVEY QUESTIONNAIRE

Hello may I please speak with [INSERT NAME]?

1. Yes [GOTO INTRODUCTION]
2. No [SAY "Perhaps you can help me anyway." GO TO INTRODUCTION]

INTRODUCTION

I2. Hello, my name is _____ and I am with CRA (Corporate Research Associates), and we are performing a study on energy efficiency behaviours among households in Nova Scotia for Efficiency Nova Scotia Corporation (ENSC). We would appreciate your collaboration in answering questions related to your household's energy usage patterns and consumption. The information you provide will be used to help Efficiency Nova Scotia improve its energy efficiency services. The survey will take about fifteen minutes. Is this a good time for you?

1. Yes [CONTINUE]
2. No, I am not the person best suited to answer questions on my household's energy usage patterns and consumption [PROMPT: "Is there someone else in the household who would know about your home's energy usage patterns and consumption?"]
3. Yes [ASK TO SPEAK TO THEM AND REPEAT INTRODUCTION]

No [THANK & TERMINATE]

99. Refused [THANK AND TERMINATE]

[IF REFUSED, ASK "Can we schedule a more convenient time for you to conduct this survey?"

[SCHEDULED, IF NECESSARY, FOR: _____]

Behaviour Changes (Series B)

[ASK ALL PARTICIPANTS]

- B1. In the last 12 months, did you or someone else in your household purchase one or more energy-efficient appliances for your home?
1. Yes
 2. No [GO TO B5]
 8. (Don't Know) [GO TO B5]
 9. (Refused) [GO TO B5]

- B2. I am going to read you a list of energy-efficient appliances that your household may have purchased. For each one, can you please tell me if you or someone else from your household purchased it in the last 12 months [1=YES, PURCHASED, 2=NO, NOT PURCHASED, 8=DON'T KNOW, 9=REFUSED]?
- Energy-efficient refrigerator
 - Energy-efficient clothes washer
 - Energy-efficient dishwasher
 - Energy-efficient freezer
 - Energy-efficient room air conditioner
 - Any other energy-efficient appliance? SPECIFY: _____
- B3. [ASK IF B2a-e = YES] How many [INSERT ANSWER B2a-e] did you purchase in the last 12 months? [RECORD NUMBER. PROBE FOR SPECIFIC ANSWER. 98=DON'T KNOW, 99=REFUSED]
- B4. In the last 12 months, have you taken any steps to reduce your home energy use?
- Yes
 - No [GO TO H1]
 - (Don't Know) [GO TO H1]
 - (Refused) [GO TO H1]
- B5. I am going to read you a list of energy-efficient behaviours that your household may have adopted. For each one, can you please tell me if your household has adopted it in the last 12 months [1=YES, 2=NO, 3=I WAS ALREADY DOING THAT, 8=DON'T KNOW, 9=REFUSED]?
- Insulate your windows with heat-shrink film
 - Hang laundry to dry
 - Wash clothes in cold water
 - Turn off your computer at night
 - Reduce shower time
 - Reduce your refrigerator's temperature set point
 - Turn off lights when not needed
 - Adjust the display of your television by reducing the brightness and contrast
 - Turn off your water heater when you're away
 - Use a ceiling fan rather than air conditioning
 - Use a home power monitor to have real-time feedback on your electricity consumption

[NOTE TO INTERVIEWERS – READ IF NECESSARY IN B5a: A heat-shrink film is a transparent plastic film that you stick to your window frame inside your house and that you heat with a hair dryer to stretch it and remove creases.]

Home Energy Report (Series H)

[ASK ALL PARTICIPANTS]

H1. Do you recall having signed up on the Efficiency Nova Scotia website to have access to an online report which compares your household's electricity usage to similar homes, illustrates energy usage patterns and provides you with energy efficiency tips to help you reduce your energy consumption?

1. Yes
2. No [GO TO DEMOGRAPHICS]
8. (Don't Know) [GO TO DEMOGRAPHICS]
9. (Refused) [GO TO DEMOGRAPHICS]

H2. Thinking of this online report, in general, what have you done with it? Did you... [ACCEPT ONE RESPONSE]

1. Read the website content thoroughly
2. Read some of the website's content
3. Skim some of the website's content
4. Glance at the pictures, graphs, or headlines
6. (Other) [SPECIFY _____]
8. (Don't know)
9. (Refused)

For the purpose of the survey, when referring to this online report, I will call it the Home Energy Report.

Program Participation (Series P)

P1. What was the SINGLE most important reason you decided to sign up online for your Home Energy Report? [ACCEPT ONE RESPONSE] [DO NOT READ]

1. (To save on energy/to save on energy costs)
2. (Comfort)
3. (To help the environment)
4. (Reduce greenhouse gases)
5. (To reduce my water consumption)
6. (To find out/improve my home energy rank compared to other similar houses)
7. (To get Air Miles)
96. (Other) [SPECIFY _____]
98. (Don't know) [GO TO P3]
99. (Refused) [GO TO P3]

P2. Were there any other reasons? [DO NOT READ. ACCEPT MULTIPLE. SAME LIST AS P1]

P3. Before signing up for the Home Energy Report, had you participated in any of Efficiency Nova Scotia's energy efficiency programs?

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

P4. [ASK IF P3=YES] Which Efficiency Nova Scotia programs did you participate in before the Home Energy Report? [RECORD VERBATIM ANSWER. ALLOW MULTIPLE. 98=DON'T KNOW, 99=REFUSED]

Tips (Series B)

Questions on Tips: Buy Energy-efficient Appliances

[ASK BF1 TO BF4 SERIES IF PURCHASED ENERGY-EFFICIENT DISHWASHER (B2c=YES) OR ENERGY-EFFICIENT ROOM AIR CONDITIONER (B2e=YES); ASK TWICE IF PURCHASED BOTH; OTHERWISE SKIP TO BW1.]

We now have a few questions about your decision to purchase an energy efficient appliance in the last 12 months.

BF1. What makes you think the [dishwasher/ the room air conditioner] unit(s) you purchased in the last 12 months is/are energy-efficient? [DO NOT READ. ACCEPT MULTIPLE]

1. (The Energy Star symbol on the appliance)
2. (The store salesperson told me it was energy-efficient)
3. (The EnerGuide label on the appliance/energy consumption on the EnerGuide label)
6. (Other) [SPECIFY_____]
8. (Don't know)
9. (Refused)

BF2. [ASK IF BF1≠1] Was this [dishwasher/room air conditioner] an Energy Star model?

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

BF3. How influential was your Home Energy Report on your decision to purchase this [energy-efficient dishwasher/energy-efficient room air conditioner]? Please give your answer on a scale of 0 to 10, where 0 indicates the Home Energy Report 'had no influence at all on your purchase decision' and 10 indicates that the Home Energy Report was 'extremely influential on your purchase decision'. [PROBE TO AVOID ACCEPTING A RANGE]

___ Response ___ 98 Don't Know ___ 99 Refused

BF4. How likely would you have been to purchase a new [energy-efficient dishwasher/energy-efficient room air conditioner] without your Home Energy Report? Without your Home Energy Report, would you have definitely, probably, probably not, or definitely not purchased this appliance anyway? [CODE ONE ONLY]

1. Definitely
2. Probably
3. Probably not
4. Definitely not
8. (Don't know)
9. (Refused)

Questions on Tip: Insulate your Windows with Heat-Shrink Film [ASK IF B5a=YES]

We now have a few questions about your decision to install heat-shrink film in the last 12 months.

BW1. How influential was your Home Energy Report on your decision to insulate your windows with heat-shrink film? Please give your answer on a scale of 0 to 10, where 0 indicates the Home Energy Report 'had no influence at all on your decision' and 10 indicates that the Home Energy Report was 'extremely influential on your decision'. [PROBE TO AVOID ACCEPTING A RANGE]

___ Response ___ 98 Don't Know ___ 99 Refused

BW2. How likely would you have been to insulate your windows with heat-shrink film without your Home Energy Report? Without your Home Energy Report, would you have definitely, probably, probably not, or definitely not insulated your windows with heat-shrink film anyway? [CODE ONE ONLY]

1. Definitely
2. Probably
3. Probably not
4. Definitely not
8. (Don't know)
9. (Refused)

BW3. On what type of window did you mostly install heat-shrink film? [READ. CODE ONLY ONE]

1. Sliding windows
2. Awning windows
3. Casement windows
4. Hopper windows
5. Single- or double-hung windows
8. (Don't know)
9. (Refused)

BW4. On how many windows did you install heat-shrink film? [RECORD ANSWER. PROBE FOR A SPECIFIC ANSWER. 98=DON'T KNOW, 99=REFUSED]

BW5. Do you plan on installing heat-shrink film on your windows again this winter? [CODE ONLY ONE]

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

Questions on Tip: Hang Laundry to Dry [ASK IF B5b=YES]

We now have a few questions about your decision to hang laundry to dry in the last 12 months.

BL1. How influential was your Home Energy Report on your decision to hang your laundry to dry? Please give your answer on a scale of 0 to 10, where 0 indicates the Home Energy Report 'had no influence at all on your decision' and 10 indicates that the Home Energy Report was 'extremely influential on your decision'. [PROBE TO AVOID ACCEPTING A RANGE]

___ Response ___ 98 Don't Know ___ 99 Refused

BL2. How likely would you have been to hang your laundry to dry without your Home Energy Report? Without your Home Energy Report, would you have definitely, probably, probably not, or definitely not hung your laundry to dry anyway? [CODE ONE ONLY]

1. Definitely
2. Probably
3. Probably not
4. Definitely not
8. (Don't know)
9. (Refused)

BL3. What do you use to hang your laundry to dry? [ACCEPT MULTIPLE RESPONSES] [READ]

1. Indoor drying racks / hangers
2. Outdoor clothesline
3. Outdoor drying racks, or
6. Something else [SPECIFY _____]
8. (Don't know)
9. (Refused)

BL4. [ASK IF BL3=2 OR 3, ASK TWICE IF REQUIRED] Did you purchase this [insert response from BL3] in the past 12 months?

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

BL5. [ASK IF BL4=YES, ASK TWICE IF REQUIRED] Did you obtain a discount on this [**INSERT RESPONSE FROM BL3**], or obtained it/them for free under Efficiency Nova Scotia's Instant Savings program? This program offered instant discounts at the cash register for the purchase of clothes lines and outdoor drying racks in the fall of 2013 and the spring of 2014.

1. Yes, got a discount or it for free
2. No,
8. (Don't Know)
9. (Refused)

BL6. Thinking about a typical week, approximately how many loads of clothes washing does your household do per week? [RECORD NUMBER, PROBE FOR SPECIFIC ANSWER]

- ___ Response
- ___ 97 (I don't own a washing machine) [GO TO BV1]
- ___ 98 (Don't Know) [GO TO BL9]
- ___ 99 (Refused) [GO TO BL9]

BL7a. [ASK IF ANSWER TO BL6 > 0] Thinking of those [ANSWER TO BL6] loads, approximately how many were hung to dry in a typical week in the spring and summer period prior to you signing up online for your Home Energy Report? [RECORD NUMBER, PROBE FOR SPECIFIC ANSWER]

- ___ Response ___ 98 Don't Know ___ 99 Refused

BL7b. [ASK IF ANSWER TO BL6 > 0] Thinking of those [ANSWER TO BL6] loads, approximately how many were hung to dry **in the fall and winter period** prior to you signing up online for your Home Energy Report? [RECORD NUMBER, PROBE FOR SPECIFIC ANSWER]

___ Response ___ 98 Don't Know ___ 99 Refused

BL8a. [ASK IF ANSWER TO BL6 > 0] Thinking of those [ANSWER TO BL6] loads, approximately how many are hung to dry **in the spring and summer period**, after you had signed up online for your Home Energy Report? [RECORD NUMBER, PROBE FOR SPECIFIC ANSWER]

___ Response ___ 97 Non applicable ___ 98 Don't Know ___ 99 Refused

BL8b. [ASK IF ANSWER TO BL6 > 0] Thinking of those [ANSWER TO BL6] loads, approximately how many are hung to dry **in the fall and winter period**, after you had signed up online for your Home Energy Report? [RECORD NUMBER, PROBE FOR SPECIFIC ANSWER]

___ Response ___ 97 Non applicable ___ 98 Don't Know ___ 99 Refused

BL9. Do you own a clothes dryer?

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

BL10. [ASK IF BL9 = 1] Is it an electric or gas clothes dryer? [CODE ONE ONLY]

1. Electric
2. Gas
8. (Don't Know)
9. (Refused)

BL11. [ASK IF BL9=2] Did you own a clothes dryer before signing up for your online Home Energy Report? [DO NOT READ. ACCEPT ONLY ONE, PROBE FOR SPECIFIC NO RESPONSE]

1. Yes
2. No, but I was using the clothes dryer of a Laundromat or of my building laundry room
3. No, but I was using someone else's clothes dryer
4. No
8. (Don't Know)
9. (Refused)

Questions on Tip: Wash Clothes in Cold Water [ASK IF B5c=YES]

BV1. In the last 12 months, did you participate in Efficiency Nova Scotia's Residential Direct Install program? As part of this program, someone would have come to your house and installed new lighting or domestic water heating energy efficiency products, such as compact fluorescent light bulbs (CFLs) and faucet aerators, at no charge.

1. Yes [GO TO BC1]
2. No
8. (Don't know) [GO TO BC1]
9. (Refused) [GO TO BC1]

BV3. How influential was your Home Energy Report on your decision to wash your clothes in cold water? Please give your answer on a scale of 0 to 10, where 0 indicates the Home Energy Report 'had no influence at all on your decision' and 10 indicates that the Home Energy Report was 'extremely influential on your decision'. [PROBE TO AVOID ACCEPTING A RANGE]

___ Response ___ 98 Don't Know ___ 99 Refused

BV4. How likely would you have been to wash your clothes in cold water without your Home Energy Report? Without your Home Energy Report, would you have definitely, probably, probably not, or definitely not washed your clothes in cold water anyway? [CODE ONE ONLY]

1. Definitely
2. Probably
3. Probably not
4. Definitely not
8. (Don't know)
9. (Refused)

BV5. [DO NOT ASK IF ALREADY PROVIDED A RESPONSE TO BL6] Thinking about a typical week, approximately how many loads of clothes washing does your household do per week? [RECORD NUMBER, PROBE FOR SPECIFIC ANSWER]

___ Response
___ 97 (I don't own a washing machine) [GO TO BC1]
___ 98 (Don't Know) [GO TO BC1]
___ 99 (Refused) [GO TO BC1]

BV6. [ASK IF ANSWER TO BL6 OR BV5 > 0] Thinking of the [ANSWER TO BL6 OR BV5] loads of clothes washing your household does in a typical week, approximately how many were washed in cold water prior to you signing up online for your Home Energy Report? [RECORD NUMBER, PROBE FOR SPECIFIC ANSWER]

___ Response ___ 98 Don't Know ___ 99 Refused

BV7. [ASK IF ANSWER TO BL6 OR BV5 > 0] Thinking of the [ANSWER TO BL7 OR BV6] loads of clothes washing your household does in a typical week, approximately how many are washed in cold water, now that you have signed up online for your Home Energy Report? [RECORD NUMBER, PROBE FOR SPECIFIC ANSWER]

___ Response ___ 98 Don't Know ___ 99 Refused

Questions on Tip: Turn Off Computer at Night [ASK IF B5d=YES]

We now have a few questions about your decision to turn off your computer at night in the last 12 months

BC1. How influential was your Home Energy Report on your decision to turn off your computer at night? Please give your answer on a scale of 0 to 10, where 0 indicates the Home Energy Report 'had no influence at all on your decision' and 10 indicates that the Home Energy Report was 'extremely influential on your decision'. [PROBE TO AVOID ACCEPTING A RANGE]

___ Response ___ 98 Don't Know ___ 99 Refused

BC2. How likely would you have been to turn off your computer at night without your Home Energy Report? Without your Home Energy Report, would you have definitely, probably, probably not, or definitely not turned off your computer at night anyway? [CODE ONE ONLY]

1. Definitely
2. Probably
3. Probably not
4. Definitely not
8. (Don't know)
9. (Refused)

BC3. Prior to signing up online for your Home Energy Report, how many times a week did you used to turn off your computer at night? [RECORD NUMBER 0-7. PROBE FOR SPECIFIC ANSWER. 8=DON'T KNOW, 9=REFUSED]

BC4. Now that you have signed up online for your Home Energy Report, how many times a week do you turn off your computer at night? [RECORD NUMBER 0-7. PROBE FOR SPECIFIC ANSWER. 8=DON'T KNOW, 9=REFUSED]

BC5. What types of computers do you turn off at night? [READ CHOICES. ACCEPT MULTIPLE]

1. Desktop computer
2. Laptop computer
7. (Other, specify:_____)
8. (Don't Know)
9. (Refused)

BC6. Is the power-saving mode on this computer active? [CODE ONLY ONE]

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

BC7. [ASK IF YES IN BC6] How many minutes does it take for your computer to go into power-saving mode? [RECORD NUMBER OF MINUTES. PROBE FOR SPECIFIC ANSWER. 98=DON'T KNOW, 99=REFUSED]

Questions on Tip: Reduce Shower Time [ASK IF B5e=YES]

We now have a few questions about your decision to reduce your shower time in the last 12 months.

BS1. How influential was your Home Energy Report on your decision to reduce your shower time? Please give your answer on a scale of 0 to 10, where 0 indicates the Home Energy Report 'had no influence at all on your decision' and 10 indicates that the Home Energy Report was 'extremely influential on your decision'. [PROBE TO AVOID ACCEPTING A RANGE]

___ Response ___ 98 Don't Know ___ 99 Refused

BS2. How likely would you have been to reduce your shower time without your Home Energy Report? Without your Home Energy Report, would you have definitely, probably, probably not, or definitely not reduced your shower time anyway? [CODE ONE ONLY]

1. Definitely
2. Probably
3. Probably not
4. Definitely not
8. (Don't know)
9. (Refused)

BS3. Prior to signing up online for your Home Energy Report, what was your typical shower time in minutes, approximately? [RECORD NUMBER OF MINUTES. PROBE FOR SPECIFIC ANSWER, 98=DON'T KNOW, 99=REFUSED]

BS4. Now that you have signed up online for your Home Energy Report, what is your current typical shower time in minutes, approximately? [RECORD NUMBER OF MINUTES. PROBE FOR SPECIFIC ANSWER, 98=DON'T KNOW, 99=REFUSED]

Satisfaction with the Program (Series CS)

Moving along to another topic... The following questions will be about your participation in the Home Energy Report. The Home Energy Report refers to the online report that illustrates your household's energy usage patterns and provides you with energy efficiency tips to help you reduce your energy consumption.

CS1. How did you first learn about the Home Energy Report? **[DON'T READ; ALLOW MULTIPLE RESPONSE BUT DO NOT PROBE FOR MULTIPLE]**

1. Media advertising
2. Contacted directly by Efficiency Nova Scotia
3. Through a third party contractor or service provider
4. Efficiency Nova Scotia website
5. Facebook or other social media
6. Word of mouth
7. (Refused)
8. (Don't know)
9. (Other: SPECIFY_____)

S1. Overall, how satisfied are you with the Home Energy Report? Are you completely satisfied, mostly satisfied, mostly dissatisfied, or completely dissatisfied with it? **[CODE ONLY ONE]**

1. Completely satisfied
2. Mostly satisfied
3. Mostly dissatisfied
4. Completely dissatisfied
7. (Neither satisfied nor dissatisfied)
8. (Don't know)
9. (Refused)

S2. **[IF DISSATISFIED—S1=3 or 4]** You indicated being dissatisfied with the Home Energy Report overall. For what reasons were you not satisfied with the Home Energy Report overall? Probe: Any other reasons? **[DO NOT READ. PROBE FOR SPECIFIC REASONS. ACCEPT MULTIPLE]**

1. (I expected more)
2. (My energy consumption did not decrease after following the tips)
3. (I did not think the tips were relevant for my home/did not like the tips)
4. (The online report was not easy to read/understand)
5. (I experienced difficulty creating my online account)
96. (Other) [SPECIFY _____]
98. (Don't know)
99. (Refused)

S3. Now I'm going to ask you about your experience with specific aspects of the Home Energy Report. For each one, please tell me if you are completely satisfied, mostly satisfied, mostly dissatisfied, or completely dissatisfied with that specific aspect. [CODE ONE ONLY PER ASPECT]

- a. The appearance of the report
- b. The clarity of the report
- c. The usefulness of the tips provided
- d. The ease to create and update your online account

- 1. Completely satisfied
- 2. Mostly satisfied
- 3. Mostly dissatisfied
- 4. Completely dissatisfied
- 7. (Neither satisfied nor dissatisfied)
- 8. (Don't know)
- 9. (Refused)

S4. [ASK IF S3c=3 or 4] You mentioned being dissatisfied with the usefulness of the tips provided in your Home Energy Report. In your opinion, what could be done to improve this aspect? [98 = Don't know, 99 = Refused] [RECORD ANSWER]

CS6. Did you speak directly to any of Efficiency Nova Scotia's contact centre representatives? **[DO NOT READ RESPONSES – CODE ONE ONLY]**

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

IF YES IN CS6, CONTINUE, OTHERWISE SKIP TO CS27.

CS7. Overall, how satisfied were you with the level of service provided, by the contact centre representative? Were you completely satisfied, mostly satisfied, mostly dissatisfied, or completely dissatisfied with the level of service provided by this individual? **[CODE ONE ONLY]**

- 1. Completely satisfied
- 2. Mostly satisfied
- 3. Mostly dissatisfied
- 4. Completely dissatisfied
- 7. (Neither satisfied nor dissatisfied)
- 8. (Don't know)
- 9. (Refused)

CS9. And how satisfied were you with the contact centre representative on each of the following service aspects? Were you completely satisfied, mostly satisfied, mostly dissatisfied, or completely dissatisfied with the representative's... **[READ AND ROTATE FACTORS]? [CODE ONE RESPONSE FOR EACH FACTOR]**

- a. Service attitude
 - b. Knowledge of programs available
 - c. Ability to provide advice
-
- 1. Completely satisfied
 - 2. Mostly satisfied
 - 3. Mostly dissatisfied
 - 4. Completely dissatisfied
 - 7. (Neither satisfied nor dissatisfied)
 - 8. (Don't know)
 - 9. (Refused)

CS27. Based on your personal experience, would you definitely, probably, probably not, or definitely not recommend the programs offered by Efficiency Nova Scotia to others? **[CODE ONE ONLY]**

- 1. Definitely
- 2. Probably
- 3. Probably not
- 4. Definitely not
- 7. (Not eligible to any other programs)
- 8. (Don't know)
- 9. (Refused)

CS28. How likely would you be to participate in other programs offered by Efficiency Nova Scotia if your household qualified? Would you definitely, probably, probably not, or definitely not participate in other programs? **[CODE ONE ONLY]**

- 1. Definitely
- 2. Probably
- 3. Probably not
- 4. Definitely not
- 8. (Don't know)
- 9. (Refused)

Recommendations (Series R)

[ASK ALL RESPONDENTS]

R1. Do you have any recommendations that you think would help improve the Home Energy Report? PROBE: Anything else? **[DO NOT READ, ACCEPT MULTIPLE]**

1. (Improve the appearance of the report)
2. (Improve the content of the report/Provide more relevant tips)
3. (Make the report clearer)
4. (No recommendation)
6. (Other [SPECIFY _____])

Demographic Characteristics (Series D)

[ASK ALL RESPONDENTS]

These final questions are asked for statistical purposes only. The information collected is strictly confidential.

D1. What type of residence do you live in? [READ RESPONSES 1-7, THEN 96; SELECT ONE RESPONSE]

1. Apartment building that has fewer than five stories
2. Apartment building that has five to twenty stories
3. Row house (Single story apartment building)
4. Detached single-family home
5. Semi-detached house
6. Mobile home or house trailer
7. Townhouse or duplex with shared adjacent walls
96. Or some other type [SPECIFY: _____]
98. (Don't know)
99. (Refused)

D2. Do you own or rent this home?

1. Own/buying
2. Rent/lease
3. Other (Describe) _____
99. (Refused)

D3. Do you pay the electric bills for your home?

- 1. Yes
- 2. No
- 96. (Other) [Specify _____]
- 98. (Don't Know)
- 99. (Refused)

D4. Including yourself, how many people live in this residence on a full-time basis?

Number of people: _____ [NOTE: DON'T ALLOW ZERO FOR A RESPONSE]

- 99. (Refused)

D5. What is your age group? Are you: [READ]

- 1. 18 to 24
- 2. 25 to 34
- 3. 35 to 44
- 4. 45 to 54
- 5. 55 to 64
- 6. 65 or over
- 99. (Refused)

D6. What is the highest grade of schooling completed by the head of your household? [READ IF NECESSARY]

- 1. (Less than high school graduation diploma)
- 2. (High school graduation diploma and/or some post secondary)
- 3. (Trades certificate or diploma)
- 4. (College certificate or diploma)
- 5. (University degree, certificate or diploma)
- 97. Other (SPECIFY: _____)
- 98. (Don't know)
- 99. (Refused)

D7. Which of the following income categories best describes your total annual household income before taxes in 2013? Stop me when I reach the right category. [READ LIST; SELECT ONE RESPONSE]

- 1. Less than \$15,000
- 2. \$15,000 - \$24,999
- 3. \$25,000 - \$34,999

- 4. \$35,000 - \$49,999
- 5. \$50,000 - \$69,999
- 6. \$70,000 - \$79,999
- 8. \$80,000 or more
- 98. (Don't know)
- 99. (Refused)

D8. [DO NOT READ] Gender:

- 1. Male
- 2. Female

END: THAT IS ALL THE QUESTIONS I HAVE FOR YOU. THANK YOU FOR TAKING THE TIME TO RESPOND TO THIS SURVEY.

APPENDIX III PARTICIPANT SURVEY RESULTS

The participant survey results are presented in the following tables.

B1. In the last 12 months, did you or someone else in your household purchase one or more energy-efficient appliances for your home?

Purchased an Energy Efficient Appliance	2014
<i>Sample Size</i>	<i>340</i>
Yes	38%
No	61%
Don't know/Refused	1%

B2. I am going to read you a list of energy-efficient appliances that your household may have purchased. For each one, can you please tell me if you or someone else from your household purchased it in the last 12 months...

Purchased an Energy Efficient Appliance**	2014
<i>Sample Size*</i>	<i>129</i>
Energy-efficient clothes washer	31%
Energy-efficient dishwasher	25%
Energy-efficient refrigerator	24%
Energy-efficient freezer	16%
Energy-efficient room air conditioner	12%
Others	60%
*Base: Respondents who purchased an energy efficient appliance **Percent saying 'yes'	

B2f. Other energy efficient appliances purchased.

Purchased an Energy Efficient Appliance – Other Mentions	2014
<i>Sample Size*</i>	<i>77</i>
Energy-efficient stove	27%
Heat pump	23%
Energy-efficient dryer	23%
Dehumidifier	13%
Energy-efficient microwave	9%
Water heater	9%
Others	17%
*Base: Respondents who mentioned other types of appliances in B2	

- B4. In the last 12 months, have you taken any steps to reduce your home energy use?
- B5. I am going to read you a list of energy-efficient behaviours that your household may have adopted. For each one, can you please tell me if your household has adopted it in the last 12 months?

Taken Steps to Reduce Home Energy Use	2014
<i>Sample Size</i>	340
Yes to at least one energy efficient behaviour	80%
No	8%
Already undertaking activities	12%

Adopted Energy Efficient Behaviours**	2014
<i>Sample Size*</i>	313
Turn off lights when not needed	72%
Wash clothes in cold water	57%
Turn off your computer at night	53%
Hang laundry to dry	50%
Use a ceiling fan rather than air conditioning	44%
Reduce shower time	43%
Turn off your water heater when you're away	31%
Reduce your refrigerator's temperature set point	17%
Adjust the display of your television by reducing the brightness and contrast	17%
Insulate your windows with heat-shrink film	8%
Use a home power monitor to have real-time feedback on your electricity consumption	6%
*Base: All respondents except those who purchased an energy efficient appliance AND who have not taken steps to reduce home energy use.	
**Percent saying 'yes'	

- H1. Do you recall having signed up on the Efficiency Nova Scotia website to have access to an online report which compares your household's electricity usage to similar homes, illustrates energy usage patterns and provides you with energy efficiency tips to help you reduce your energy consumption?

Recall Signing Up for HER	2014
<i>Sample Size</i>	340
Yes	74%
No	20%
Don't know	7%

H2. Thinking of this online report, in general, what have you done with it? Did you...

Done with HER	2014
<i>Sample Size*</i>	250
Read the website content thoroughly	38%
Read some of the website's content	34%
Skim some of the website's content	13%
Glance at the pictures, graphs or headlines	6%
Others	5%
Don't know/refused	4%
*Base: Respondents who recall signing up for HER	

P1. What was the SINGLE most important reason you decided to sign up online for your Home Energy Report?

P2. Were there any other reasons?

Motivations for Signing Up for HER	2014	
	Most Important Reason	Other Reasons**
<i>Sample Size*</i>	250	243
To save on energy/to save on energy costs	46%	14%
To find out/improve home energy rank compared with other similar houses	24%	10%
Personal interest/interested in the information	5%	2%
To see/track energy use	5%	1%
Find tips to improve efficiency-usage	4%	3%
To stop receiving flyers/letters in the mail	2%	-
To help the environment	1%	3%
To get Air Miles	1%	1%
Reduce greenhouse gases	-	1%
Don't know/no other reasons/Refused	3%	61%
Others	9%	6%
*Base: Respondents who recall signing up for HER		
**Multiple Responses		

P3. Before signing up for the Home Energy Report, had you participated in any of Efficiency Nova Scotia's energy efficiency programs?

Participated in Other ENSC programs	2014
<i>Sample Size*</i>	250
Yes	56%
No	43%
Don't know	1%

*Base: Respondents who recall signing up for HER

P4. Which Efficiency Nova Scotia programs did you participate in before the Home Energy Report?

ENSC Programs Previously Participated	2014
<i>Sample Size*</i>	139
Instant Savings/Light bulb replacement	49%
Energy Audit	29%
Water saving/low flow shower heads/faucet aerators/toilets	22%
Hot water tank wrap	17%
Home Energy Assessment	15%
Appliance Retirement	7%
Insulation	6%
Windows/doors	4%
Home heating	4%
Power bars/Smart Power Strips	2%
Clothesline	1%
Residential Direct Install	1%
Thermostat/Programmable thermostat	1%
Others	10%
Don't know	2%

*Base: Respondents who participated in other ENSC programs

BF1. What makes you think the [dishwasher/the room air conditioner] unit(s) you purchased in the last 12 months is/are energy-efficient?

Reason for Believing Appliance was Energy Efficient	2014	
	Dishwasher (%)	Air conditioner (#)
<i>Sample Size*</i>	25	14
EnerGuide label on the appliance/energy consumption on EnerGuide label	40%	3
The Energy Star symbol on the appliance	32%	1
Information provided with appliance	12%	3
New model should be more efficient	12%	1
Researched/compared appliances	8%	-
Salesperson indicated it was energy efficient	4%	-
Word of mouth	-	4
Because it was a heat pump	-	3
Others	4%	2
*Base: Respondents who purchased an energy efficient dishwasher or air conditioner		

BF2. Was this [dishwasher/room air conditioner] an Energy Star model?

Appliance was Energy Star	2014	
	Dishwasher (%)	Air conditioner (#)
<i>Sample Size</i>	25	14
Yes	96%	11
No	-	1
Don't know	4%	2
*Base: Respondents who purchased an energy efficient dishwasher or air conditioner. Results are combined from BF1 and BF2.		

BF3. How influential was your Home Energy Report on your decision to purchase this [energy-efficient dishwasher/energy-efficient room air conditioner]? Please give your answer on a scale of 0 to 10, where 0 indicates the Home Energy Report 'had no influence at all on your purchase decision' and 10 indicates that the Home Energy Report was 'extremely influential on your purchase decision'.

Importance of HER in Influencing Purchase	2014			
	Dishwasher		Air conditioner	
	Sample Size*	Mean Score**	Sample Size*	Mean Score**
Average rating: 10= "Extremely influential", 0= "No influence at all"				
HER influence on purchase decision	24	3.1	14	4.3
*Base: Respondents who purchased an energy efficient dishwasher or air conditioner ** "Don't know/refused" have been removed from calculation				

BF4. How likely would you have been to purchase a new [energy-efficient dishwasher/energy-efficient room air conditioner] without your Home Energy Report? Without your Home Energy Report, would you have definitely, probably, probably not, or definitely not purchased this appliance anyway?

Likelihood of Purchasing Appliance Without HER**	2014	
	Dishwasher (%)	Air conditioner (#)
Sample Size*	25	14
Definitely	28%	8
Probably	72%	4
Probably not	-	2
Definitely not	-	-
*Base: Respondents who purchased an energy efficient dishwasher or air conditioner **"Don't know/refused" have been removed from calculation		

BW1. How influential was your Home Energy Report on your decision to insulate your windows with heat-shrink film? Please give your answer on a scale of 0 to 10, where 0 indicates the Home Energy Report 'had no influence at all on your decision' and 10 indicates that the Home Energy Report was 'extremely influential on your decision'.

Importance of HER in Installing Heat Shrink Film	2014	
	Sample Size*	Mean Score**
Average rating: 10= "Extremely influential", 0= "No influence at all"		
HER influence on purchase decision	18	1.8
*Base: Respondents who insulated with heat shrink film **"Don't know/refused" have been removed from calculation		

BW2. How likely would you have been to insulate your windows with heat-shrink film without your Home Energy Report? Without your Home Energy Report, would you have definitely, probably, probably not, or definitely not insulated your windows with heat-shrink film anyway?

Likelihood of Insulating Windows Without HER	2014 (#)
<i>Sample Size*</i>	18
Definitely	13
Probably	4
Probably not	1
Definitely not	-
*Base: Respondents who insulated with heat shrink film	

BW3. On what type of window did you mostly install heat-shrink film?

Types of Windows Heat Shrink Film Installed	2014 (#)
<i>Sample Size*</i>	18
Sliding windows	8
Single or double-hung windows	6
Casement windows	3
Don't know	1
*Base: Respondents who insulated with heat shrink film	

BW4. On how many windows did you install heat-shrink film?

Number of Windows Heat Shrink Film Installed	2014 (#)
<i>Sample Size*</i>	18
1-2	6
3-4	6
5+	6
Average	3.9
*Base: Respondents who insulated with heat shrink film	

BW5. Do you plan on installing heat-shrink film on your windows again this winter?

Plan on Installing Heat Shrink Film on Windows Again	2014 (#)
<i>Sample Size*</i>	18
Yes	17
No	1
*Base: Respondents who insulated with heat shrink film	

BL1. How influential was your Home Energy Report on your decision to hang your laundry to dry? Please give your answer on a scale of 0 to 10, where 0 indicates the Home Energy Report 'had no influence at all on your decision' and 10 indicates that the Home Energy Report was 'extremely influential on your decision'.

Importance of HER in Deciding to Hang Laundry to Dry	2014	
	Sample Size*	Mean Score**
Average rating: 10= "Extremely influential", 0= "No influence at all"		
HER influence on decision	110	2.3
*Base: Respondents who hung laundry to dry ***"Don't know/refused" have been removed from calculation		

BL2. How likely would you have been to hang your laundry to dry without your Home Energy Report? Without your Home Energy Report, would you have definitely, probably, probably not, or definitely not hung your laundry to dry anyway?

Likelihood of Hanging Laundry to Dry Without HER**	2014 (%)
Sample Size*	109
Definitely	67%
Probably	27%
Probably not	6%
Definitely not	1%
*Base: Respondents who hung laundry to dry ***"Don't know/refused" have been removed from calculation	

BL3. What do you use to hang your laundry to dry?

How Laundry is Hung to Dry*	2014 (%)
Sample Size**	110
Outdoor Clothesline	85%
Indoor drying racks/hangers	51%
Outdoor Drying Racks	8%
*Multiple Responses **Base: Respondents who hung laundry to dry	

BL4. Did you purchase this outdoor clothesline/outdoor drying rack in the past 12 months?

Purchase Clothesline/Drying Rack in Past 12 Months	2014	
	Clothesline (%)	Drying Rack (#)
Sample Size*	94	9
Yes	23%	2
No	77%	7
*Base: Respondents who use a clothesline or outdoor drying rack to dry clothing		

BL5. Did you obtain a discount on this outdoor clothesline/outdoor drying rack, or obtained it/them for free under Efficiency Nova Scotia's Instant Savings program?

Received Discount on Clothesline	2014	
	Clothesline (%)	Drying Rack (#)
Sample Size*	22	2
Yes	9%	-
No	91%	2
*Base: Respondents who purchased clothesline/drying rack in past 12 months		

BL6. Thinking about a typical week, approximately how many loads of clothes washing does your household do per week?

BL7a. Thinking of those [ANSWER TO BL6] loads, approximately how many were hung to dry in a typical week in the spring and summer period prior to you signing up online for your Home Energy Report?

BL7b. Thinking of those [ANSWER TO BL6] loads, approximately how many were hung to dry in the fall and winter period prior to you signing up online for your Home Energy Report?

BL8a. Thinking of those [ANSWER TO BL6] loads, approximately how many are hung to dry **in the spring and summer period**, after you had signed up online for your Home Energy Report?

BL8b. Thinking of those [ANSWER TO BL6] loads, approximately how many are hung to dry **in the fall and winter period**, after you had signed up online for your Home Energy Report?

Loads of Clothes Washing Hung to Dry	2014				
	Loads done in a typical week	Loads hung in a typical week in spring and summer before HER	Loads hung in a typical week in fall and winter before HER	Loads hung in a typical week in spring and summer after HER	Loads hung in a typical week in fall and winter after HER
Sample size*	110	109	109	109	109
0	-	5%	24%	3%	22%
1-2 loads	23%	45%	50%	42%	50%
3-4 loads	45%	31%	11%	30%	15%
5-9 loads	22%	12%	7%	16%	8%
10+ loads	9%	2%	-	4%	-
Don't know	1%	6%	7%	6%	6%
Average**	4.3	2.7	1.6	3.2	1.7
*Base: Respondents who hung laundry to dry					
**Don't know removed from calculation of mean score					

BL9. Do you own a clothes dryer?

Own a Clothes Dryer	2014 (%)
Sample Size*	110
Yes	98%
No	2%
*Base: Respondents who hung laundry to dry	

BL10. Is it an electric or gas clothes dryer?

Type of Clothes Dryer	2014 (%)
Sample Size*	108
Electric	97%
Gas	3%
*Base: Respondents who hung laundry to dry and own a clothes dryer	

BL11. Did you own a clothes dryer before signing up for your online Home Energy Report?

Own Clothes Dryer Prior to HER	2014 (#)
<i>Sample Size*</i>	2
Yes	1
No	1
*Base: Respondents who do not own a clothes dryer	

BV1. In the last 12 months, did you participate in Efficiency Nova Scotia's Residential Direct Install program? As part of this program, someone would have come to your house and installed new lighting or domestic water heating energy efficiency products, such as compact fluorescent light bulbs (CFLs) and faucet aerators, at no charge.

Previously Participated in RDI	2014 (%)
<i>Sample Size*</i>	132
Yes	32%
No	68%
*Base: Respondents who washed clothes in cold water	

BV2. During your participation in this program, you might have received information during the visit from the installer about the benefits of washing your clothes in cold water. The installer would have spoken to you about your clothes washing behaviour and encouraged you to set your washing temperature to cold. The installer might have also placed a removable sticker on your washing machine with a "Set wash temperature to cold!" reminder. Do you recall having this conversation with the installer?

Recall Discussion with RDI Installer Regarding Cold Water Washing	2014 (%)
<i>Sample Size*</i>	42
Yes	31%
No	67%
Don't know	2%
*Base: Respondents who washed clothes in cold water and participated in RDI	

BV3. How influential was your Home Energy Report on your decision to wash your clothes in cold water? Please give your answer on a scale of 0 to 10, where 0 indicates the Home Energy Report 'had no influence at all on your decision' and 10 indicates that the Home Energy Report was 'extremely influential on your decision'.

Importance of HER in Decision to Wash Clothes in Cold Water	2014	
	Sample Size*	Mean Score**
Average rating: 10= "Extremely influential", 0= "No influence at all"		
HER influence on decision to wash in cold water	118	1.6
*Base: Respondents who washed clothes in cold water. ***"Don't know/refused" have been removed from calculation		

BV4. How likely would you have been to wash your clothes in cold water without your Home Energy Report? Without your Home Energy Report, would you have definitely, probably, probably not, or definitely not washed your clothes in cold water anyway?

Likelihood of Washing Clothes in Cold Water Without HER	2014 (%)
Sample Size*	118
Definitely	70%
Probably	24%
Probably not	6%
Definitely not	-
*Base: Respondents who washed clothes in cold water	

BV5. Thinking about a typical week, approximately how many loads of clothes washing does your household do per week?

BV6. Thinking of the [ANSWER TO BL6 OR BV5] loads of clothes washing your household does in a typical week, approximately how many were washed in cold water prior to you signing up online for your Home Energy Report?

BV7. Thinking of the [ANSWER TO BL7 OR BV6] loads of clothes washing your household does in a typical week, approximately how many are washed in cold water, now that you have signed up online for your Home Energy Report?

Loads of Washing Done in Cold Water	2014		
	Loads done in a typical week	Loads washed in cold water prior to HER	Loads washed in cold water after HER
<i>Sample size*</i>	<i>118**</i>	<i>118</i>	<i>118</i>
0	-	7%	-
1-2 loads	19%	25%	25%
3-4 loads	38%	31%	34%
5-9 loads	20%	14%	16%
10+ loads	9%	3%	4%
Don't know****	14%	19%	20%
Average***	4.4	3.3	3.7
*Base: Respondents who washed clothes in cold water **Results for BL6 and BV5 combined ***Don't know removed from calculation of mean score ****Due to a programming error, 15 respondents did not receive BV5. These respondents have been included as don't know responses.			

BC1. How influential was your Home Energy Report on your decision to turn off your computer at night? Please give your answer on a scale of 0 to 10, where 0 indicates the Home Energy Report 'had no influence at all on your decision' and 10 indicates that the Home Energy Report was 'extremely influential on your decision'.

Importance of HER in Decision to Turn Off Computer at Night	2014	
	<i>Sample Size*</i>	Mean Score**
Average rating: 10= "Extremely influential", 0= "No influence at all"		
HER influence on decision to turn off computer at night	<i>119</i>	2.5
*Base: Respondents who turned off computer at night ***"Don't know/refused" have been removed from calculation		

BC2. How likely would you have been to turn off your computer at night without your Home Energy Report? Without your Home Energy Report, would you have definitely, probably, probably not, or definitely not turned off your computer at night anyway?

Likelihood of Turning off Computer Without HER	2014 (%)
<i>Sample Size*</i>	121
Definitely	58%
Probably	23%
Probably not	15%
Definitely not	4%
*Base: Respondents who turned off computer at night	

BC3. Prior to signing up online for your Home Energy Report, how many times a week did you use to turn off your computer at night?

BC4. Now that you have signed up online for your Home Energy Report, how many times a week do you turn off your computer at night?

Times per Week Computer was Turned Off at Night	2014 (%)	
	Times per week turned off computer before HER	Times per week turned off computer after HER
<i>Sample Size*</i>	121	121
0	17%	2%
1-2	9%	3%
3-4	9%	3%
5-6	6%	11%
7+	59%	80%
Average**	4.9	6.4
*Base: Respondents who turned off computer at night ***"Don't know/refused" removed from calculation of mean score		

BC5. What types of computers do you turn off at night?

Types of Computers Turned off at Night**	2014 (%)
<i>Sample Size*</i>	121
Laptop computer	67%
Desktop computer	66%
Tablet/iPad	8%
Others	4%
*Base: Respondents who turned off computer at night **Multiple Responses	

BC6. Is the power-saving mode on this computer active?

Power Saving Mode is Active	2014 (%)
<i>Sample Size*</i>	121
Yes	84%
No	7%
Don't know	9%
*Base: Respondents who turned off computer at night	

BC7. How many minutes does it take for your computer to go into power-saving mode?

Number of Minutes for Computer to Enter Power Saving Mode	2014 (%)
<i>Sample Size*</i>	121
1-2	26%
3-5	30%
6+	21%
Don't know	23%
*Base: Respondents who turned off computer at night	

BS1. How influential was your Home Energy Report on your decision to reduce your shower time? Please give your answer on a scale of 0 to 10, where 0 indicates the Home Energy Report 'had no influence at all on your decision' and 10 indicates that the Home Energy Report was 'extremely influential on your decision'.

Importance of HER in Decision to Reduce Shower Time	2014	
	Sample Size*	Mean Score**
Average rating: 10= "Extremely influential", 0= "No influence at all"		
HER influence on decision to reduce shower time	97	3.5
*Base: Respondents who reduced shower time ***"Don't know/refused" have been removed from calculation		

BS2. How likely would you have been to reduce your shower time without your Home Energy Report? Without your Home Energy Report, would you have definitely, probably, probably not, or definitely not reduced your shower time anyway?

Likelihood of Reducing Shower Time without HER**	2014 (%)
Sample Size*	97
Definitely	44%
Probably	31%
Probably not	22%
Definitely not	3%
*Base: Respondents who reduced shower time. **"Don't know removed from calculation"	

BS3. Prior to signing up online for your Home Energy Report, what was your typical shower time in minutes, approximately?

BS4. Now that you have signed up online for your Home Energy Report, what is your current typical shower time in minutes, approximately?

Typical Shower Time	2014 (%)	
	Shower Time before HER	Shower Time after HER
Sample Size*	100	100
Less than 5 minutes	11%	23%
5-9 minutes	31%	49%
10-19 minutes	40%	25%
20+ minutes	12%	-
Don't know/refused	6%	3%
Average**	10.0	6.6
*Base: Respondents who reduced shower time ***"Don't know/refused" removed from calculation of mean score		

CS1. How did you first learn about the Home Energy Report?

Sources of Awareness*	2014 (%)
<i>Sample Size</i>	250
Media advertising	26%
Through the mail/Bill insert	21%
Word of mouth	14%
Internet (general)	6%
Contacted directly by ENSC	6%
ENSC website	5%
Facebook or other social media	3%
Booth at community centre/event	2%
Through Nova Scotia Power	2%
Email/Email from ENSC	2%
Air Miles promotion	1%
Through the HER report received in the mail	1%
Through third party contractor or service provider	1%
Others	6%
Don't know	12%
*Multiple Responses	

S1. Overall, how satisfied are you with the Home Energy Report? Are you completely satisfied, mostly satisfied, mostly dissatisfied, or completely dissatisfied with it?

Satisfaction with HER	2014 (%)
<i>Sample Size*</i>	238
Completely satisfied	20%
Mostly satisfied	59%
Mostly dissatisfied	15%
Completely dissatisfied	5%
Neither satisfied nor dissatisfied	1%
*Don't know removed from calculations	

S2. You indicated being dissatisfied with the Home Energy Report overall. For what reasons were you not satisfied with the Home Energy Report overall?

Reasons for Dissatisfaction**	2014 (%)
<i>Sample Size*</i>	48
Not accurate/Don't agree with report	38%
Poor comparison/House not comparable to other houses in area	25%
Not enough information on energy use/Want more detail	15%
I did not think the tips were relevant for my home/did not like the tips	10%
My energy consumption did not decrease after following the tips	10%
I experienced difficulty creating my online account	2%
I expected more	2%
Others	23%
Refused	2%
*Base: Respondents who were dissatisfied with HER	
**Multiple Responses	

S3. Now I'm going to ask you about your experience with specific aspects of the Home Energy Report. For each one, please tell me if you are completely satisfied, mostly satisfied, mostly dissatisfied, or completely dissatisfied with that specific aspect.

Satisfaction with Aspects of HER	2014	
	<i>Sample Size**</i>	Satisfied*
Appearance of report	229	98%
Clarity of report	233	93%
Usefulness of tips provided	239	84%
Ease to create and update online account	186	88%
* Percentage completely satisfied/mostly satisfied.		
***"Don't know/Refused" removed from calculations		

S4. You mentioned being dissatisfied with the usefulness of the tips provided in your Home Energy Report. In your opinion, what could be done to improve this aspect?

Suggestions to Improve Usefulness of Tips	2014 (%)
<i>Sample Size*</i>	31
Already aware of information/tips/information isn't new	42%
Information/tips should be more specific to the house	10%
Didn't decrease energy costs/power bill is still high	6%
Provide more detail	6%
Don't know/refused	36%
*Base: Respondents who were dissatisfied with usefulness of tips provided in HER	

CS6. Did you speak directly to any of Efficiency Nova Scotia's contact centre representatives?

Contact with ENSC Contact Centre	2014
<i>Sample Size*</i>	250
Yes	26%
No	70%
Don't know	5%
*Base: Respondents who recalled signing up for HER	

CS7. Overall, how satisfied were you with the level of service provided by the contact centre representative? Were you completely satisfied, mostly satisfied, mostly dissatisfied, or completely dissatisfied with the level of service provided by this individual?

CS9. And how satisfied were you with the contact centre representative on each of the following service aspects?

Satisfaction with Overall Performance**	2014	
	<i>Sample Size*</i>	Satisfied***
Service attitude	61	92%
Knowledge of programs available	61	89%
Overall level of service provided	63	84%
Ability to provide advice	62	82%
*Base: Number of respondents who had contact with ENSC contact center representatives **Percentage completely satisfied/mostly satisfied. ***"Don't know/Refused" removed from calculations		

CS27. Based on your personal experience, would you definitely, probably, probably not, or definitely not recommend the programs offered by Efficiency Nova Scotia to others?

Would Recommend Programs to Others**	2014 (%)
<i>Sample Size*</i>	247
Definitely	53%
Probably	39%
Probably not	5%
Definitely not	3%
*Base: Respondents who recalled signing up for HER ***"Don't know/refused" have been removed from calculation	

CS28. How likely would you be to participate in other programs offered by Efficiency Nova Scotia if your household qualified?

Would Participate in Other ENSC Programs**	2014 (%)
<i>Sample Size*</i>	244
Definitely	51%
Probably	43%
Probably not	4%
Definitely not	1%
*Base: Respondents who recalled signing up for HER ***"Don't know/refused" have been removed from calculation	

R1. Do you have any recommendations that you think would help improve the Home Energy Report?

Recommendations**	2014
<i>Sample Size*</i>	250
More detailed information on energy usage	6%
Improve house comparisons/Compare to houses of similar size/age	5%
Report should be more specific to the house (how house is occupied/heated)	4%
Improve the content of the report/Provide more relevant tips	4%
Make the report more clear	1%
No recommendations	72%
Others	10%
*Base: Respondents who recalled signing up for HER **Multiple Responses	

D1. What type of residence do you live in?

Type of Residence	2014
<i>Sample Size</i>	340
Single-family detached	87%
Semi-detached	3%
Townhouse or duplex	3%
Mobile home or house trailer	2%
Apartment building that has fewer than five stories	1%
Apartment building that has five to twenty stories	1%
Row house	1%
Others	1%

D2. Do you own or rent this home?

Home Ownership	2014
<i>Sample Size</i>	340
Own	94%
Rent	5%

D3. Do you pay the electric bills for your home?

Pay Electric Bill	2014
<i>Sample Size</i>	340
Yes	99%
No	-
Others	1%
Refused	-

D4. Including yourself, how many people live in this residence on a full-time basis?

Full-time Residents	2014
<i>Sample Size</i>	340
1	11%
2	53%
3	17%
4	13%
5 or more	6%
Average	2.5

D5. What is your age group? Are you...

Respondent Age	2014
<i>Sample Size</i>	340
18 to 24	1%
25 to 34	5%
35 to 44	11%
45 to 54	22%
55 to 64	33%
65 or older	27%
Refused	1%

D6. What is the highest grade of schooling completed by the head of your household?

Education	2014
<i>Sample Size</i>	340
Less than high school	1%
High school graduate	21%
Trade certificate	5%
College diploma	20%
University diploma	49%
Others	1%
Don't know/Refused	2%

D7. Which of the following income categories best describes your total annual household income before taxes in 2013?

Household Income	2014
<i>Sample Size</i>	340
Less than \$15,000	1%
\$15,000 to \$24,999	2%
\$25,000 to \$34,999	6%
\$35,000 to \$49,999	10%
\$50,000 to \$69,999	17%
\$70,000 to \$79,999	8%
\$80,000 or more	36%
Refused / Don't know	19%

D8. Gender:

Gender	2014
<i>Sample Size</i>	<i>340</i>
Male	61%
Female	39%

