

2016 Demand Side Management Annual Report

17 November 2018



Preface

In preparation of Enbridge's Application for 2016 Demand Side Management Clearance of Deferral and Variance Accounts, EB-2018-0301, this final 2016 Demand Side Management Annual Report has been updated from its original draft following the release of the Evaluation Contractor's (DNV-GL) final 2016 Natural Gas Demand Side Management Annual Verification Report, dated October 30th, 2018.

In accordance with details provided in Enbridge's 2016 Clearance Application, this 2016 DSM Annual Report reflects 2016 verified program results as presented in the Evaluation Contractor's aforementioned Annual Verification Report.



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Executive Summary

Enbridge Gas Distribution summarized its 2016 DSM Plan in the 2015-2020 Multi-Year DSM Plan (EB-2015-0049), filed on April 1st, 2015. The Company's 2016 DSM Plan was outlined consistent with the provisions set out by the Ontario Energy Board in the Report of the Board: Demand Side Management Framework for Natural Gas Distributors (2015-2020), published December 22nd, 2014 (EB-2014-0134).

In its Decision and Order, published January 20th, 2016, and the update to the Decision and Order, published February 24th, 2016, the Board responded to the details outlined in the Company's Plan and determined that Enbridge reasonably interpreted the DSM Framework. The Decision summarized the Board approved 2016 programs, budgets, metrics and targets for all scorecards. The 2016 Annual Report provides an overview on the Company's results.

The Company is pleased to report that in the 2016 DSM program year, the portfolio generated total audited gas savings of 837.1 million net lifetime (cumulative) cubic meters. These savings are a direct result of the Company's ongoing efforts delivering the Resource Acquisition and Low Income programs. Natural gas savings attributable to Market Transformation and Energy Management program delivery are not captured in these totals, since results for this program are not measured on the basis of cubic meters (m^3) or lifetime (cumulative) cubic meters saved.

As outlined in the Filing Guidelines to the Demand Side Management Framework for Natural Gas Distributors (2015-2020), submitted by the Board on December 22nd, 2014 (EB-2014-0134), the Board calls for application of a Total Resource Cost (the TRC-Plus) test as well as the introduction of the Program Administrator Cost (PAC) test to screen for cost-effectiveness of programs. In 2016, the portfolio demonstrated cost-effective program delivery based on positive results from both the TRC-Plus and PAC screening tests. The TRC-Plus ratio for the Resource Acquisition program was 2.7, while the TRC-Plus ratio for the Low Income program was 2.0 – both well above cost-



effectiveness screening thresholds. The 2016 portfolio had an overall TRC-Plus ratio of 2.6 and an overall PAC ratio of 2.7. The TRC-Plus ratio and the PAC ratio for the Resource Acquisition program were 2.7 and 2.9 respectively, while both the TRC-Plus ratio and the PAC ratio for the Low Income program were 2.0.

Table ES.0 2016 DSM Portfolio Results

Program	Annual Net Gas Savings (m ³)	Cumulative Net Gas Savings (m ³)	Budget	2016 Spending	TRC-Plus Ratio	PAC Ratio
Resource Acquisition						
Home Energy Conservation	14,988,260	229,695,730	\$12,148,317	\$22,057,458	2.0	1.7
Adaptative Thermostats	3,024,528	45,367,920	\$876,371	\$1,666,753	2.7	4.5
C&I Prescriptive	3,174,750	51,377,592	\$7,020,664	\$1,001,671	3.2	7.9
C&I Direct Install	5,277,573	79,163,595	\$2,196,952	\$2,390,902	10.8	5.2
C&I Custom	18,327,992	315,357,341	\$4,955,421	\$6,746,119	4.0	6.9
Small New Construction	-	-	\$396,933	\$0	-	-
Energy Leaders	67,119	671,186	\$400,000	\$73,775	1.5	1.4
Run It Right (RA)	387,468	1,937,342	\$1,260,162	\$300,962	0.7	0.7
Comprehensive Energy Mgmt (RA)	-	-	\$48,805	\$0	-	-
<i>Overheads</i>	-	-	\$5,033,048	\$4,630,077	-	-
Total RA	45,247,691	723,570,707	\$34,336,673	\$38,867,717	2.7	2.9
Low Income						
Single Family (Part 9)	1,155,256	28,814,754	\$5,806,064	\$4,543,350	1.1	0.9
Multi Residential (Part 3)	4,120,642	84,728,581	\$3,279,028	\$2,326,325	3.4	5.5
New Construction	-	-	\$1,116,696	\$258,877	-	-
<i>Overheads</i>	-	-	\$1,743,622	\$1,604,019	-	-
Total LI	5,275,898	113,543,335	\$11,945,410	\$8,732,572	2.0	2.0
Market Transformation						
Residential Savings by Design	-	-	\$3,250,842	\$3,469,121	-	-
Commercial Savings by Design	-	-	\$1,345,890	\$1,398,940	-	-
School Energy Competition	-	-	\$302,197	\$289,555	-	-
Run It Right (MT)	-	-	\$250,824	\$225,819	-	-
Comprehensive Energy Mgmt (MT)	-	-	\$464,930	\$106,806	-	-
<i>Overheads</i>	-	-	\$964,351	\$887,140	-	-
Total MT	0	0	\$6,579,034	\$6,377,381		
Portfolio Overheads	-	-	\$3,500,000	\$1,670,616	-	-
Grand Total	50,523,589	837,114,042	\$56,361,117	\$55,648,285	2.6	2.7

* Not all values may compute exactly due to rounding

In 2016, the Resource Acquisition program contributed a total of 723.6 million net cumulative cubic meters (CCM) in natural gas savings; the Low Income program delivered 113.5 million net CCM natural gas savings, and Market Transformation and



Energy Management offers continued to demonstrate substantial results. The cumulative net gas savings of the individual offers are outlined above in Table ES.0.

DSM results for 2016 were achieved with total spending of \$55,648,285. In comparison, the OEB approved budget for 2016 as per the Board’s Decision was \$56,361,117.

Table ES.1 2016 DSM Results Summary

2016 DSM Results Summary	
Net CCM Savings	837,114,042 m³
DSMIDA amount recoverable from Ratepayers	\$6,365,751
LRAMVA amount payable to Ratepayers*	-\$95,625
DSMVA amount payable to Ratepayers*	-\$712,832

* The LRAMVA and DSMVA are negative indicating that these amounts are payable to ratepayers.

The maximum DSM shareholder incentive (DSMI) available for the 2016 program year is \$10,450,000. The determination of the Company’s incentive is based on 2016 DSM performance in relation to the weighted scoring approach. The resulting DSM Shareholder Incentive earned by the Company for 2016 is \$6,365,751, as outlined in Table ES.1. The DSM Incentive Deferral Account (DSMIDA) is utilized to record the shareholder incentive amount earned by Enbridge as a result of its DSM program results.

The Lost Revenue Adjustment Mechanism Variance Account (LRAMVA) is utilized to true-up the lost distribution revenues associated with DSM activity relative to what was included in the forecast for rate-setting purposes. The Lost Revenue Adjustment Mechanism calculation based on 2016 results is \$14,656. As such the Lost Revenue Adjustment Mechanism Variance Account amount relative to the forecasted impact included in distribution rates for 2016 is \$95,625 to be refunded to ratepayers.



The DSM Variance Account (DSMVA) is utilized to track the difference between DSM spending in 2016 and the amount already built into rates which equals the 2016 OEB approved DSM budget. This amount totalled \$712,832.

In the face of evolving and fluctuating government policies and mandates in the Province's energy efficiency landscape, the Company continues to be proud of its accomplishments in DSM and is pleased to demonstrate successful results across the range of 2016 offers.

1. Introduction

The continuing need for DSM efforts in the province of Ontario was outlined by the Ontario Energy Board (the “Board”) in the Report of the Board: Demand Side Management Framework for Natural Gas Distributors (2015-2020), published December 22nd, 2014 (the “Framework”).

To guide the utilities’ DSM portfolios, the Framework established a number of goals including, assisting consumers in managing their energy bills, promoting energy efficiency and creating a culture of conservation. The Framework also provides direction for DSM programs and outlines the proposed weighted scorecard approach to measuring DSM performance.

Enbridge Gas Distribution (“Enbridge”, the “Company”) has demonstrated significant achievement in results since Demand Side Management was introduced to its customers in the mid-1990s. Between 1995 and 2016, Enbridge’s energy efficiency programs reduced customer consumption by 11.1 billion cubic meters of natural gas. These gas savings have resulted in a reduction of 20.8 million tonnes of greenhouse gas emissions¹, roughly equal to removing 4 million cars from the road for one year.²

Enbridge’s 2016 DSM portfolio included programs directed towards Resource Acquisition, Low Income, and Market Transformation and Energy Management as follows:

Resource Acquisition Program

- Home Energy Conservation Offer
- Residential Adaptive Thermostat Offer
- Custom Commercial Offer
- Custom Industrial Offer

¹ Assumes 1.875kg of CO_{2e} is emitted for each m³ gas that is consumed.

² Assumes the average automobile produces 5.1 tonnes of CO₂ per year.



- Run it Right Offer
- Commercial and Industrial Prescriptive Offer
- Commercial and Industrial Direct Install Offer
- Energy Leaders Initiative

Low Income Program

- Home Winterproofing Offer
- Low Income Multi-Residential Offer
- Low Income New Construction Offer

Market Transformation and Energy Management Program

- Savings by Design – Residential Offer
- Savings by Design – Commercial Offer
- School Energy Competition
- Run it Right Offer
- Comprehensive Energy Management Offer

The 2016 Annual Report (the “Report”) on Enbridge’s Demand Side Management programs provides a summary of the results achieved over the program year as demonstrated by each program’s scorecard performance. The Report provides a comparison of actual and target results for each program and also provides an opportunity for Enbridge to highlight successes as well as lessons learned. In addition the Report offers information in support of the Company’s 2016 Demand Side Management Incentive Deferral Account (DSMIDA), Demand Side Management Variance Account (DSMVA), and the Lost Revenue Adjustment Mechanism Variance Account (LRAMVA) claims.

As requested in the Framework, Enbridge and Union Gas consulted to align on the general format of each utility’s Annual Report. The report will be reviewed by the OEB’s third party Evaluation Contractor, DNV GL, to facilitate the 2016 program evaluation.

As outlined in the Framework, beginning in 2015 the governance structure changed significantly such that the Board is now responsible for the oversight responsibility of the annual audit and evaluation of the utilities' DSM results, including selecting the Evaluation Contractor. Board Staff now plays the primary role in coordinating this process and contracted DNV-GL as the Evaluation Contractor for 2016. The final 2016 Natural Gas Demand Side Management Annual Verification Report, was issued by DNV-GL on October 30th, 2018.

Enbridge remains committed to the objective of continually improving its DSM practices, program design and delivery. A significant component of this effort includes the consideration of recommendations and expertise provided by stakeholders through the annual audit and evaluation process. In past years for example, learnings which could evolve program design, enhance delivery or improve savings calculation methodologies have been incorporated in the Company's DSM offerings. The delayed 2016 process however has limited the Company's ability to consider recommendations or incorporate learnings in a timely fashion to support continuous improvements.

Despite evolving government policies and mandates that are presenting new challenges to operating in the energy efficiency landscape, as well as the continuing low cost of natural gas relative to increasing electricity prices, Enbridge is pleased to continue to offer DSM programming through the Board approved 2015-2020 Multi-Year DSM Plan to help its customers reduce their energy bills, and at the same time provide support for the Province's greenhouse gas reductions emissions targets.

2. Demand Side Management

2.1 2016 DSM Plan

On March 31st, 2014 the Minister of Energy issued a Directive to the Board calling for the development of a new DSM policy framework. This new framework was to span a period of six years beginning January 1st, 2015 and, among other things, enable the achievement of all cost-effective DSM.

On September 15th, 2014 the Board issued a Draft Report of the Board outlining its proposed 2015-2020 DSM Framework for Natural Gas Distributors (EB-2014-0134) and called upon all interested parties to provide comment. On October 15th, 2014 Enbridge, Union Gas, and a wide variety of stakeholders provided comment on the Board's proposed 2015-2020 DSM Framework.

On December 22nd, 2014 the Board released its Framework and the accompanying Guidelines.

On April 1, 2015, Enbridge filed the Multi-Year Demand Side Management Plan (2015-2020) (EB-2015-0049) in accordance with the 2015-2020 Framework. In the Decision and Order, published January 20th, 2016, and the update to the Decision and Order, published February 24th, 2016, the Board responded to the details outlined in the Multi-Year Demand Side Management Plan (the "Plan"), and on January 20th, 2016 and February 24th, 2016 provided a Decision and a Revised Decision respectively to support the Plan which included Enbridge's 2016 approved programs and budgets.

Enbridge's 2016 to 2020 DSM portfolio includes offers that have existed in the past as well as others that are new in this Plan. These new or enhanced offers have been developed based on industry input, stakeholder input, Enbridge's experience, and research from best practices in other jurisdictions. They are responsive to market fundamentals, including opportunities and challenges, and perhaps most importantly,

they are directly responsive to the Board's EB-2014-0134 Framework guiding principles and key priorities.

The provisions set forth in the Plan were intended to be flexible within reason, allowing the Company to introduce, change, or discontinue activities or initiatives as is necessary to respond to market conditions and the needs of its customers, within the constraints of the DSM budgets and scorecards approved by the Board and the terms of the Framework and the Board's EB-2014-0134 Filing Guidelines.

2.2 Program and Portfolio Design

The Company's DSM activities continue to drive change in the market through focused efforts to deliver natural gas savings and related benefits to customers. Enbridge's 2016 DSM Plan includes three distinct programs; Resource Acquisition, Low Income, and Market Transformation and Energy Management. Within each of these programs, Enbridge makes a variety of energy efficiency offers available in support of its customers and the province's greenhouse gas (GHG) emission reduction efforts.

The Resource Acquisition program and its offers focus on achieving direct, volumetric natural gas savings customer by customer that commonly involve the installation of energy efficient equipment or the implementation of operational improvements. These improvements are often supported by technical assistance and financial incentives among other approaches.

The activities undertaken and offers made available in the Low Income program are largely similar to offers included within Resource Acquisition and Market Transformation and Energy Management. However, delivering energy efficiency to the low income market presents a unique set of challenges and requires a tailored approach. While the Low Income program will often yield lower net Total Resource Cost (TRC) benefits relative to Resource Acquisition, delivery of energy efficiency to these consumers yields various benefits which are difficult to quantify, justifying a Board-approved threshold for cost-effectiveness which is lower than that of Resource Acquisition.

Lastly, Enbridge's Market Transformation and Energy Management program focuses on facilitating fundamental changes in the market, such as increased market shares of energy efficient products and services, or the influencing of consumer behavior and attitudes to reduce the consumption of natural gas. Enbridge's Market Transformation and Energy Management offers have a long-term and holistic view of the use of energy in Ontario and seek to operate where competitive forces are not expected to yield the results sought within an acceptable timeframe.

2.3 Cost-Effectiveness Screening

The utility is expected to assess its DSM portfolio through a method of calculating and screening the cost-effectiveness of its programs as a means of assessing economic value of the DSM portfolio. As outlined in the Framework, beginning in 2015, the Board adopted "an enhanced TRC test, or the "TRC-Plus" test, which the gas utilities should use to screen all potential DSM programs when developing their multi-year DSM plans." The utilities were instructed to apply a 15% non-energy benefit adder to the benefit side of the TRC test calculation. Furthermore, the Board directed the utilities to also "incorporate the PAC test as a secondary cost-effectiveness reference tool to help better inform which programs should be proposed."

"The TRC-Plus test measures the benefits and costs of DSM programs for as long as those benefits and costs persist and applies a 15% non-energy benefit adder." The 15% non-energy benefit adder accounts for other benefits not related to the reduction in natural gas such as environmental, economic and social benefits.

In the case of the Resource Acquisition program, if the TRC-Plus ratio (which compares the present value of the natural gas, electricity and water savings and 15% non-energy benefits adder to the present value of the costs) exceeds 1.0, the program is considered cost-effective.



In recognition that the Low Income program may include additional benefits that are not reflected in the TRC-Plus test, the Low Income program is screened using a TRC-Plus threshold of 0.7.

As highlighted in the Guidelines, some programs, such as Market Transformation are not typically amenable to a screening approach (such as TRC-Plus) and instead are reviewed and assessed on their own merits based on the objectives of the program.

The Company has also applied the Program Administrator Cost (PAC) test as a secondary reference tool in assessing the programs' cost-effectiveness. As outlined in the Guidelines, "the costs included in the PAC test calculation include all expenditures by the utility to administer DSM programs (i.e., costs to design, plan, administer, deliver, monitor and evaluate)."

The Annual Report provides an opportunity to report both TRC-Plus and PAC assessments for the 2016 DSM program results. Cost-effectiveness screening for 2016 is summarized in Section 4.3.

2.4 Program Evaluation

As outlined in the Framework, beginning in 2015, the Board introduced that it would be taking on the coordination function of the Evaluation, Measurement & Verification (EM&V) process. Additional clarity regarding a new governance structure for the 2015-2020 DSM evaluation process of program results was provided on August 21st, 2015, in the memo from the Board to the utilities and to participants in the EB-2014-0134 consultation (EB-2015-0245). The focus of the memo was the establishment of the OEB's process to evaluate the results of Natural Gas Demand Side Management programs from 2015 to 2020. This document included the following evaluation responsibilities:

- The OEB would be responsible for coordinating and overseeing the evaluation and audit process, including selecting a third party Evaluation Contractor.



- The Evaluation Contractor (EC) would carry out the evaluation and audit processes and would draft an EM&V Plan for the natural gas utilities' DSM programs.
- An Evaluation Advisory Committee (EAC), which includes representation from each of the utilities, would be formed to provide input and advice to the OEB on the development of the plan and on the evaluation and audit of DSM results.

2.5 2016 Annual Audit and Evaluation of DSM Results

Enbridge's 2016 DSM results, as summarized in the DSM Annual Report are subject to an independent external audit. As referenced in section 2.4, the Board's August 21st, 2014 memo (EB-2015-0245) specified that the OEB would be responsible for coordinating and overseeing the evaluation and audit process, including selecting a third party EC and publishing the final evaluation results on an annual basis. The memo specified that the EC will carry out the annual evaluation and audit processes of all DSM programs and provide an opinion on whether the claimed DSM Incentive (DSMI) amount, LRAMVA, and DSMVA have been correctly calculated using reasonable assumptions. The EAC which includes utility representation as described in Section 2.6 below will provide input and play an advisory role throughout the evaluation and audit effort to facilitate the achievement of the audit objectives. Board Staff communicated it had issued an RFP on February 8th, 2016, for the procurement and selection of the EC. Subsequently, Board staff announced it had selected DNV GL as the EC and a "kick-off" EAC meeting introducing DNV GL convened on May 12th, 2016. Board Staff communicated that the expectation was that DNV GL would be the EC for the both the 2015 and 2016 program years.

2.6 Evaluation Advisory Committee

As detailed in the August 21st, 2015 memo from the Board (EB-2015-0245), the EAC provides input and advice as required throughout the DSM evaluation process. The EAC is comprised of:

- Experts representing non-utility stakeholders, with demonstrated experience and expertise in the evaluation of DSM technologies and programs, natural gas energy efficiency technologies, multi-year impact assessments, net-to-gross studies, free ridership analysis and natural gas energy efficiency persistence analysis;
- Expert(s) retained by the OEB;
- Representatives from the Independent Electricity System Operator (IESO);
- Representatives from each natural gas utility; and
- Representatives from the Ministry of Energy (MOE) and the Environmental Commissioner of Ontario (ECO), who will participate as observers.

The OEB appointed the following non-utility stakeholders as members of the EAC:

- Chris Neme, Energy Futures Group
- Jay Shepherd, Jay Shepherd Professional Corporation
- Marion Fraser, Fraser & Company

On May 5, 2016, two additional independent experts were added to the EAC:

- Ted Kesik, Knowledge Mapping Inc.
- Robert Wirtshafter, Wirtshafter Associates Inc.

Non-utility stakeholders are expected to provide input and advice based on their experience and technical expertise and not to advocate positions of parties they have represented before the OEB in various proceedings.



3. OEB Data Reporting Requirements

The following tables summarize the annual reporting key elements outlined in Section 14.2 of the Guidelines.

Table 3.0 Annual and Long-Term DSM Budgets
 (\$/year and \$/6 years)

OEB Approved Annual and Long-Term Budgets							
	2015	2016	2017	2018	2019	2020	2015 2020 Total
Resource Acquisition (RA)							
Residential	\$1,872,720	\$13,024,688	\$16,705,000	\$20,175,000	\$20,578,500	\$20,990,070	\$93,345,978
Commercial / Industrial	\$12,571,070	\$16,278,937	\$17,679,381	\$17,737,977	\$16,355,713	\$16,685,480	\$97,308,558
RA Program Costs	\$14,443,790	\$29,303,625	\$34,384,381	\$37,912,977	\$36,934,213	\$37,675,550	\$190,654,536
RA Overheads	\$4,731,485	\$5,033,048	\$5,104,327	\$5,249,479	\$5,122,057	\$5,232,967	\$30,473,363
Total RA	\$19,175,275	\$34,336,673	\$39,488,708	\$43,162,456	\$42,056,270	\$42,908,517	\$221,127,899
Low Income (LI)							
LI Program Costs	\$6,864,090	\$10,201,788	\$10,908,121	\$11,690,496	\$11,923,306	\$12,160,772	\$63,748,573
LI Overheads	\$517,988	\$1,743,622	\$1,619,299	\$1,618,681	\$1,653,531	\$1,689,078	\$8,842,199
Total LI	\$7,382,078	\$11,945,410	\$12,527,420	\$13,309,177	\$13,576,837	\$13,849,850	\$72,590,772
Martket Transformation (MT)							
MT Program Costs	\$4,890,900	\$5,614,683	\$5,849,381	\$6,045,400	\$6,174,079	\$6,305,335	\$34,879,778
MT Overheads	\$1,353,687	\$964,351	\$868,335	\$837,054	\$856,225	\$875,783	\$5,755,435
Total MT	\$6,244,587	\$6,579,034	\$6,717,716	\$6,882,454	\$7,030,304	\$7,181,118	\$40,635,213
Total Program Costs (without overheads)	\$26,198,780	\$45,120,096	\$51,141,883	\$55,648,873	\$55,031,598	\$56,141,657	\$289,282,887
Total Program Overheads	\$6,603,160	\$7,741,021	\$7,591,961	\$7,705,214	\$7,631,813	\$7,797,828	\$45,070,997
Total Program Costs (with overheads)	\$32,801,940	\$52,861,117	\$58,733,844	\$63,354,087	\$62,663,411	\$63,939,485	\$334,353,884
Portfolio Overheads							
EM&V	n/a	\$1,500,000	\$1,700,000	\$1,700,000	\$1,736,746	\$1,774,228	\$8,410,974
Collaboration & Innovation ^{1 2}	\$1,000,000	\$1,000,000	\$1,000,000	\$1,000,000	\$1,021,616	\$1,043,663	\$6,065,279
DSM IT ³	n/a	\$1,000,000	\$1,000,000	\$1,000,000	\$1,000,000	\$1,000,000	\$5,000,000
Energy Literacy	n/a	\$0	\$500,000	\$500,000	\$0	\$0	\$1,000,000
Total Portfolio Overheads ^{1 2 3}	n/a	\$3,500,000	\$4,200,000	\$4,200,000	\$3,758,362	\$3,817,891	\$19,476,253
2015 Incremental Budget ^{1 2}	\$4,920,291	n/a	n/a	n/a	n/a	n/a	n/a
Total Portfolio Budget	\$37,722,231	\$56,361,117	\$62,933,844	\$67,554,087	\$66,421,773	\$67,757,376	\$358,750,428

1. In 2015, the Collaboration & Innovation amount of \$1M was included in the incremental budget of \$4.92M.

2. Total Collaboration & Innovation budget as approved by the Board is \$6M for 2015-2020.

3. Total DSMIT budget as approved by the Board is \$5M for 2015-2020 with \$1M accrued per year between 2016-2020.



Table 3.1 Actual Annual Total DSM Costs
 (including DSM spending³, overheads, evaluation, shareholder incentive, lost revenues)
 for each rate class dating back to 2007

Annual Actual Total DSM Costs										
RATE CLASS	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016
RATE 1	\$11,894,135	\$12,545,981	\$14,794,795	\$12,467,796	\$14,214,627	\$17,935,484	\$13,881,901	\$23,507,037	\$26,855,974	\$42,390,914
RATE 6	\$2,848,384	\$7,519,262	\$7,486,577	\$10,713,308	\$15,103,141	\$17,127,050	\$15,172,590	\$13,901,251	\$15,646,361	\$17,001,090
RATE 9	\$0	\$0	\$0	\$0	\$0	\$1,425	\$1,420	\$1,712	\$1,839	\$2,030
RATE 100	\$8,949,764	\$3,201,527	\$2,667,170	\$86,297	\$17,677	\$0	\$0	\$0	\$0	\$0
RATE 110	\$3,658,449	\$1,041,758	\$1,943,819	\$1,470,858	\$1,048,222	\$783,904	\$937,258	\$1,189,687	\$1,899,864	\$1,250,531
RATE 115	\$643,144	\$1,716,735	\$1,314,146	\$545,382	\$602,386	\$1,329,072	\$1,420,390	\$567,271	\$657,559	\$532,093
RATE 125	\$0	\$0	\$0	\$0	\$0	\$53,449	\$53,268	\$64,223	\$68,967	\$76,131
RATE 135	\$1,762	\$79,757	\$11,685	\$59,163	\$121,756	\$441,318	\$320,401	\$123,739	\$58,863	\$85,564
RATE 145	\$855,487	\$901,590	\$676,730	\$729,534	\$655,237	\$495,925	\$369,074	\$253,864	\$152,227	\$84,478
RATE 170	\$294,508	\$1,860,562	\$1,843,628	\$2,040,735	\$2,195,089	\$536,445	\$149,399	\$457,841	\$403,107	\$574,392
RATE 200	\$0	\$0	\$0	\$0	\$0	\$18,529	\$18,466	\$22,264	\$23,909	\$26,392
RATE 300	\$0	\$0	\$0	\$0	\$0	\$3,563	\$3,551	\$4,281	\$4,598	\$5,075
TOTAL	\$29,145,632	\$28,867,172	\$30,738,550	\$28,113,075	\$33,958,134	\$38,726,165	\$32,327,718	\$40,093,170	\$45,773,267	\$62,028,692

Table 3.2 Historic Actual Annual DSM Spending

	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016
Total DSM Spending (\$ millions)¹	\$21.20	\$23.03	\$25.42	\$24.00	\$27.24	\$30.61	\$27.84	\$32.51	\$35.78	\$55.65

1. Total DSM Spending includes variable costs, fixed costs and DSMVA where applicable

Table 3.3 DSM Spending as a Percent (%) of Distribution Revenue

	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016
Total DSM Spending (millions \$)¹	\$21.2	\$23.0	\$25.4	\$24.0	\$27.2	\$30.6	\$27.8	\$32.5	\$35.8	\$55.6
Total Distribution Revenue (millions \$)^{2 3 4 5}	\$980.9	\$995.9	\$1,012.1	\$960.4	\$978.8	\$972.0	\$1,055.0	\$1,044.0	\$1,055.4	\$1,122.0
DSM Spending as % of Distribution Revenue	2.2%	2.3%	2.5%	2.5%	2.8%	3.1%	2.6%	3.1%	3.4%	5.0%

1. Total DSM Spending includes variable costs, fixed costs and DSMVA where applicable

2. Distribution Revenue is equal to the gas distribution margin, and is the gas sales and distribution revenue less the cost of gas

3. Distribution Revenue includes gas sales and transportation of gas less gas commodity cost

4. Distribution Revenue excludes transmission, compression, and storage

5. Distribution Revenue is based on data unnormalized for weather

³ As the request is for actual costs, Enbridge interprets this to be 'DSM spending' rather than 'DSM budget' as written in Section 14.2 of the Guidelines.



Table 3.4 Historic Shareholder Incentive Amounts Available and Earned

	2007	2008	2009	2010	2011	2012 ¹	2013	2014	2015	2016 ²
	\$ millions									
Total Shareholder Incentive Earned	\$8.25	\$5.80	\$5.36	\$4.16	\$6.77	\$8.16	\$4.54	\$7.65	\$10.08	\$6.37
Maximum Shareholder Incentive Available	\$9.00	\$9.22	\$9.24	\$9.40	\$10.16	\$10.45	\$10.66	\$10.87	\$11.09	\$10.45

1. 2012 Shareholder Incentive includes reduction of -\$657,223 per Board's decision (EB-2013-0352)

2. 2016 Shareholder Incentive subject to Board approval

Table 3.5 Shareholder Incentive Earned as a Percent (%) of DSM Spending⁴

	2007	2008	2009	2010	2011	2012 ²	2013	2014	2015	2016 ³
Total Shareholder Incentive (\$ million)	\$8.25	\$5.80	\$5.36	\$4.16	\$6.77	\$8.16	\$4.54	\$7.65	\$10.08	\$6.37
Total DSM Spending¹	\$21.20	\$23.03	\$25.42	\$24.00	\$27.24	\$30.61	\$27.84	\$32.51	\$35.78	\$55.65
Shareholder Incentive Earned as a % of DSM Spending	39%	25%	21%	17%	25%	27%	16%	24%	28%	11%

1. Total DSM Spending includes variable costs, fixed costs and DSMVA where applicable

2. 2012 Shareholder Incentive includes reduction of -\$657,223 per Board's decision (EB-2013-0352)

3. 2016 Shareholder Incentive subject to Board approval

Table 3.6 Annual and Long-Term Natural Gas Savings Targets

Annual Natural Gas Savings Targets						
Scorecard	2015	2016	2017 ¹	2018	2019	2020
Resource Acquisition	1,011.9	631.1	806.5	<i>Targets are formulaic based on past year's performance</i>		
Low Income	92.8	96.7	167.1			
Total	1,104.7	727.8	973.6			

1. 2017 targets are calculated based on 2016 audited results multiplied by the 2017 budget multiplied by the productivity improvement of 2% in accordance with the Board's direction for a target adjustment mechanism beginning in 2017.

⁴ Enbridge interprets this request as requesting values as a percentage of 'DSM spending' rather than 'DSM budget' as written in Section 14.2 of the Guidelines.



**Table 3.7 2016 Total Annual & Cumulative Natural Gas Savings
(Gross and Net)**

	2016 Annual Gas Savings		2016 Cumulative Gas Savings	
	Gross	Net	Gross	Net
Resource Acquisition	84,749,901	45,247,691	1,365,482,647	723,570,707
Low-Income	5,282,139	5,275,898	113,605,747	113,543,335
Total	90,032,041	50,523,589	1,479,088,394	837,114,042

**Table 3.8 Total Historic Annual Natural Gas Savings
(Gross and Net)**

	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016 ¹
Total Net Gas Savings (millions m3)	85.07	77.25	69.86	64.58	76.40	60.14	47.74	43.54	48.97	50.52
Total Gross Gas Savings (millions m3)	85.99	121.98	117.62	98.82	114.14	92.53	66.06	60.62	67.09	90.03

1. 2016 DSM results subject to Board approval

**Table 3.9 Total Historic Cumulative Natural Gas Savings
(Gross and Net)**

	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016 ¹
Total Net CCM (millions m3)	1,214.10	1,118.98	1,039.18	951.40	1,253.82	1,068.98	826.91	719.84	826.17	837.11
Total Gross CCM (millions m3)	1,233.54	1,809.65	1,801.77	1,455.74	1,811.35	1,593.05	1,148.12	993.62	1,114.13	1,479.09

1. 2016 DSM results subject to Board approval



Table 3.13 Total Natural Gas Sales per Rate Class Subject to DSM Costs

Rate Class	2016 Natural Gas Volumes (millions m3)
General Service	
Rate 1	4,506.7
Rate 6	4,488.6
Total General Service	8,995.3
Contract Service	
Rate 100	3.2
Rate 110	827.6
Rate 115	497.6
Rate 135	64.6
Rate 145	45.7
Rate 170	302.2
Total Contract Service	1,740.9
Grand Total	10,736.2

**Natural Gas Sales (Volumes) for rate classes that are subject to DSM only*

Table 3.14 Number of Customers by Customer Type

Customer Type	# of Customers 2016
Residential ¹	1,959,569
Commercial	158,811
Industrial	6,303
Total	2,124,683

1. Residential customers include Low Income, which cannot be differentiated



Table 3.15 Number of Customers Broken Out by Rate Class

Rate Class	# of Customers 2016
Rate 1	1,959,569
Rate 6	164,692
Rate 9	6
Rate 100	2
Rate 110	269
Rate 115	27
Rate 125	5
Rate 135	45
Rate 145	38
Rate 170	25
Rate 200	1
Rate 300	2
Rate 315	2
Total	2,124,683



4. 2016 DSM Program Results Summary

4.1 2016 DSM Scorecard Summary

The 2016 DSM program scorecard performance is presented in Table 4.0.

Table 4.0 2016 DSM Program Scorecard Summary

	Component	Metric	Weight	Targets			2016 Results
				Lower Band	Target	Upper Band	
Resource Acquisition	Large Volume Customers	Cumulative Savings (million m ³) ¹	40%	249.1	332.2	498.3	328.75
	Small Volume Customers	Cumulative Savings (million m ³)	40%	224.2	298.9	448.4	394.82
	Residential Deep Savings	Participants ²	20%	6,194	8,259	12,389	12,986
Low Income	Single Family (Part 9)	Cumulative Savings (million m ³)	45%	23.8	31.8	47.7	28.81
	Multi-residential (Part 3)	Cumulative Savings (million m ³)	45%	48.7	64.9	97.4	84.73
	New Construction	Participants	10%	5	6	9	6
Market Transformation	Residential Savings by Design	Builders	10%	25	33	50	31
		Homes Built	15%	2,063	2,751	4,127	2,206
	Commercial Savings by Design	New Developments	25%	25	33	50	43
	School Energy Competition	Schools	10%	41	55	83	25
	Run It Right	Participants	20%	62	83	124	84
	Comprehensive Energy Mgmt	Participants	20%	5	7	11	7

1. Large volume consumers include commercial customers with a 3 year average annual consumption of greater than 75,000 m³/year or industrial customers with a 3 year average consumption of greater than 340,000 m³/year.

2. Number of participants with at least 2 qualifying measures (average annual gas savings across all participants is at least 15% of combined baseline space heating and water heating usage as calculated by HOT2000).

The 2016 weighted scorecard is the basis for the calculation of the Demand Side Management Shareholder Incentive. DSMI amounts for the 2016 program year are outlined in Section 9 of this report.



Table 4.1 2016 CCM Savings Results by Sector

Program/Sector	2016 Net CCM Results (m³)
Resource Acquisition	
<i>Residential</i>	<i>275,063,650</i>
<i>Commercial & Industrial</i>	<i>448,507,056</i>
Resource Acquisition Total	723,570,707
Low Income	113,543,335
Combined Total	837,114,042

As summarized in Table 4.1, in terms of Net Cumulative Cubic Meters (CCM) savings, 2016 results totalled 837,114,042 cumulative m³ for all offers that include CCM as a metric. In 2016, the Commercial and Industrial sector was the largest overall contributor to CCM savings, accounting for 448,507,056 CCM or 54% of the total net CCM results. The Residential sector and the Low Income program were responsible for 33% and 14% of CCM, respectively.

In 2016, Enbridge delivered five offers through the Market Transformation and Energy Management scorecard. Results for the Market Transformation program offers are reviewed in Section 7 of this report.

4.2 Annual and Cumulative (Gross and Net) Results

As outlined in the Guidelines, the utilities “should provide the annual and cumulative resource savings attributable to each program, presented as both net and gross of the adjustment factors”⁵ in the Annual Report.

⁵ EB-2014-0134. Filing Guidelines to the Demand Side Management Framework for Natural Gas Distributors (2015-2020), OEB, December 22, 2014, page 18.



Table 4.2 2016 Annual and Cumulative Natural Gas Savings

	Program/Sector/Offer	Gross Annual Gas Savings (m ³)	Net Annual Gas Savings (m ³)	Gross CCM (m ³)	Net CCM (m ³)
Resource Acquisition	Residential				
	<i>Home Energy Conservation</i>	17,633,248	14,988,260	270,230,271	229,695,730
	<i>Adaptative Thermostats</i>	3,150,550	3,024,528	47,258,250	45,367,920
	Total Residential	20,783,798	18,012,788	317,488,521	275,063,650
	Commercial & Industrial				
	<i>Custom Industrial</i>	31,026,926	10,409,534	489,779,784	164,321,118
	<i>Custom Commercial</i>	22,807,626	7,918,458	409,751,690	151,036,223
	<i>Run It Right</i>	774,008	387,468	3,870,040	1,937,342
	<i>Prescriptive</i>	3,735,085	3,174,750	60,591,326	51,377,592
	<i>Direct Install</i>	5,555,340	5,277,573	83,330,100	79,163,595
<i>Energy Leaders</i>	67,119	67,119	671,186	671,186	
Total C & I	63,966,104	27,234,902	1,047,994,126	448,507,056	
Low Income	Low Income				
	<i>Single Family (Part 9)</i>	1,159,201	1,155,256	28,854,208	28,814,754
	<i>Multi-Residential (Part 3)</i>	4,122,938	4,120,642	84,751,540	84,728,581
	Total Low Income	5,282,139	5,275,898	113,605,747	113,543,335
	Grand Total	90,032,041	50,523,589	1,479,088,394	837,114,042

Table 4.2 details the annual gas savings and cumulative lifetime natural gas savings results (in cubic meters) for each of the offers in the Resource Acquisition and Low Income programs that have CCM as a performance metric. Savings results are summarized for both gross and net savings (net of applicable adjustment factors).



4.3 2016 Program Cost-Effectiveness Screening

Table 4.3 summarizes the TRC-Plus screening calculations for the 2016 Enbridge DSM Portfolio for illustrative purposes. The portfolio as a whole was cost-effective with an overall TRC-Plus ratio of 2.6. Further, the each of the Resource Acquisition and Low Income programs to which this screening applies, were also cost-effective to deliver as individual programs.

Table 4.3 2016 TRC-Plus Screening Summary

	Program/Sector/Offer	NPV TRC Plus Benefits	Total TRC Costs	Net TRC Plus Benefits	TRC Plus Ratio *
RESOURCE ACQUISITION	Residential				
	<i>Home Energy Conservation</i>	47,079,000	24,007,000	23,072,000	2.0
	<i>Adaptative Thermostats</i>	13,388,000	4,947,000	8,441,000	2.7
	Residential Total	60,467,000	28,954,000	31,513,000	2.1
	Commercial & Industrial				
	<i>Custom Industrial</i>	36,698,000	6,335,000	30,363,000	5.8
	<i>Custom Commercial</i>	28,151,000	9,694,000	18,457,000	2.9
	<i>Run It Right</i>	407,000	609,000	-202,000	0.7
	<i>Prescriptive</i>	11,636,000	3,640,000	7,996,000	3.2
	<i>Direct Install</i>	13,191,000	1,221,000	11,970,000	10.8
<i>Energy Leaders</i>	<u>219,000</u>	<u>146,000</u>	<u>73,000</u>	<u>1.5</u>	
Commercial & Industrial Total	90,302,000	21,645,000	68,657,000	4.2	
<i>Overheads</i>		<u>4,630,000</u>	<u>-4,630,000</u>		
Resource Acquisition Total	150,769,000	55,229,000	95,540,000	2.7	
LOW INCOME	Low Income				
	<i>Single Family (Part 9)</i>	4,855,000	4,318,000	537,000	1.1
	<i>Multi-Residential (Part 3)</i>	<u>15,634,000</u>	4,559,000	11,075,000	<u>3.4</u>
	<i>Overheads</i>		<u>1,604,000</u>	<u>-1,604,000</u>	
Low Income Total	20,489,000	10,481,000	10,008,000	2.0	
	Combined RA/Low Income **	171,258,000	65,710,000	105,548,000	2.6

* Note values may not compute exactly due to rounding.

** This summary does not include calculations for the Market Transformation program.



As proposed in the Guidelines, the Company is expected to use the PAC test as a secondary reference tool in assessing the programs' cost-effectiveness. Table 4.4 below summarizes the PAC screening calculations for the 2016 Enbridge DSM Portfolio. The portfolio as a whole had a positive overall PAC ratio of 2.7.

Table 4.4 2016 PAC Screening Summary

	Program/Sector/Offer	NPV PAC Benefits	Total PAC Costs	Net PAC Benefit	PAC Ratio *
RESOURCE ACQUISITION	Residential				
	<i>Home Energy Conservation</i>	37,497,000	22,057,000	15,440,000	1.7
	<i>Adaptive Thermostats</i>	7,450,000	1,667,000	5,783,000	4.5
	Residential Total	44,947,000	23,724,000	21,223,000	1.9
	Commercial & Industrial				
	<i>Custom Industrial</i>	23,531,000	2,318,000	21,213,000	10.2
	<i>Custom Commercial</i>	22,929,000	4,428,000	18,501,000	5.2
	<i>Run It Right</i>	354,000	527,000	-173,000	0.7
	<i>Prescriptive</i>	7,901,000	1,002,000	6,899,000	7.9
	<i>Direct Install</i>	12,325,000	2,391,000	9,934,000	5.2
<i>Energy Leaders</i>	<u>106,000</u>	<u>74,000</u>	<u>32,000</u>	<u>1.4</u>	
Commercial & Industrial Total	67,146,000	10,740,000	56,406,000	6.3	
<i>Overheads</i>		<u>4,630,000</u>	<u>-4,630,000</u>		
Resource Acquisition Total	112,093,000	39,094,000	72,999,000	2.9	
LOW INCOME	Low Income				
	<i>Single Family (Part 9)</i>	4,213,000	4,543,000	-330,000	0.9
	<i>Multi-Residential (Part 3)</i>	<u>12,707,000</u>	2,326,000	10,381,000	<u>5.5</u>
	<i>Overheads</i>		<u>1,604,000</u>	<u>-1,604,000</u>	
Low Income Total	16,920,000	8,473,000	8,447,000	2.0	
	Combined RA/Low Income **	129,013,000	47,567,000	81,446,000	2.7

* Note values may not compute exactly due to rounding.

** This summary does not include calculations for the Market Transformation program.

5. Resource Acquisition Scorecard

Enbridge works across the entire marketplace to build awareness of the energy efficiency opportunities supported through its Resource Acquisition (RA) program. The ongoing education, customer support and technical assistance provided by DSM consultants continue to be key drivers in delivering results for the RA program.

The performance metrics in Enbridge's Resource Acquisition scorecard encompass results attributable to offers which are geared to the Residential, Commercial, and Industrial market segments. Performance for the Resource Acquisition program is measured primarily in terms of net CCM of natural gas savings, and in one case, the Home Energy Conservation (HEC) offer also includes a participant metric.

RA offers focus on achieving direct, volumetric natural gas savings customer by customer that commonly involve the installation of energy efficient equipment or the implementation of operational or process improvements.

In 2016, the RA scorecard introduced separate CCM metrics for large and small customers. The large volume metric includes savings from offer participants who have a three year average annual consumption of greater than 75,000 m³/year in the Commercial sector or 340,000 m³/year in the Industrial sector. The small volume metric includes savings from DSM participants with a three year average annual consumption of less than 75,000 m³/year in the Commercial sector or 340,000 m³/year in the Industrial sector, and also includes savings from the Residential sector.

In the past, all CCM were captured in a single metric, which created a tendency for the utility to focus on its largest Commercial and Industrial customers as both cost efficiency and shareholder incentive were maximized through the pursuit of the largest projects. As a result, the smaller Commercial and Industrial market has been under-served. By separating Small and Large Volume Customer CCM metrics, Enbridge can focus on both customer groups and generate results through higher participation levels.



In the Residential Sector there are two offers, HEC and Adaptive Thermostats. The HEC offer comprises upgrades to space and water heating equipment and home building envelope upgrades and the Adaptive Thermostats offer focuses on a single measure upgrade.

For Commercial customers, Custom and Prescriptive offers are available for new and existing Commercial building customers and include the installation of efficient heating, ventilating and air conditioning (HVAC) systems, operational improvements, and custom solutions specific to the customer's needs.

Industrial customers tend to have differing and unique considerations. In addition to selected prescriptive measures, projects for Industrial customers are most often customized solutions, engineered to meet the specific needs of a customer's manufacturing process and facility.

Results for Enbridge's 2016 RA program were divided into Large Volume and Small Volume Customers. As outlined in Table 5.0, the achievement for the Large Volume Customers metric was 328.75 million CCM. The Small Volume Customers result exceeded the target, with 394.82 million CCM. The Resource Acquisition program scorecard also includes a deep savings metric specific to the Residential sector. There were 12,986 Residential Deep Savings Participants, exceeding the upper band.



Table 5.0 2016 Resource Acquisition Scorecard

Component	Metric	Weight	Targets			2016 Result
			Lower Band	Target	Upper Band	
Large Volume Customers	Cumulative Savings (million m ³) ¹	40%	249.1	332.2	498.3	328.75
Small Volume Customers	Cumulative Savings (million m ³)	40%	224.2	298.9	448.4	394.82
Residential Deep Savings	Participants ²	20%	6,194	8,259	12,389	12,986

1. Large volume consumers include commercial customers with a 3 year average annual consumption of greater than 75,000 m³/year or industrial customers with a 3 year average consumption of greater than 340,000 m³/year.

2. Number of participants with at least 2 qualifying measures (average annual gas savings across all participants is at least 15% of combined baseline space heating and water heating usage as calculated by HOT2000).

Within the RA program, each of the Residential, Commercial and Industrial sectors contributed to the CCM savings achievement as detailed below in Table 5.1. Further detail on the offers within each of these sectors is provided in the following pages.

Table 5.1 2016 Resource Acquisition Program Sector Results

Resource Aquisition Program Sector	2016 Net CCM (m ³)	# of Projects	# of Units
<i>Residential</i>	275,063,650	30,016 ¹	17,030 ²
<i>Commercial & Industrial</i>	448,507,056	1,404 ³	7,254 ⁴
Total Resource Acquisition	723,570,707	31,420	24,284

1. # of Projects summarizes the total number of unique projects for HEC and adapative thermostats.

2. # of Units summarizes the number of units installed for adapative thermostats

3. # of Projects summarizes the number of unique projects for custom, prescriptive, direct install, RIR, and energy leaders offers.

4. # of Units summarizes the number of units installed for prescriptive, and direct



All Resource Acquisition offers delivered to Enbridge customers in 2016 and discussed below will be continued in the Resource Acquisition DSM program in 2017.

5.1 Residential Resource Acquisition

Enbridge serves over 1.9 million Residential sector customers across the Company's franchise territory. Residential customers represent the largest segment in Enbridge's service area, consequently the Company undertakes significant efforts to serve these customers, including through its DSM offers and initiatives.

Offers marketed to Residential customers in 2016 include Home Energy Conservation and Adaptive Thermostats. Enbridge introduced HEC in 2012. In addition to helping homeowners understand energy improvement opportunities through the completion of a home energy audit, this offering looks at whole home energy savings and encourages participants to install measures that generate ongoing energy savings. The Adaptive Thermostat offer is new in market in 2016 and provides customers with rebates to support the installation of smart thermostats, which use sensors and wi-fi technology allowing homeowners to maintain comfort while achieving energy savings.

2016 DSM Results for Residential Resource Acquisition offers are provided in Table 5.2. Further detail on the Residential Resource Acquisition offers is provided in the following pages.

Table 5.2 2016 Residential Resource Acquisition Results

Resource Acquisition Residential Sector	2016 Net CCM (m ³)	# of Participants	# of Units	TRC Plus Ratio	PAC Ratio
<i>Home Energy Conservation</i> ¹	229,695,730	12,986	-	2.0	1.7
<i>Adaptive Thermostats</i>	45,367,920	17,030	17,030	2.7	4.5
Total Residential	275,063,650	30,016	17,030	2.09	1.89

1. Number of participants with at least 2 qualifying measures (average annual gas savings across all participants is at least 15% of combined baseline space heating and water heating usage as calculated by HOT2000).



5.11 Home Energy Conservation

<p>Objectives</p>	<p>The aim of the Home Energy Conservation offer is to promote meaningful improvements to Residential customers’ gas consumption and thereby help customers lower their energy bills.</p> <p>The goal of the HEC offer is to achieve deep energy savings in existing homes and to raise awareness of the benefits of energy efficiency. The initiative is designed to reduce gas use for space and water heating using a holistic approach, encouraging conservation through the installation of high efficiency equipment as well as thermal envelope improvements to reduce the space heating load. With financial incentives, the offer helps homeowners make their homes more energy efficient and reduces the burden of high energy costs.</p>
<p>Target Customer</p>	<p>HEC is targeted to Rate 1 Residential customers.</p>
<p>Metrics</p>	<p>As part of the Resource Acquisition program, HEC has two metrics. The first metric is lifetime natural gas savings – CCM savings. The second metric is the total number of Residential participants who install at least two qualifying measures. The aggregate annual gas savings across all participants in the portfolio must achieve on average at least a 15% reduction in annual natural gas use in comparing the results of the D (pre-installation) assessment to the results of the E (post-installation) assessment as determined by HOT2000 (NRCan’s) accredited energy modelling software.</p>
<p>Offer Description</p>	<p>The HEC offer is a direct-to-consumer delivered initiative. Participants work with an Enbridge partner Service Organization (SO) to undergo a preliminary energy assessment to determine the home’s current energy use. The SO assigns a Certified Energy Auditor (CEA) to audit</p>



	<p>the home and complete a blower door test to measure the home’s air tightness. The CEA models the home using HOT2000 and completes an energy efficiency report for the homeowner. This report details energy savings tips and information and outlines the energy savings opportunities for the home as well as provides an EnerGuide rating. The homeowner is therefore in a position to make informed decisions regarding potential improvements. Participants are required to install at least two eligible measures. Once energy upgrades are completed, the CEA completes a post-installation audit to model for the customer the energy savings achieved, as determined by HOT2000.</p> <p>Funding is directed at covering the cost of the energy audits and providing a tiered incentive. Natural gas savings claims are determined based on pre and post HOT2000 modelled consumption. CEAs submit modeling simulation files along with supporting data to NRCan. Enbridge receives pre and post audit data from NRCan and compiles monthly reports. This data is tracked and reviewed with SOs for validation. Tracking reports summarize information regarding project specifics, including participant details, project dates, measures installed and gas savings (m³).</p>
<p>Cost-Effectiveness</p>	<p>The HEC offer is cost-effective as supported by the TRC-Plus and PAC ratios summarized in Table 5.3 below.</p>
<p>2016 Results</p>	<p>As outlined in Table 5.3 below, the HEC offer contributed 229.70 million CCM to the Resource Acquisition Small Volume Customer metric in 2016 with a total of 12,986 participants.</p>



Table 5.3 2016 Home Energy Conservation Results

Resource Aquisition Residential Sector	2016 Net CCM (m ³)	# of Participants	TRC-Plus Ratio	PAC Ratio
<i>Home Energy Conservation</i> ¹	229,695,730	12,986	2.0	1.7

1. Number of participants with at least 2 qualifying measures (average annual gas savings across all participants is at least 15% of combined baseline space heating and water heating usage as calculated by HOT2000).


2016 Commentary and Lessons Learned


- When the HEC offer was launched in 2012, efforts were strategically targeted to the Markham community, which was identified based on location, age of homes, and community interest in energy efficiency. The HEC offer grew with the expansion into areas across the Enbridge franchise area, including York Region, The City of Toronto, Ottawa, Barrie, Durham, Niagara, Peel, Dufferin County, and Simcoe County. With continued expansion of the HEC offer across the Enbridge franchise area, HEC has grown substantially from 271 participants in 2012 to 12,986 participants during the 2016 program year.


- Enbridge’s market delivery strategy focuses marketing and communication efforts on the home improvement contractor community. In 2015, funding for the HEC offer was halted mid-year in order to manage budget requirements. As a result, dedicated efforts were required in 2016 to re-engage contractors and ensure customers understood that the offer was resuming. Enbridge was able to take advantage of the heating months early in 2016 despite a lack of momentum after the program was cancelled in 2015.


- Continuing increases in energy related costs remain a driving force for homeowners to consider energy-efficient improvements and upgrades. The educational home audit and incentive support for upgrades offered in HEC provides customers with increased understanding and the opportunity to improve their personal energy usage and reduce their carbon footprint.

Your Home Energy Upgrades Guide


- 


Add Attic Insulation: Attic insulation will prevent heated and cooled air from escaping through the top of your home.
- 


Increase Wall Insulation: Better insulation helps to keep heat in during the winter and out during the summer, providing more comfort and lower energy bills.
- 


Upgrade Basement Wall Insulation: A properly insulated basement helps to prevent heat loss and mold-causing condensation. It also makes for a more comfortable living space.
- 


Air Sealing: Air leakage means your furnace will need to work harder to heat your home. Proper sealing prevents drafts, increasing comfort and lowering energy bills."

- 

Replace Windows: Better windows help to prevent costly drafts and condensation. They also allow for solar gains, which heat your home, and solar shading, which helps cool your home.
- 

Convert Furnace: Installing a high-efficiency furnace will give you improved climate control, energy savings and a more comfortable indoor environment overall.
- 

Upgrade Water Heater: A high-efficiency or tankless water heater can reduce your natural gas consumption, saving you money.
- 

Drain Water Heat Recovery: Drain Water Heat Recovery units preheat the water going into your water tank with warm water from the shower or dishwasher, so your water tank doesn't have to work as hard. Your water heater will use less energy, for lower bills.
- 

Exposed Floor Insulation: Insulating the underside of floors exposed to unheated spaces (such as a room over the garage) can keep floors warmer and provide a more cozy living space.

EARN UP TO \$2,100 IN INCENTIVES

\$1,600	<p>Achieve 25% - 49% gas savings as per final energy audit</p> <p>\$500 covering the full energy audit costs, not including HST</p> <ul style="list-style-type: none"> • An instant rebate of \$150 will be applied to the first audit and \$350 for the remainder of the audit cost will be reimbursed in the total remaining incentive amount. <p>Total amount of incentive to homeowner is \$1450</p>
\$2,100	<p>Achieve 50% or above in gas savings as per final energy audit</p> <p>\$500 covering the full energy audit costs, not including HST</p> <ul style="list-style-type: none"> • An instant rebate of \$150 will be applied to the first audit and \$350 for the remainder of the audit cost will be reimbursed in the total remaining incentive amount. <p>Total amount of incentive to homeowner is \$1950</p>

To find out if you can reach 25% annual gas savings, a pre- and post-home energy audit is required by an Enbridge approved Certified Energy Auditor (CEA). Additional information on the program can be found at knowyourenergyscore.ca. Program may be subject to change or cancellation without notice at any time.



- Following a consultation process, Enbridge determined that the lower tier incentive of \$1000 (\$500 for pre and post energy audits and \$500 for achieving 15%-24% annual gas savings) may not be motivation enough for participants to install gas savings measures through this offer. As a result, marketing efforts focused on the middle and higher tiers with the objective of driving higher gas savings. This simplified two-tiered approach was promoted effective January 1, 2016 with minimal change to the offer design as participants who reached the lower tier were still eligible.

- Enbridge Gas Distribution retained a third party evaluator, Econoler Inc. to perform a process evaluation of the HEC offer in 2016. The Econoler report can be found in Appendix C. Some key research objectives included evaluating the offer details and delivery, evaluating the HEC database and documentation, determining sources of awareness and customer recruitment efforts, determining the levels of satisfaction, and identifying barriers that affect performance. The process evaluation involved benchmarking against similar offers, as well as surveys and interviews with participants, Certified Energy Auditors, contractors, and delivery agents. Based on their findings, Econoler provided recommendations, such as:
 - Improve the program database by introducing better uniformity and some additional participant information, such as the participants' email address, the incentive amount, and D Audit file number, and savings potential,
 - Providing a brief program description leaflet for contractors to hand out to potential participants summarizing the participation process, eligibility criteria, eligible upgrades, and incentives,
 - Working to improve levels of satisfaction by endeavouring to have participants receive audit reports in a timely manner, and

In its efforts to evolve offers with an eye to continuous improvement, Enbridge is considering how to address these recommendations. Some have been fully implemented such as providing program description leaflets to contractors to assist with customer understanding of the offer.

- In early 2016, Enbridge and Niagara Peninsula Energy Inc. (NPEI) worked on a collaborative venture promoting a combined electricity and natural gas conservation offering. This effort involved Energy Advisors in the Niagara area and provided a Save on Energy coupon booklet for all participants of HEC.
- In 2016, significant efforts were undertaken to support the Independent Electric System Operator Whole Home Pilot (WHP) initiative, launching Q2 2017. The WHP provides consumers with a combined offer to promote gas and electric savings. This collaboration will allow IESO to utilize the HEC infrastructure to perform an electric assessment of the home at the time the customer completes the pre-audit. In addition to the existing HEC incentives, the Pilot provides further electricity incentives.
- As the program has grown, Enbridge continues to improve internal processes. Significantly increasing participation numbers has necessitated streamlined data collection and rigorous reconciliation to ensure quality control. Enbridge continues to work diligently with Service Organizations and Energy Auditors in order to effectively manage processes and continue to support participation.
- Despite recent success, there remain challenges in delivering this offer. In particular, the cost of natural gas remains relatively low when compared with competing fuels, which makes natural gas upgrades less attractive from a return on investment perspective. Despite this, Enbridge was able to enroll participants in this offer by providing positive messaging through marketing and education efforts.
- As the marketplace evolves with the addition of new programs (IESO Heating and Cooling Program, Green Investment Fund (GIF) Program, etc.), it will be increasingly important to have clear messaging and communication with both



customers and contractors to mitigate confusion and ensure understanding of the offer.

- The HEC offer will continue in 2017. Enbridge is working to expand the reach of the offering by increasing efforts in the marketplace with insulators, window installers and hot water tank distributors to help drive offer awareness, encourage uptake of multiple measures, and drive participation.
- Targeted marketing will be developed promoting specific bundles of measures to reach savings thresholds. The objective is to provide specific customer segments an illustrated pathway to achieve results given their housing features.

5.12 Residential Adaptive Thermostat

Objectives	The goal of this offer is to broadly reach the mass market with a straight forward prescriptive approach that can help customers achieve gas savings.
Target Customer	The Adaptive Thermostat offer is targeted to Rate 1 Residential customers.
Metrics	As part of the Resource Acquisition program, the primary metric for the Adaptive Thermostat offer is lifetime natural gas savings - CCM savings.
Offer Description	Beyond HEC, the company introduced an additional opportunity to offer support to the mass market in 2016, through the Adaptive Thermostat offer. Customers can benefit from the potential savings generated by installing and using a smart thermostat. This offer provides a stand-alone prescriptive opportunity for Residential customers.



	<p>An incentive is provided to customers upon qualified / approved installation. To receive an incentive, customers must meet the following eligibility criteria:</p> <ul style="list-style-type: none"> • Be a Residential customer in Enbridge franchise area; • Have a valid Enbridge account number; and, • Register the device to confirm installation and activation of the unit and facilitate incentive payment. <p>Through partnerships with participating manufacturers, the Company utilizes web portals specific to each manufacturer to facilitate customer participation. These sites provide confirmation of installation and activation, as well as allow for customized incentive payment processing. As part of the customer registration process, these portals track the thermostat connection date for each customer, identifying when the thermostat was actually activated in the home.</p>
<p>Cost-Effectiveness</p>	<p>The Residential Adaptable Thermostat offer is cost-effective as supported by the TRC-Plus and PAC ratios summarized in Table 5.4 below.</p>
<p>2016 Results</p>	<p>The Residential Adaptive Thermostat offer was successful in 2016, the first year of the offer, as Enbridge claimed 17,030 units through its DSM program.</p>

Table 5.4 2016 Residential Adaptive Thermostat Results

Resource Aquisition Residential Sector	2016 Net CCM (m ³)	# of Units	TRC-Plus Ratio	PAC Ratio
<i>Adaptative Thermostats</i>	45,367,920	17,030	2.7	4.5

2016 Commentary and Lessons Learned

- When the 2015-2020 Plan was drafted in April 2015, it was anticipated that the incentive level for an Adaptive Thermostat should be \$75. However in 2016, smart thermostats retailed at \$250 and above (in part due to the lower Canadian dollar). Therefore, Enbridge determined it would be necessary to increase the incentive level to \$100 to encourage uptake of this newer technology. Later in the year, as new generations of smart devices were released, the price of the technology further increased.
- As a new offering in 2016, Enbridge was able to support the offer in partnership with two major manufacturers of smart thermostats. Both manufacturers have reported substantial sales increases across the Enbridge franchise since offer inception. A third vendor was introduced to the program in Q4 2016.

knowyourenergyscore.ca

SMART THERMOSTATS
Home comfort.
Automatic savings.

You could be eligible for a \$100 bill credit.*

Purchase and install one of the qualifying smart thermostats** and apply before Dec. 31, 2016.



- Enbridge worked with vendors in supporting the promotion of the offer through in-store marketing and digital advertising such as online ads and YouTube videos. In addition, Enbridge created a website to supplement the strong marketing partnerships in place with vendors.
- Enbridge also worked with the participating manufacturers to leverage web portals to facilitate a customer registration process that would confirm installation and activation, adding customized incentive payment processing.
- The dual-fuel savings generated by this technology makes it a good opportunity for collaboration with an electric LDC and Enbridge successfully entered into an agreement with Toronto-Hydro Electric System Limited (THESL) in Q4 2016. Through this collaboration, THESL and Enbridge each paid \$50 toward the \$100 incentive for participants in the THESL franchise area with air conditioning. In 2016, 2,026 devices were installed through this collaboration, allowing Enbridge to provide rebates to more customers than they might have otherwise been able to support.
- The Residential Adaptive Thermostat offer will continue in 2017 and incentive levels are expected to remain the same as Enbridge will continue to market this offer province wide and maintain the collaboration effort with THESL.
- Also for 2017, Enbridge is exploring inclusion of other eligible manufacturers as well as looking at the opportunity to add contractor direct install as an option for the consumer.



5.13 Expansion of Residential Offers through the Green Investment Fund

In February 2016, the Ontario Government announced the allocation of \$100 million from the GIF toward helping homeowners reduce their energy bills and cut greenhouse gas emissions. In partnership with Enbridge Gas Distribution and Union Gas, this effort was intended to help about 37,000 homeowners conduct audits to identify energy-saving opportunities and complete retrofits. Consequently, in 2016, Enbridge and the Province signed an agreement for the establishment of \$58 million of this funding toward the expansion of the Company's HEC and Adaptive Thermostat offerings and the introduction of a behavioural initiative. Beyond the reach of Enbridge's DSM offer, this effort is targeting inclusion of 25,000 residential homeowners over the three year term of the agreement.

GIF funding in support of Residential participation in a whole home retrofit will drive incremental uptake of gas customers beyond what would have been achieved with DSM HEC funding alone. The foundation for this effort however is the existing HEC offer, which was introduced in the Company's DSM portfolio and has been offered in the market since 2012. The expanded initiative is designed to leverage the existing design, delivery and execution of the DSM HEC and Adaptive Thermostat offers already in place. For this reason, attribution of in-franchise gas customer Residential results cannot be determined merely based on the source of funding.

In addition, GIF funding will extend the market for this offer to the inclusion of homes with a primary heating fuel that is non-gas (oil, propane or wood), as well as to homes outside of the Company's franchise territory; these participants and results will be fully attributable to GIF.

Though this expanded effort did not officially go into market until November 2016, initial efforts to expand the offer to leverage the GIF funding focused on upfront planning,



staffing and logistics. Residential results attributed to GIF in 2016 are outlined in Table 5.5.

Table 5.5 2016 Residential Results Attributed to GIF

Offer	# of Participants/ Units
Home Energy Conservation	10 homes (all non-gas)
Adaptive Thermostats	2,000 units

Initial spending in 2016 from GIF funding totalled approximately \$950,000. Beyond incentives tied to these GIF results, much of the early GIF spending in 2016 related to bringing on staff, implementing systems, initiating marketing plans and expansion to the non-gas and out-of-franchise markets.

The agreement with the Province earmarked \$2.2 of the \$58 million GIF funds to support a Residential behavioural initiative. This program is intended to influence customers to change their energy use decisions and actions through the delivery of customized energy reports including benchmarking to the community and past performance. The communications will also provide energy savings tips and other tools to motivate behavioural changes, and will be leveraged to promote the benefits of participation in the HEC and Adaptive Thermostat offerings. 100% of the results from the behavioural offer will be attributed to the GIF initiative.

5.2 Commercial and Industrial Resource Acquisition

Enbridge serves large and small volume Commercial and Industrial customers that span a wide variety of sub-sectors. Some of these include multi-residential buildings, commercial office buildings, schools/universities, hotels/motels, warehouses, retail facilities, food services, hospitals/health-care, and government/municipal facilities in the Commercial sector and agricultural, manufacturing, and automotive facilities in the Industrial sector.



Offers designed for Commercial and Industrial customers include custom, prescriptive and direct install approaches supporting the installation of energy efficient equipment and the adoption of energy efficient practices. This is accomplished through the provision of energy audits, technical support, opportunity assessment, data and consumption analysis, education initiatives, and incentives.

DSM programming available to Commercial and Industrial customers is delivered directly by Enbridge’s Energy Solutions Consultants (ESCs) to customers, building owners, and facility managers and operators, as well as through supply chain channels and business partners, including HVAC contractors, engineering firms and energy service advisors.

2016 results for Commercial and Industrial Resource Acquisition offers are provided in Table 5.6. Further detail on the Commercial and Industrial Resource Acquisition offers is provided in the following pages.

Table 5.6 2016 Commercial and Industrial Resource Acquisition Results

Resource Acquisition	2016 Net CCM (m ³)	# of Projects ¹	# of Units ²	TRC Plus Ratio	PAC Ratio
<i>Custom Commercial</i>	151,036,223	496	-	5.8	10.2
<i>Custom Industrial</i>	164,321,118	181	-	2.9	5.2
<i>Run It Right</i>	1,937,342	39	-	0.7	0.7
<i>Prescriptive</i>	51,377,592	555	6,909	3.2	7.9
<i>Direct Install</i>	79,163,595	129	345	10.8	5.2
<i>Energy Leaders</i>	671,186	4	-	1.5	1.4
Total/Average	448,507,056	1,404	7,254	4.2	6.3

1. # of Projects summarizes the number of unique projects for custom, prescriptive, direct install, RIR, and energy leaders offers.

2. # of Units summarizes the number of units installed for prescriptive and direct install offers.



5.21 Custom Commercial

<p>Objectives</p>	<p>The goal of the Commercial Custom offer is to promote energy efficiency and to reduce natural gas use through the capture of energy efficiency opportunities in commercial buildings, including retrofits of building components and upgrades at the time of replacement. The objective is to provide technical support, business support services, and financial incentives to help customers meet energy efficiency and budgetary goals.</p>
<p>Target Customer</p>	<p>The Custom Commercial offer targets Commercial customers who are in Rates 6, 110, 115, 135, 145, and 170.</p>
<p>Metrics</p>	<p>As part of the Resource Acquisition program, the primary metric for the Commercial offer is lifetime natural gas savings - CCM savings.</p> <p>There are two metrics defined in the 2016 scorecard, one for Large Volume Customers and one for Small Volume Customers. Large Volume Consumers include Commercial customers with a 3 year average annual gas consumption greater than 75,000 m³/year. Small Volume Customers include Commercial customers with a three year average annual gas consumption below 75,000 m³/year.</p>
<p>Offer Description</p>	<p>The Commercial Custom offer provides technical assistance and financial incentives aimed at encouraging Commercial customers to implement energy efficient technologies. The offer consists of variable incentives based on project specific details wherein custom calculations are used to estimate the savings. Enbridge provides consultative services to customers and third party service providers aimed at assessing building energy consumption and making recommendations for gas-saving measures. Upon implementing recommended energy efficiency projects, customers are eligible to</p>



	<p>receive financial incentives under this offer. Beginning in 2016, Enbridge implemented a tiered Commercial custom incentive structure as described in the table below:</p> <table border="1"> <thead> <tr> <th>% of Annual Consumption (m³) Saved</th> <th>\$/m³ Incentive</th> </tr> </thead> <tbody> <tr> <td>0-10%</td> <td>\$0.10/m³</td> </tr> <tr> <td>10-20%</td> <td>\$0.20/m³</td> </tr> <tr> <td>20% and above</td> <td>\$0.30/m³</td> </tr> </tbody> </table> <p>The Commercial Custom offer provides up to 50% of the project’s capital cost or a maximum of \$100,000 per project. The objective of the tiered incentive structure is to drive completion of projects that yield incremental savings. The additional incentive for these projects should encourage the adoption of additional efficiency measures and/or the installation of the most efficient equipment possible to achieve the highest result. From the customer’s perspective, the higher incentive helps offset the increased capital requirement that may be associated with achieving greater savings, allowing the customer to increase the project scope and making the project(s) more feasible.</p>	% of Annual Consumption (m ³) Saved	\$/m ³ Incentive	0-10%	\$0.10/m ³	10-20%	\$0.20/m ³	20% and above	\$0.30/m ³
% of Annual Consumption (m ³) Saved	\$/m ³ Incentive								
0-10%	\$0.10/m ³								
10-20%	\$0.20/m ³								
20% and above	\$0.30/m ³								
<p>Cost-Effectiveness</p>	<p>The Commercial Custom offer was cost-effective, as supported by the TRC-Plus screening summarized in Table 5.7.</p>								
<p>2016 Results</p>	<p>As summarized in Table 5.7, 496 Commercial custom projects were claimed in 2016; these projects accounted for 151.04 million CCM in net natural gas savings. Custom projects traditionally drive the highest percentage of Commercial results.</p>								



Table 5.7 2016 Custom Commercial Results

Resource Acquisition	2016 Net CCM (m ³)	# of Projects	TRC-Plus Ratio	PAC Ratio
<i>Custom Commercial</i>	151,036,223	496	5.8	10.2

2016 Commentary and Lessons Learned

- A significant portion of Enbridge’s Resource Acquisition results continue to be driven through delivering custom projects. In 2016, in the Commercial sector, a revised tiered incentive has been successful with an increase of multi-measure projects in 2016 as well as an increase in the average CCM savings generated per project.
- Fundamental to the Custom offer, Enbridge continues to provide technical expertise to support and influence Commercial customers and business partners to identify and implement energy efficient projects. Enbridge’s Commercial sales team is comprised of Energy Solutions Consultants, each with a sector(s) focus. In an effort to create and encourage energy efficient retrofits these ESCs employ a three-pronged approach, specifically working with customers (including key accounts), business partners (who provide services or products promoting the energy efficient technologies), and industry associations.
- In addition, municipal and government customers continue to require dedicated account management. Company representatives works closely with municipalities throughout the year to identify and provide technical support for energy efficiency projects to propel their energy management plans.
- Business partners play a significant role in promoting the Custom Commercial offer and influencing customers to choose higher efficiency options. These business partners include contractors, distributors, manufacturers, wholesalers, and consulting engineers. In 2016, Enbridge launched an initiative to improve the way Enbridge works with these groups and expand the number of business partners supporting our programs. With the help of Enbridge’s ESCs, an active

database comprising business partners was amalgamated to more effectively serve mutual customers. As a result, these partners have registered to be part of our e-commerce plan, which includes the following benefits:

- Quarterly Webinars (Program Launches and Cap and Trade)
 - Email blasts (program updates, changes to regulations, codes and standards, and time limited campaigns)
 - Online applications
 - Access to a micro site
- Enbridge engages key stakeholders and organizations in efforts to further support education and build awareness of the Enbridge services and DSM support available. These groups include:
- American Society of Heating, Refrigerating and Air-Conditioning Engineers (ASHRAE)
 - Association of Condominium Managers of Ontario (ACMO)
 - Canadian Condominium Institute (CCI)
 - Canadian Healthcare Engineering Society (CHES)
 - Centre for Energy Advancement through Technological Innovation (CEATI)
 - Continental Automated Buildings Association (CABA)
 - Eastern Ontario Landlord Organizations (EOLO)
 - Federation of Rental Providers of Ontario (FRPO)
 - Gas Technology Institute (GTI)
 - Greater Toronto Apartment Association (GTAA)
 - Hotel Engineering/Facilities Manager's Association of Toronto (HEAT)
 - Ontario Association of School Business Officials (OASBO)
 - Ontario Long-Term Care Association (OLTCA)
 - Ontario Recreation and Facilities Association (ORFA)
 - Ontario Refrigeration and Air Conditioning (ORAC)
 - Ontario Restaurant Hotel & Motel Association (ORHMA)
 - Professional Retail Store Maintenance Association (PRSM)

- Restaurants Canada
- The Building Owners and Managers Association (BOMA Toronto, BOMA Ottawa)
- The Heating, Refrigeration and Air Conditioning Institute (HRAI)
- Toronto and Region Conservation Authority (TRCA)

Enbridge Gas Distribution

Commercial Custom Retrofit Incentive Program




Earn up to

50%

of Project Costs*

Energy saved is money earned



TIER 3	\$0.30/m³ <small>For remaining gas savings above 20%</small>
TIER 2	\$0.20/m³ <small>For gas savings >10% or ≤ 20%</small>
TIER 1	\$0.10/m³ <small>For the first ≤ 10% gas savings</small>

Tiered incentives offer incremental percentage incentives over three levels of savings.

- In addition, Enbridge ESCs were active at major events and conferences to further build DSM program awareness, hear from stakeholders, and provide

customers with opportunities to discuss their challenges directly with DSM representatives. Some of these events included:

- City of Toronto – Live Green, Toronto Hotel Sustainability Conference
 - Canadian Healthcare Engineering Society, Provincial Trade Show & Education
 - Ontario Long Term Care Association, Industry Event
 - TRCA, Greening Health Care and Mayor's Megawatt Challenge Events
 - Canadian Condominium Institute, Ottawa Conference / Tradeshow
 - Federation of Rental Providers of Ontario, MAC Awards
 - Eastern Ontario Landlord Organization, Spring and Fall Networking Events
 - BOMA Toronto, PM Expo
 - Operations, Maintenance & Construction of Ontario Association of School Business Officials Annual Tradeshow
- Competing priorities for Commercial customers continued to be one of the major challenges to DSM project uptake in 2016. With limited capital to invest into energy efficiency upgrades, customers must weigh a variety of options. Investing in gas utility DSM initiatives to decrease natural gas consumption is considered among other alternatives often including investing in Conservation Demand Management (CDM) initiatives to reduce higher cost electricity consumption. Customers often stand to benefit from a significantly larger incentive to pursue CDM upgrades on a per energy unit basis.
- In addition to strengthening relationships with business partners, Enbridge continues to promote collaboration efforts with the IESO and applicable Local Distribution Companies (LDCs) to further encourage energy conservation among all the energy sources, whether water, electricity or gas. Despite considerably lower funding to provide financial incentives relative to CDM programs, Enbridge recognizes the value this co-ordination can bring to customers who participate in DSM by also highlighting CDM incentives and accessing LDC expertise wherever

efficiency opportunities are considered. Enbridge will continue to act in the best interest of its customers by leveraging all support and funding available to customers, to supplement the Company's own technical expertise and project implementation support.

- In 2016, Enbridge collaborated with LDCs in various targeted areas including:
 - A hotel/motel energy concierge initiative with Niagara Peninsula Energy Inc. was designed to test a comprehensive electricity and natural gas program in the LDC's service area. The goal was to create a 'one stop shop' for natural gas and electricity conservation for customers. In 2017, IESO and other LDCs will discuss expanding the program in other regions.
 - In December 2016, Enbridge participated in the first Networking Initiative planned by the GTHA Sales Force Collaboration sub-committee. Enbridge and LDC Energy Solutions Consultants within the Greater Toronto and Hamilton Area met for a half-day session at the Powerstream office in Vaughan.
 - Successful Collaboration Case Studies sessions were held, discussing projects such as the dual fuel benefits of Demand Control Kitchen Ventilation (DCKV) and Hospital Ventilation.

- Moving into 2017, the goal of the Commercial group is to continue to further strengthen collaboration with IESO, LDCs, municipalities and key alliances to jointly promote energy conversation, maximize the benefits for customers, and improve program cost effectiveness.



5.22 Custom Industrial

<p>Objectives</p>	<p>The Industrial Custom offer is designed to capture cost-effective energy savings within the Industrial sector by delivering customized energy solutions, including providing technical and financial support to customers. Industrial ESCs focus on assisting customers with the adoption of energy efficient technologies by overcoming financial, knowledge or technical barriers. This offer provides engineering technical support, business support services, and financial incentives to help customers meet production, energy efficiency, and budgetary needs.</p> <p>The primary objectives of this offer include:</p> <ul style="list-style-type: none"> • Maximizing the energy savings potential of the Industrial sector; • Increasing adoption of energy efficient technologies among Industrial customers; • Assisting customers in overcoming implementation hurdles including financial, knowledge, and technical barriers to increasing energy efficiency; • Supporting customers’ project planning by enhancing the return on investment of projects.
<p>Target Customer</p>	<p>The Custom Industrial offer is available to Industrial customers (including Agricultural) in Rates 6, 110, 115, 135, 145 and 170.</p> <p>Custom projects encompass opportunities where savings are linked to unique industrial processes, building specifications, uses and technologies. With the Custom offer, Enbridge mainly targets Industrial customers (both large and small) whose gas usage is primarily consumed through process loads.</p>



<p>Metrics</p>	<p>As part of the Resource Acquisition program, the primary metric for the Industrial Custom offer is lifetime natural gas savings - CCM savings.</p> <p>For the purposes of the scorecard, Industrial customers are divided into Large and Small Volume customers, with corresponding incentives applied to each group. Large Volume Industrial customers are defined as having a three year average annual consumption of greater than 340,000 m³/year. Small Volume Industrial customers are defined as having a three year average annual consumption of less than 340,000 m³/year.</p>
<p>Offer Description</p>	<p>In the Industrial sector, offers include the Industrial Custom offer and the Prescriptive offer together with a number of enabling initiatives, such as support for Industrial customers in identifying energy-saving opportunities through to assistance with project implementation.</p> <p>These offers are primarily promoted and delivered by ESCs (professional engineers) who are active in the marketplace. ESCs are trusted energy advisors that work with customers to determine solutions to address multiple objectives, namely production, energy efficiency and budgetary considerations. Work involves addressing technical barriers to energy efficiency adoption as well as financial barriers that may hinder business justification and implementation.</p> <p>Enabling initiatives allow ESCs to work with the customers to identify potential opportunities, quantify benefits, and justify action. Such initiatives include: ESCs leveraging their skills and tools to identify efficiency opportunities; involvement of third-party vendors to conduct specific types of audits or assessments of facilities; and/or ESCs assisting with the development of project implementation plans.</p> <p>Due to the unique nature of Industrial customers, custom solutions developed by ESCs are designed and engineered to meet the specific</p>



	<p>requirements of each particular customer facility. Five core components are common to the Custom offer:</p> <p>Knowledge Development: Technical publications, quarterly updates, themed workshops and a resource based energy solutions portal are offered to provide customers with the knowledge to make informed decisions through education.</p> <p>Opportunity Identification: ESCs provide support to assist customers in the identification of efficiency opportunities, such as equipment testing and assessment and thermal imaging.</p> <p>Measurement: ESCs assist customers in selecting appropriate means of measurement to quantify key energy inputs.</p> <p>Engineering Analysis: ESCs assist customers who do not have the resources needed to conduct financial, technical and enterprise risk evaluations for potential projects.</p> <p>Implementation Support: ESCs work with customers on an implementation plan and connect them with business partners to complete the project.</p> <p>The following tiered incentive structure is provided with the Custom Industrial offer:</p> <ul style="list-style-type: none"> • \$0.20/m³ for first 50,000 m³ gas saved • \$0.05/m³ for gas savings above 50,000 m³ <p>This incentive structure is designed to provide additional support to customers (both large and small) with the implementation of smaller projects. A higher tier for smaller projects makes energy efficiency implementation for these efforts more attractive to Enbridge’s Industrial customers. This is particularly true for smaller customers. Enbridge believes it is important to directly engage this under-served market in light of the Board’s direction to achieve all cost-effective</p>
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	<p>DSM with a reasonable rate impact.</p> <p>The Custom Industrial offer is largely influenced by the relationship fostered between Enbridge’s ESCs and customers. ESCs are responsible for providing sound technical and business support, in addition to preparing engineering calculations, documenting substantiated savings claims and key project information. Savings for each custom project are calculated on an individual basis. Each custom project includes applicable supporting project documentation that outlines key parameters and details gas savings calculations.</p>
Cost-Effectiveness	<p>Enbridge continues to demonstrate a high level of cost-effectiveness for the Custom Industrial offers as supported by the TRC-Plus and PAC screening summarized in Table 5.8 that follows.</p>
2016 Results	<p>As summarized in Table 5.8, there were 181 projects completed in the Industrial Custom offer in 2016, which contributed 164.32 million CCM. Custom projects for Industrial customers can be varied across a wide range of technologies and improvements. In 2016, results from custom projects were led by savings from projects focused on industrial process efficiency improvements, the installation of control systems, and operational improvements unique to specific customers.</p>

Table 5.8 2016 Custom Industrial Resource Acquisition Results

Resource Acquisition	2016 Net CCM (m ³)	# of Projects	TRC-Plus Ratio	PAC Ratio
<i>Custom Industrial</i>	164,321,118	181	2.9	5.2

2016 Commentary and Lessons Learned

- The Industrial sector utilizes most of its energy for process related consumption as opposed to heating and ventilation purposes. Most often, the building itself consumes a small portion of energy compared with the process equipment within the facility. Many Industrial customers lack the technical knowledge regarding energy efficient technologies that may help improve these processes and reduce overall energy consumption. Consequently, the industrial team focuses its efforts on helping customers identify ways to improve manufacturing efficiency through improved equipment efficiency and the optimization of process lines.
- Overall, the Custom offer remained largely unchanged in 2016 from the previous year. Enbridge is pleased with strong Industrial custom results in 2016. Project focuses reflect a developing trend, shifting from capital-intensive projects, such as equipment upgrades, to opportunities focused on process improvements. The outcome has been an increasing proportion of projects which continue to drive annual savings, but yield a lower CCM.
- Custom projects tend to be resource intensive, requiring extensive technical expertise and data analysis as well as the development of relationships over many years and an understanding of the customer's business. Regardless of the size of the customer or the project, this effort is consistent.
- The Company continues to pursue opportunities to undertake audits and studies at Industrial customers' facilities (e.g., plant energy assessments, steam trap audits, or meter studies) to identify for the customer potential savings that could be realized with the implementation of recommended improvements. Enbridge's financial incentives towards audits (such as air-balance audits) have helped uncover savings potential in areas that customers would not have otherwise explored. As a result, Enbridge is able to increase these customers' overall

process efficiency by reducing their existing energy consumption and increasing their energy efficiency. Approximately 70 audits were completed in 2016.

Our Approach

Making energy work for you

Enbridge Gas Distribution offers industrial customers complementary technical support and financial incentives to help you identify and implement energy efficiency initiatives that save energy, cut operating costs, reduce carbon emissions and improve your bottom line.

At Enbridge, rather than offering a transactional approach to energy efficiency, we focus on continuous energy improvement. A dedicated Enbridge **Energy Solutions Consultant (ESC)** will work with you year round to understand your business needs and help you make the most out of the energy you consume.

Although energy flows from your meter to your equipment...

savings opportunities are evaluated from your product's energy requirements upstream.

- Enbridge offered a variety of materials and forums aimed at increasing awareness of energy efficiency opportunities and benefits, educating Industrial customers and providing resources to research and evaluate potential improvement solutions. Efforts in 2016 included offering quarterly newsletters, developing and marketing the Industrial Energy Solutions Portal and hosting energy efficiency workshops and webinars.

- The industrial team hosted workshops focused on educating customers and their employees on identifying energy conservation opportunities and providing information to help evaluate potential projects. These workshops helped customers identify projects that not only resulted in natural gas savings, but also identified electric and water savings opportunities. The 2016 workshops included the following:
 - Energy Management in Industrial Facilities
 - Minimize the Impact of Cap and Trade through HVAC Efficiency
 - Heat Recovery Workshop
 - Water Heating and Management Workshop

- Over 120 customers took part in these workshops in 2016 and most workshop participants attended more than one event, which serves as an indication that these customers value the information provided. Workshop feedback survey results were excellent with ratings of 95% support in terms of relevancy of the content covered.

- Enbridge has seen some success with limited time incentive campaigns, launched to coincide with workshops. For example, a successful campaign offered increased incentives to complete a facility air balance assessment. This led to an increased number of heating and ventilation projects considered. Further, as part of the HVAC workshop, a campaign to fund the design and installation of a customized control system for exhaust fans was introduced. These campaigns will be continued in 2017.

- Over its 20 plus years offering DSM in the province, the Company has established and developed solid relationships with many of the larger Industrial customers; however as outlined in the 2016-2020 Plan, the Company recognizes there is more work needed to support the small industrial facilities in addressing energy efficiency. Efforts in 2016 have focused on improved engagement and relationship development with the smaller Industrial customer base. As a result of



this work, Enbridge saw an increase in the number of projects in this segment. The Company will continue to look at ways to tailor efforts to realize achievement in this challenging market segment.

- The Industrial Custom offer is centered on understanding customers' needs and creating solutions in line with each customer's specific goals. Industrial customers can lose between 20% and 50% of thermal energy as waste. Customers often do not have enough time or knowledge to investigate potential ways to recover waste heat. Through relationships built between Enbridge and customer site contacts, Enbridge takes the time to understand customers' processes, risk tolerances, and financial boundaries. As a result, Enbridge is seen as an unbiased source of information that the customer can rely upon when making investments. The Industrial Custom offer is an important component in Enbridge's DSM portfolio and will continue in 2017.

5.23 Run it Right

The Run it Right offer includes two metrics, one in each of the Resource Acquisition and Market Transformation and Energy Management (MTEM, MT, "Market Transformation") scorecards. For the purposes of this report, details regarding the Run it Right offer in 2016 are included in Section 7.4 which provide a summary of the MTEM Program.



5.24 Commercial & Industrial Prescriptive (Fixed) Incentive

<p>Objectives</p>	<p>The goal of the Prescriptive offer is to reduce natural gas use through the capture of cost effective energy efficiency opportunities in new and existing Commercial and Industrial sector buildings.</p>
<p>Target Customer</p>	<p>The Commercial and Industrial Prescriptive offer is intended for Commercial and Industrial customers in Rates 6, 110, 115, 135, or 145.</p>
<p>Metrics</p>	<p>As part of the Resource Acquisition program, the primary metric for the Commercial and Industrial Prescriptive (Fixed) Incentive offer is lifetime natural gas savings - CCM savings.</p> <p>Commercial and Industrial customers are divided into Large and Small Volume customers. Large Volume Commercial customers are defined as having a three year average annual consumption of greater than 75,000 m³/year. Small Volume Commercial customers are defined as having a three year average annual consumption of less than 75,000 m³/year. Large Volume Industrial customers are defined as having a three year average annual consumption of greater than 340,000 m³/year. Small Volume Industrial customers are defined as having a three year average annual consumption of less than 340,000 m³/year.</p>
<p>Offer Description</p>	<p>The method of determining annual savings for measures included in the Prescriptive offer is based on substantiation documents that detail deemed cubic meter savings. The costs of energy efficient upgrades are intended to be offset by energy savings. The Prescriptive offer encompasses both pure prescriptive and quasi-prescriptive measures. Gas savings for pure prescriptive technologies are based</p>



	<p>on simple deemed values. Examples of prescriptive technologies include demand control kitchen ventilation, dishwashers, and Energy Star equipment. Enbridge also provides incentives for quasi-prescriptive technologies, which use simple calculations incorporating relevant inputs. These measures include demand control ventilation (DCV), infrared heaters, make-up air units, and high efficiency boilers.</p> <p>In 2016, Enbridge increased selected fixed incentives as part of a strategy to target more participation among Commercial and Industrial customers, specifically smaller customers. It was anticipated that higher incentives, covering a large proportion of the incremental cost of more energy efficient capital equipment, would work to overcome one of the main barriers to adoption. In some cases, the Company has determined that higher fixed incentives are necessary in order for the offer to be competitive and relevant to customers, especially in light of low natural gas prices, and the greater incentive levels for electricity conservation offered by LDCs.</p>
<p>Cost-Effectiveness</p>	<p>The Commercial & Industrial Prescriptive (Fixed) Incentive offer was cost-effective, as supported by the TRC-Plus screening summarized in Table 5.9.</p>
<p>2016 Results</p>	<p>As outlined in Table 5.9, Prescriptive offers generated 51.38 million CCM and included 6,909 units installed across Commercial and Industrial facilities.</p>

Table 5.9 2016 Commercial and Industrial Prescriptive Results

Resource Acquisition	2016 Net CCM (m ³)	# of Projects	# of Units	TRC Plus Ratio	PAC Ratio
<i>Prescriptive</i>	51,377,592	555	6,909	3.2	7.9

2016 Commentary and Lessons Learned

- Enbridge markets the Commercial and Industrial Prescriptive Incentive offer through a variety of channels, which include the following:
 - Mass marketing through the Enbridge website, email blasts, and bill inserts,
 - ESCs working directly with the end use customer in order to provide expertise and education,
 - Marketing through a network of industry partners. The market delivery efforts geared to the network of industry partners yield the most significant results. These industry partners include service provers, associations, engineering firms, and distributors.

- In 2016, Enbridge marketed the Prescriptive offer to industry partners through presentations, sponsorships and events, and communication channels, including:
 - Presentations:
 - Annual General Meetings - Hotel Engineering Facility Managers Association of Toronto (HEAT)
 - Sustainability Partner Meetings – Buildings Owner and Managers Association Toronto (BOMA Toronto)
 - Retail Energy Innovation Workshop - Retail Council of Canada (RCC) and the Professional Retail Store Maintenance Association (PRSM)
 - Educational Days – Canadian Boiler Society (CBS)
 - Sponsorships and Events:
 - Fall Networking Event – Eastern Ontario Landlord Association (EOLO)
 - MAC Awards - Federation of Rental-housing Providers of Ontario (FRPO)
 - PM Expo – BOMA Toronto

- OMC Workshop - Ontario Association of School Business Officials (OASBO)
 - ACMO CCI-T Conference - Association of Condominium Managers of Ontario (ACMO) and Canadian Condominium Institute (CCI)
 - Communication Channels:
 - Newsletters - Ontario Restaurant Hotel Motel Association (ORHMA), Ontario Refrigeration & Air Conditioning Contractors Association (ORAC), Greater Toronto Apartment Association (GTAA), and FRPO

- The 2016 Commercial and Industrial Prescriptive Incentive offer is a continuation from previous years, with the following updates in 2016:
 - In an effort to drive increased participation in certain measures, corresponding incentives were increased. The previous rebate did not provide an adequate incentive to offset the measure's incremental cost. Measures that saw an incentive increase in 2016 included: Air Doors (all), Energy Recovery Ventilation/Heat Recovery Ventilation (ERV/HRV), Ozone Laundry, ENERGY STAR Dishwashers and ENERGY STAR Fryers.
 - The Prescriptive suite of offerings in 2016 introduced incentives for the following technologies: Condensing Furnaces, Condensing Unit Heaters, specified De-stratification Fans, Condensing Storage Water Heaters, and Condensing Tankless Water Heaters.
 - Enbridge increased promotion to support prescriptive incentives in the new construction market. Specifically, efforts focused on infrared heaters and DCVs.
 - Recognizing the need to identify and target smaller and harder to reach customers, a renewed focus was developed to deliver DSM offers, including the Prescriptive offer, to this audience.
 - Online Resources: In 2016, the successful Industrial Energy Solution Portal, which engaged customers in Enbridge offers

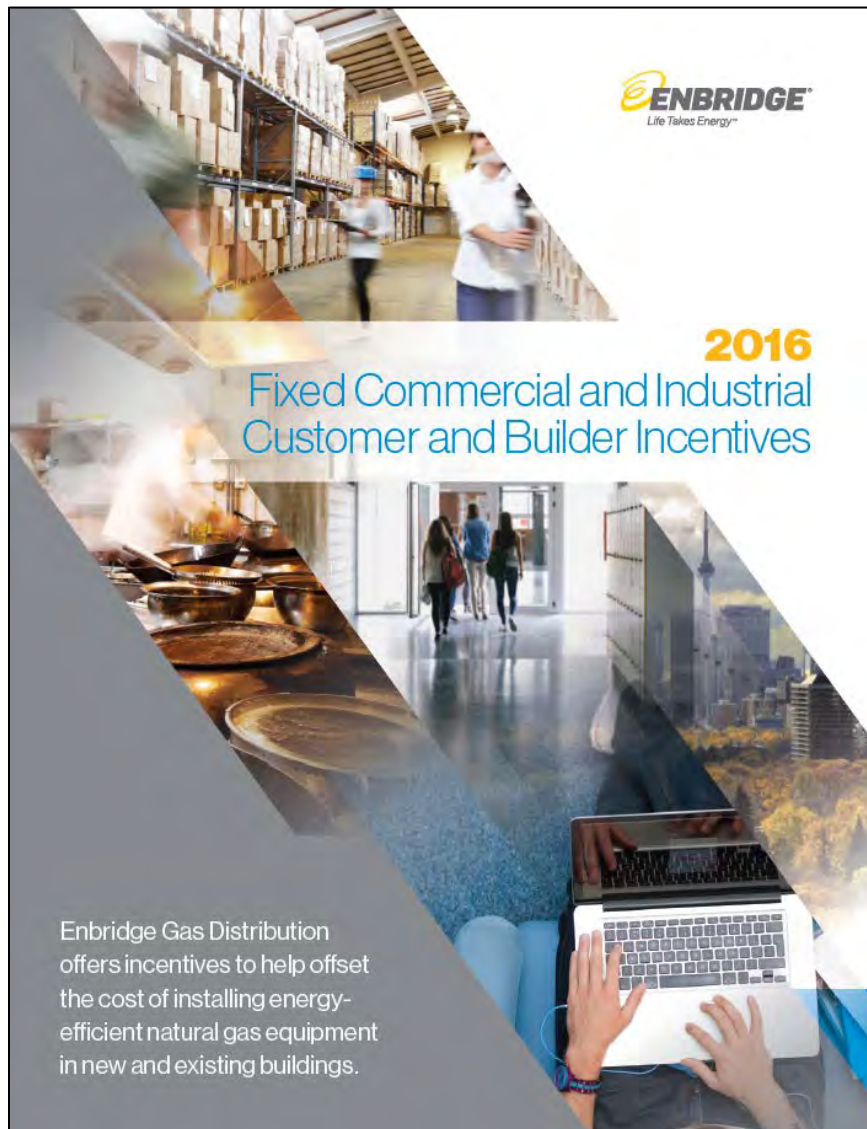


through education, tools, and resources, was leveraged to include the Prescriptive offer. Enhancements were made to the Portal in order to make the web platform appeal to a broader audience, which might be less technical than the traditional large Industrial customer.

- **Business Partner Network Database:** In an effort to better leverage potential delivery channels, qualitative research was conducted through phone calls and emails that resulted in the creation of a database of the channel partners in the small Commercial and Industrial sectors. This allowed the Company to directly target Channel Partners, classified as contractors, distributors, manufacturers, and engineering firms, who have enrolled to receive electronic communication. Specifically, webinars and targeted emails were launched to inform channels and customers of program offers, limited-time offers, sector specific information, and important industry topics (i.e. cap and trade).
- In an effort to provide convenience to customers, Enbridge continues to investigate collaboration opportunities with LDCs by highlighting incentives for dual fuel measures.
- In 2016, a Demand Control Kitchen Ventilation campaign was launched in partnership with PowerStream. The campaign's objective was to create awareness of the DCKV technology and potential savings available to food service and food sales operations in the Enbridge/ PowerStream franchise areas. Using direct mail, email blasts and outbound calling, 800 customers were contacted; these efforts resulted in over 80 leads for Enbridge.
- Enbridge investigated the application of upstream incentives (providing an incentive at the distributor or manufacturer level to make the price of that equipment more attractive) through qualitative and quantitative research. For the

specific technologies researched, Enbridge concluded that adoption of high efficiency technologies was best achieved through direct engagement with customers and business partners. Enbridge continues to explore measures that may be suitable for upstream incentivizing.

- Enbridge has had success leveraging relationships with various associations to disseminate offer information to a mass audience and will continue to collaborate with associations such as ORAC and HRAI moving into 2017.



2016
Fixed Commercial and Industrial
Customer and Builder Incentives

Enbridge Gas Distribution offers incentives to help offset the cost of installing energy-efficient natural gas equipment in new and existing buildings.



5.25 Commercial and Industrial Direct Install

<p>Objectives</p>	<p>As an expansion to the Prescriptive offer, the primary goal of the Direct Install offer is to more effectively reach the small Industrial and Commercial market segments, who remain reluctant to participate in DSM offers. The Direct Install offer, intends to extend the reach of fixed incentive DSM offers by largely supporting the cost and installation of specified measures.</p>
<p>Target Customer</p>	<p>The Commercial and Industrial Direct Install offer is intended for smaller Commercial and Industrial customers in Rates 6, 110, 115, 135, or 145, though larger customers are not precluded from participation.</p>
<p>Metrics</p>	<p>As part of the Resource Acquisition program, the primary metric for the Commercial and Industrial Direct Install offer is lifetime natural gas savings - CCM savings.</p> <p>Commercial and Industrial customers are divided into Large and Small Volume customers. Large Volume Commercial customers are defined as having a three year average annual consumption of greater than 75,000 m³/year. Small Volume Commercial customers are defined as having a three year average annual consumption of less than 75,000 m³/year. Large Volume Industrial customers are defined as having a three year average annual consumption of greater than 340,000 m³/year. Small Volume Industrial customers are defined as having a three year average annual consumption of less than 340,000 m³/year.</p>
<p>Offer Description</p>	<p>The Direct Install offer is a “turnkey” solution that makes it easy and affordable for the targeted customers to increase their energy efficiency. Enbridge and its selected contractors assist customers in</p>



	<p>their decision making processes, beginning with an assessment of the customer’s current equipment and concluding with the installation of eligible, efficient equipment. Direct Install offers are such that measures are incented up to 100% of the cost of the equipment and installation. In 2016, Enbridge’s Direct Install offer focused on Air Curtains.</p> <p>Air Curtains provide a stream of downward blowing air which prevents outdoor air infiltration. Air Curtains are commonly used on openings to the outdoors or to unheated portions of a building that need to remain open because of high traffic volumes or because of the inconvenience of constant door movement. They are suitable for installation in warehouses, manufacturing, industrial, or retail buildings with forced air space heating.</p>
<p>Cost-Effectiveness</p>	<p>The Commercial and Industrial Direct Install offers were cost-effective, as supported by the TRC-Plus screening summarized in Table 5.10.</p>
<p>2016 Results</p>	<p>As summarized in Table 5.10, Commercial and Industrial Direct Install measures totaling 345 units contributed 79.16 million CCM.</p>

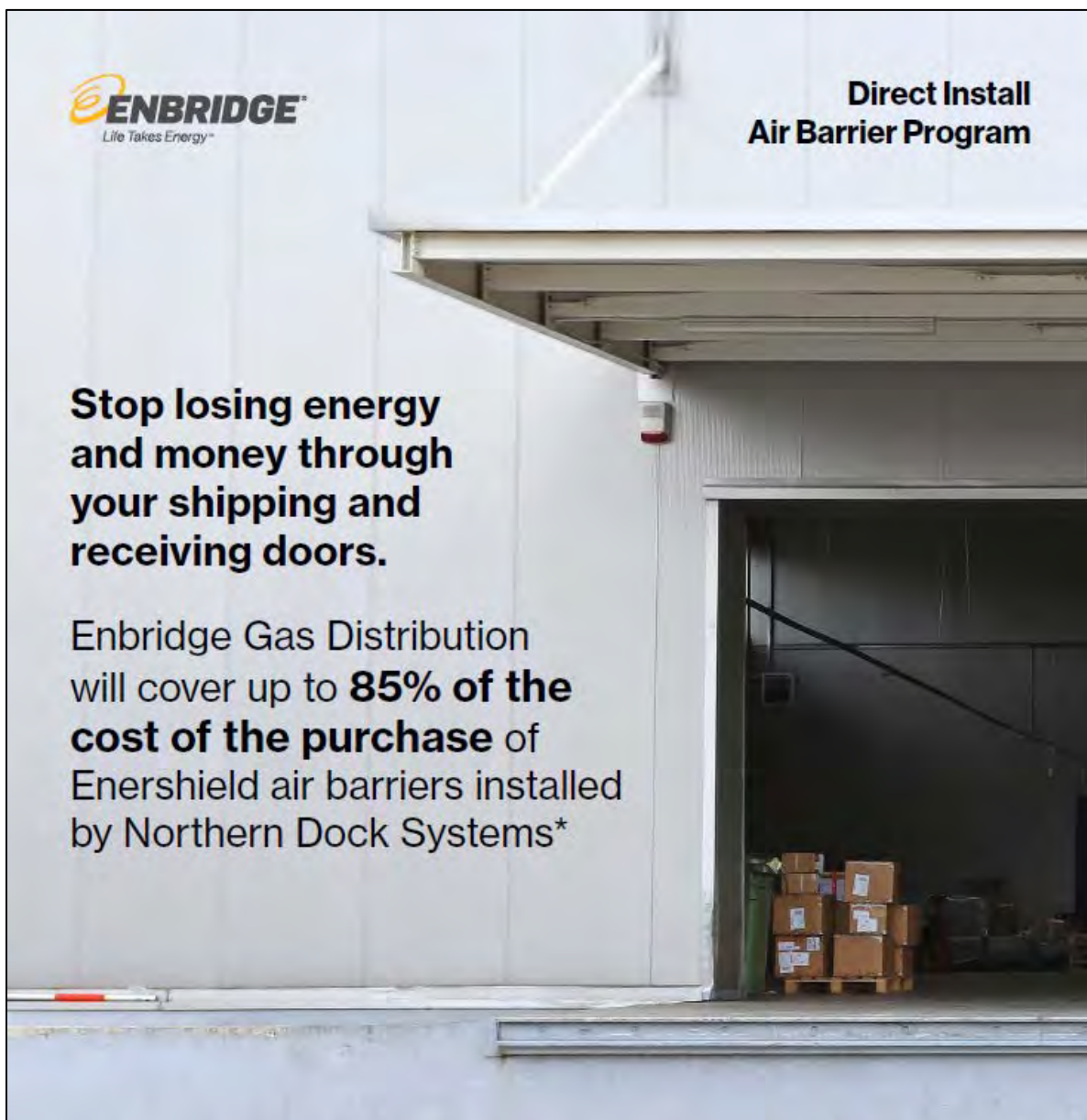
Table 5.10 2016 Commercial and Industrial Direct Install Results

Resource Acquisition	2016 Net CCM (m ³)	# of Projects	# of Units	TRC Plus Ratio	PAC Ratio
<i>Direct Install</i>	79,163,595	129	345	10.8	5.2

2016 Commentary and Lessons Learned

- 2016 was the first year that the Commercial and Industrial Direct Install offer was available to Enbridge customers.

- In assessing measures suitable for a Direct Install offer, the Company analyzed prescriptive technologies and determined that Air Curtains provided a good market opportunity to effectively serve the smaller Commercial and Industrial market segment cost-effectively. Though the existing Prescriptive offer provided an incentive for Air Curtains, the upfront cost of installation was a barrier for small Commercial and Industrial customers. In addition, these customers typically lacked the technical expertise and resources required to select a quality product and qualified contractor.





- In continuing efforts to engage the historically hard-to-reach small customer segment, this offer specifically targeted small customers who had never participated in the DSM program previously by providing an upfront financial incentive, a prequalified product, and an experienced installation contractor.

- In order to qualify for the offer, participants were expected to undertake an energy efficiency audit of their facility. These efforts benefitted the customer as the audits helped Enbridge further identify and evaluate energy efficiency opportunities within the facility.

- The Direct Install offer was successful because the total solution approach was important for Commercial and Industrial customers who typically have budgetary, personnel, and technical knowledge constraints. Moving forward, Enbridge intends to continue to evaluate other technologies to assess their suitability for a Direct Install approach.



5.26 Energy Leaders Initiative

<p>Objectives</p>	<p>The intention of the initiative is to review, determine, and support areas for incremental energy efficiency activity among customers who are deemed energy leaders and are interested in exploring innovative ways to achieve energy efficiency.</p>
<p>Target Customer</p>	<p>The Energy Leaders Initiative is intended for energy leaders in the following rate classes: Rates 6, 110, 115, 135, 145, and 170.</p>
<p>Offer Description</p>	<p>The Energy Leaders initiative focuses on early adopters of new and emerging technologies. The initiative is intended to provide these early adopters increased incentives for implementing new and innovative technologies. In its first year, Enbridge focused efforts on an emerging ice resurfacing technology to test the market.</p> <p><u>Emerging Technology – Ice Resurfacing</u></p> <p>A new Ice Resurfacing approach was promoted in 2016 as a means of supporting early adoption of an emerging technology in the commercial recreational ice arena sector. The Ice Resurfacing method uses a high precision de-aeration process to remove micro-air bubbles from water when laying or resurfacing ice in arenas. This process does not require heated water traditionally required in building or resurfacing ice pads.</p> <p>Ice resurfacing practices have been well established for decades in a manner that provides a high quality of ice. In exploring new resurfacing approaches and in consideration of the cost of the technology, facility managers needed assurance that ice quality would not be compromised. Consequently, the market uptake for the Ice Resurfacing technology was challenging and required strong implementation support to change long standing practices.</p>



Results	As summarized in Table 5.11, there were four projects completed in the Energy Leaders Initiative in 2016, which contributed 0.67 million CCM.
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Table 5.11 2016 Energy Leaders Results

Resource Acquisition	2016 Net CCM (m ³)	# of Projects	TRC-Plus Ratio	PAC Ratio
<i>Energy Leaders</i>	671,186	4	1.5	1.4

2016 Commentary and Lessons Learned

- In total, four ice resurfacing projects were completed in 2016. Given the seasonality of the technology, Enbridge plans to continue this offer into the 2017 winter and spring season.
- Enbridge completed two case studies of ice resurfacing technology, which are available on the Enbridge website. George Bell Arena and De La Salle College Arena were selected for the case studies, which promote the benefits emerging technology through existing communication channels, manufacturers, and industry associations.
- The aim of the Energy Leaders Initiative is to investigate the implementation of emerging technologies with customers who are responsive to new opportunities to improve their energy efficiency, and then apply the learnings such that the technology can be delivered to a larger audience. The participants in the adoption of the Ice Resurfacing technology were able to benefit from gas savings, and as a result, this technology will be offered to other DSM participants.
- Enbridge intends to move forward with promoting the technology as part of the Custom offer in 2017.

Enbridge Gas Distribution

Case Study

George Bell Arena



New Cold Water Resurfacing Technology is a Game Changer

“Enbridge’s rebates were the saviour for our rink. They allowed us to take advantage of this new cold water resurfacing technology with a payback of less than a year.”

Larry Woodley, Facilities Manager
George Bell Arena

George Bell Arena in Toronto’s west end is a City of Toronto facility that provides quality ice all year round for amateur hockey games. The arena’s non-profit board has a mandate to keep costs down to ensure affordability for its user groups. With ice arenas one of the biggest contributors to the city’s energy use, board and staff also have a laser focus on reducing environmental impacts.

By 2016 George Bell’s facilities manager, Larry Woodley, had already undertaken a number of energy efficiency upgrades at the aging facility including desiccant dehumidification, a lighting makeover, and a building automation system for the compressors. But energy costs were still rising.

Woodley knew that water heating was a major energy driver. In busy season their single rink is in use 62 hours a week and is flooded every 50 minutes. Each flood was using 150 gallons of water heated to 160° F (71.1° C).

The **REALice** system offered a solution. This emerging technology enables arenas to use cold rather than hot water for resurfacing the ice sheet. It is a method that delivers both natural gas and electricity savings. But there were two concerns. First that it would be a significant investment for the cost-conscious facility. Second, could it ensure the same high ice quality that was the pride of arena staff. Cold water resurfacing was gaining momentum worldwide but no other Toronto arena had installed it, so this would be its first test in the city.

Enter Enbridge’s **Energy Leaders** initiative. This incentive program was set up to promote early adoption of emerging technologies among commercial and industrial natural gas customers. By participating in the program George Bell Arena qualified for a rebate to cover 50% of the cost of the **REALice** technology.

The REALice system was installed in early December 2016 and was up and running for the prime season. Utility bills dropped dramatically from the first months. Based on an average weather year Enbridge estimates annual natural gas savings of 14,366 m³ — around 21% reduction in overall use. There are also substantial electricity savings because the ice surface can be maintained at minus 6° C with a higher brine set point and that means fewer compressor runs. Load on the dehumidifier is also reduced. It's a big boost to the facility's environmental profile.

Best of all ice quality is outstanding — the new sheet is harder and clearer than previously. User groups are happy and ice resurfacing staff have given the new system a thumbs up.

REALice System de-aerates water without heat

The REALice System, developed in Sweden and distributed in Canada by SWiCH Services Inc, eliminates the need for hot water to resurface ice — without any chemicals, filters or additional energy input. A specially designed valve, installed upstream of the resurfer's feeder hose, features intake holes positioned to create a powerful vortex or swirling action that separates the micro-air bubbles from the incoming cold water.

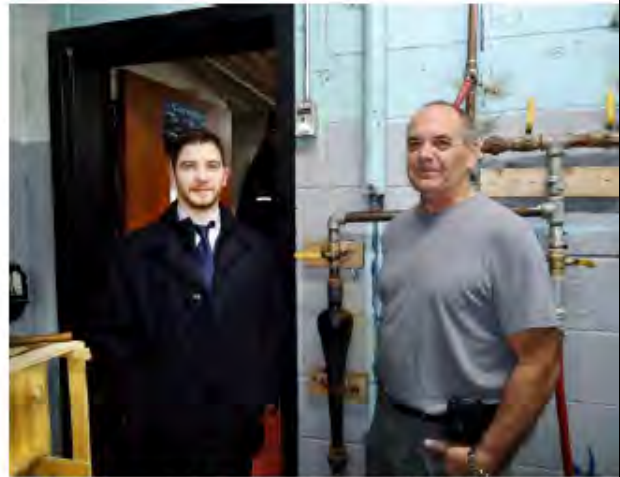
George Bell arena staff easily installed the REALice system themselves. The compact wall-mounted unit is a space saver in the arena's small equipment room.

Results¹

- Estimated 14,366 m³ annual natural gas savings
- 53,320 kWh annual electricity savings
- CO₂ (greenhouse gas) reduced by 27,000 tonnes over the life of the unit
- \$17,440 Enbridge Energy Leaders incentive

Utility cost savings amount to several thousand dollars annually. The Enbridge incentive reduced the payback of the project at George Bell arena to less than one year. But even without incentives, energy savings can pay for a REALice installation in 2 to 3 years at a single pad arena and 1 to 2 years for twin rinks using a single water feed.

¹Enbridge models natural gas and electricity savings based on average temperatures over the course of a year. Actual savings will vary with weather conditions.



Enbridge Energy Solutions Consultant, Daniel Duhamel, being shown the compact REALice installation by Facilities Manager, Larry Woodley

Take advantage of our Energy Leaders offer

Enbridge's new Energy Leaders initiative rewards and showcases our commercial and industrial customers who install leading edge technologies for incremental energy savings.

The initiative is aimed at customers who have already installed typical conservation measures and want to gain further energy savings. If you have identified an innovative technology that you would like to explore or if you would like some help to identify and assess new energy saving technologies for your facility, contact your Enbridge Energy Solutions Consultant.

Eligible projects can qualify for incentives of up to 50% of the project cost.

For more information:

☎ 1-855-659-0549

✉ energyservices@enbridge.com

5.27 Small Commercial New Construction

The Small Commercial New Construction pilot was proposed to provide small commercial builders and owners access to cost-effective energy modelling alternatives that would encourage builders to build to a higher level of energy efficiency. This offer was intended for commercial buildings that are too small to satisfy the size requirements of the Company's existing Savings by Design Commercial offer. Incentives were intended to help participants cover the costs of modelling including incentives for achieving energy efficiency targets.

The blanket 10% increase of 2016 targets as prescribed in the Board's Decision created implications for the Company's incentive budgets. As outlined in Enbridge's DSM Plan (2015 to 2020) Written Comments and Draft Accounting Order⁶ dated February 3, 2016, the Company advised the Board that particular offers may need to be reconsidered, such that "monies ... be directed from other programs to pay participant incentive amounts." The Company found itself in a challenging position where it was unable to meet its new targets without additional budget to payout incentives. The Company believed the value for rate payers was more certain by not launching the pilot in 2016, and instead using the budget to pursue results in other program offers that have been fully designed, launched, and evaluated for cost-effectiveness. As a result, the Company reassessed the portfolio giving priority to opportunities that the Company believed would maximize results and best serve rate payers. As a result funds from the Small Commercial New Construction pilot were reallocated to offers currently in market.

⁶ Enbridge Gas Distribution Inc. (File: EB-2015-0049) Multi-Year Demand Side Management Plan (2015 to 2020) Written Comments and Draft Accounting Order, February 3, 2016.

6. Low Income Scorecard

Enbridge is a leader in the delivery of energy efficiency programs specifically designed for low income customers. Programming has evolved considerably since DSM activities for this market were first offered in the Enbridge franchise in 2004.

Low Income offers are set apart to recognize the unique needs of their target customer base. Although the offers may result in a lower benefit/cost ratio, Total Resource Cost, than similar offers delivered to non-low income customers, they are expressly designed to address the needs of these consumers and include other important societal benefits.

Design and delivery considerations for this segment have been unique and as such, Enbridge has adopted non-traditional approaches to effectively reach these vulnerable customers, raise customer awareness, encourage resident and building staff engagement, and in turn, build participation. Enbridge's delivery strategy for the Low Income sector focuses on leveraging available channels and resources, community-based organizations (CBOs) and local community service providers. These groups have established relationships with trusted organizations that support the social service needs (housing affordability and environmental sustainability) of low income consumers.

The Company has also been particularly effective in building collaborative partnerships in the marketplace with LDCs and municipalities. Enbridge has recognized the benefits of collaboration with these partners, as well as with social and assisted housing support networks, in helping to inform and improve program delivery. Proactive stakeholder and customer relationship management has led to continuous program improvement and the refocusing of program strategies to be responsive to housing providers' needs and the evolution of affordable housing.

In the past, Enbridge's Low Income offers have primarily focused on the full funding and installation of energy efficient equipment or measures. In 2016, the Low Income Program expanded to include an offer similar to Enbridge's existing Savings by Design



offer. With available government funding for low income new construction, Enbridge recognized the opportunity to work with low income builders to encourage higher energy efficiency in the design of these buildings. Consequently, in 2016, Enbridge introduced the Low Income New Construction (“Affordable Housing New Construction”) offer. This offer aims to work with municipalities, as well as community housing providers, and low income builders and developers to encourage energy efficiency in new construction projects.

The 2016 Low Income Program is now comprised of three offers. In addition to Low Income New Construction, as in previous years, Low-Income Multi-Residential (targeting Part 3 buildings) and Low Income Single Family (targeting Part 9 buildings) both continue to focus on reducing the energy costs facing low income customers and their housing providers through the installation of measures and thermal envelope improvements to achieve water and space heating savings.

Want to lower your
ENERGY COSTS?
ENBRIDGE CAN HELP.

Enbridge Gas Distribution is committed to helping social and assisted housing providers save energy and money, while at the same time improve comfort for their residents.

We can help you manage your energy use and reduce your operating expenses.

Our special incentive offers are available on retrofit installations that result in natural gas savings for projects completed by December 31, 2016.

To learn more, visit www.enbridgegas.com/affordablehousing
or www.enbridgegas.com/winterproofing.

Incentives are available only to program eligible Enbridge Gas customers.



The Low Income program exhibited strong results in 2016 relative to overall scorecard performance targets, as outlined in Tables 6.0 and 6.1. Results in the Multi-Residential (Part 3) segment were strong, exceeding the target and totalled 84.73 million CCM in natural gas savings. The Low Income New Construction offer achieved its target of six participants in its first year in market.

Table 6.0 2016 Low Income Scorecard

Component	Metric	Weight	Targets		2016 Result
			Lower Band	Target	
Single Family (Part 9)	Cumulative Savings (million m ³)				28.81
Multi-residential (Part 3)	Cumulative Savings (million m ³)				84.73
New Construction	Participants				6

Table 6.1 2016 Low Income Results

Low Income Component	2016 Net CCM (m ³)	# of Projects	# of Units	TRC Plus Ratio	PAC Ratio
Single Family (Part 9)	28,814,754	1700 ¹	656 ²	1.1	0.9
Multi Residential (Part 3)	84,728,581	125 ³	622 ⁴	3.4	5.5
Total/Average	113,543,335	1,825	1,278	2.0	2.0

1. # of Projects summarizes the number of unique projects for Home Winterproofing and prescriptive offers.
2. # of Units summarizes the number of units installed for prescriptive offers.
3. # of Projects summarizes the number of unique projects for custom and prescriptive offers.
4. # of Units summarizes the number of units installed for prescriptive offers.

All Low Income offers delivered to Enbridge customers in 2016 will be continued in the Low Income DSM program in 2017. Details regarding individual offers are discussed below.



6.1 Single Family (Part 9)

Home Winterproofing and Prescriptive Measures

<p>Objectives</p>	<p>The goal of the Single Family Low Income offer is to enable energy savings through the reduction of hot water use and space heating demand in low income single family households through the installation of thermal envelope improvements, space heating and water saving measures.</p> <p>The Home Winterproofing offer aims to reduce energy costs for Part 9 low-income households by increasing the energy efficiency of their homes, while addressing comfort and some health and safety matters within the homes.</p>
<p>Target Customer</p>	<p>The Home Winterproofing offer targets social housing and assisted housing, and income qualified customers residing in low-rise buildings (Ontario Building Code (OBC, the “Code”) Part 9). This offer targets Rate 1 homeowners and tenants within the Enbridge franchise area who need assistance with their energy costs.</p> <p>Income verification is a requirement for participation in this offer.</p> <p>Eligible Enbridge customers must meet the following criteria:</p> <ul style="list-style-type: none"> • Income is at or below 135% of Statistics Canada's Low Income Cut-Off (LICO) or tenants reside in social and assisted housing, regardless of gas bill payment responsibility; • Occupants of single detached and low-rise multi-family (3 stories or less); and • Private homeowner or tenant who pays their own gas bills.
<p>Metrics</p>	<p>The primary metric for the Home Winterproofing offer is lifetime natural gas savings - CCM savings.</p>



<p>Offer Description</p>	<p>The offer provides a free home assessment and weatherization services (i.e., insulation and air sealing) to qualified Enbridge customers who meet income and customer eligibility criteria. As a direct install offer, there is no financial cost to the participant for the energy assessment or for the weatherization products and services provided. As a health and safety value-add on, a carbon monoxide monitor is included where one is not present in the home.</p> <p>At the time of assessment, the home is also prequalified for water conservation measures (e.g., showerheads and aerators) as well as a programmable thermostat, and heat reflector panels.</p> <p>Customers that qualify for the Board’s Low Income Emergency Assistance Program (LEAP) or the LDC delivered Home Assistance Program (HAP) initiative automatically meet the income eligibility requirements of the offer.</p> <p>Enbridge promotes the Home Winterproofing offer through community based organizations, which have strong relationships with low income interest groups and are well entrenched and trusted within the communities that they serve. Enbridge delivers the offer through selected qualified Delivery Agents who are responsible for designated areas within the Company’s franchise area.</p> <p>For each project, documentation is submitted by Delivery Agents summarizing installation site information (e.g., address, ownership, housing type) and natural gas savings (m³). Natural gas savings claims are determined based on pre and post HOT2000 modelled consumption. These customized energy audits are conducted by energy auditors for income qualified participants. Documentation includes:</p>



	<ul style="list-style-type: none"> • A completed pre and post audit data collection sheet • Work order including work proposed to be carried out • Cost estimate for suggested authorized retrofits • HOT2000 pre and post audit files • Pre and post project photos • Completed participant agreement/acknowledgement form <p>Participation is tracked by type of tenancy (i.e., social housing or privately-owned dwellings). Similarly, monthly reporting is provided by delivery agents and summarizes unit installations for any prescriptive measures installed.</p>
<p>Cost-Effectiveness</p>	<p>Low Income programs are often amongst the most expensive to deliver. As per the Guidelines, the Low Income program screening threshold is 0.70; the Low Income Part 9 offer was cost-effective as supported by the TRC-Plus and PAC screening in Table 6.2.</p>
<p>2016 Results</p>	<p>In 2016, actual cumulative savings for single family (Part 9) were 28.81 million CCM, as outlined in Table 6.2. These results exceeded the lower target of 23.85 million CCM.</p> <p>The Enbridge Home Winterproofing offer reached 1,512 low income households in 2016. Some of these homes also received basic prescriptive measures including showerheads and aerators where appropriate.</p>



Table 6.2 2016 Single Family (Part 9) Low Income Results

Low Income Component	2016 Net CCM (m ³)	# of Projects ¹	# of Units ²	TRC Plus Ratio	PAC Ratio
<i>Single Family (Part 9)</i>	28,814,754	1,700	656	1.1	0.9

1. # of Projects summarizes the number of unique projects for Home Winterproofing and prescriptive offers.

2. # of Units summarizes the number of units installed for prescriptive offers.

Table 6.3 Home Winterproofing – Breakdown of Results


Low Income Component	2016 Net CCM (m ³)	# of Projects ¹	TRC-Plus Ratio	PAC Ratio
<i>Home Winterproofing</i>				
<i>Private</i>	16,993,553	803	1.1	1.0
<i>Social Housing</i>	11,771,021	709	1.1	0.8
Total/Average	28,764,574	1,512	1.1	0.9

1. # of Projects summarizes the number of unique projects for Home Winterproofing.

2016 Commentary and Lessons Learned

- A total of 1,512 homes participated in the Home Winterproofing offer in 2016, of which 803 were private homes and 709 were social housing properties, as outlined in Table 6.3.
- Despite challenges onboarding social housing providers, due to their internal board approvals and upfront engagement efforts to obtain resident support, Enbridge continues to diligently work with these stakeholders given the remaining opportunities in most regions within this segment. However, almost all social housing units that were eligible for retrofits in the Ottawa geographic territory have been depleted.
- Enbridge received Ottawa Community Housing’s (OCH) Partnership Award on May 12th, 2016. This award was presented to Enbridge and EnviroCentre by the OCH Board of Directors in appreciation for all the improvement work completed in that community through Enbridge’s Home Winterproofing Program.
- In 2016, Enbridge and the United Way of Simcoe Muskoka improved the process where LEAP customers have the opportunity to participate in the Home

Winterproofing offer when applying for LEAP. The agency promoted Home Winterproofing to the customer and if interested, the agency filled out the application form on the United Way's database, similar to Enbridge's online application form. The application was sent directly to the Delivery Agent in the customer's area for follow-up.



**Yes, it's free.
No catch.
Just coziness.**

Prepare your home for winter by applying to our Home Winterproofing Program. If you qualify, you can save and stay that much warmer during the long winter months. Now that's something to cozy up to.

<p>Increase comfort We want to help you afford home improvements that will keep you warm and comfortable</p>	<p>Be healthier Living in drafty conditions can be hard on your health. Fewer drafts mean a more comfortable home for you and your family.</p>
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If you qualify, you could receive

New insulation and draft proofing installed by experienced professionals.

Enjoy savings of up to 30% of your energy use and lower energy bills.

This program is absolutely free to all homes that qualify. Enbridge will pay for the cost of energy saving improvements such as insulation and draft proofing preventing against cold drafts that are common in old homes. We want to help you afford home improvements that will keep you warm and comfortable.



We see the greatest energy savings in homes that are 35 years and older.

How to qualify

In order to qualify for this great program, you will need to meet the customer and income requirements described below:

- 1** Is your home heated by natural gas?
- 2** Are you a customer of Enbridge Gas Distribution?
- 3** Do you pay your own natural gas bill?

How to apply

- 1**  Visit winterproofing.ca and complete the online Program application form then submit the form to the Program Delivery Agent in your Area. The Program Delivery Agent will contact you within a few weeks.
- 2**  Call the Enbridge Program Delivery Agent in your area. They may be able to pre-qualify your home over the phone.
 - Signed application, proof of income
 - The account number on your gas bill
 - A copy of your last income tax assessment or benefit statement
- 3**  Mail or fax the attached Program application form to the Program Delivery Agent in your area listed on the back of this brochure.

- As of August 2016, the Home Winterproofing offer included a joint delivery initiative with Toronto Hydro, which is expected to continue through to December 31, 2017. Toronto Hydro and Enbridge are collaborating in this initiative in the delivery of their respective residential Home Assistance Conservation Demand Management and Home Winterproofing DSM Low Income offers, using a single delivery agent in the City of Toronto. The collaboration effort is targeting 400 homes and aims to provide a simplified and enhanced customer experience. In 2017, Enbridge will continue exploring opportunities to expand collaboration with other LDCs in the Enbridge franchise area.
- In line with the changing dynamics often seen in the social housing sector, in 2016, some expected completions of Home Winterproofing projects were not realized due to a revised strategy by Toronto Community Housing. In addition, forecasted results from Delivery Agents did not fully materialize. These factors contributed to an underspend in Low Income.
- Enbridge continued to work with Toronto Community Housing on a specialized initiative to identify gas savings opportunities with external cladding technologies. As a result, in 2017 and 2018, it is anticipated that 230 units will benefit from this customized approach through the Home Winterproofing offer. This technology is increasingly being utilized within the social housing sector; it is more feasible and less disruptive to residents versus interior insulation.
- Enbridge Gas Distribution retained a third party evaluator, Econoler, in 2016 to perform a process evaluation of the Home Winterproofing offer. The Econoler Process Evaluation can be found in Appendix C. Some key research objectives included evaluating the offer details and delivery, evaluating the Home Winterproofing database and documentation, determining sources of awareness and customer recruitment efforts, determining the levels of satisfaction, and identifying barriers that affect performance. The process evaluation involved benchmarking against similar offers, as well as surveys and interviews with participants, Certified Energy Auditors, contractors, delivery agents, and social

housing providers. Based on their findings, Econoler provided three recommendations, as follows:

- Define and monitor program performance indicators, such as the number of customers making applications, projects completed, Social Housing Providers contacted, as well as the customers' levels of awareness and satisfaction related to the program.
- Further complement the program database with some additional participant information, such as the participants' email address, and the pre-retrofit and post-retrofit house energy consumption values, and
- Make Social Housing Provider buildings pass a pre-application test for screening purposes related to health and safety concerns, such as moisture, asbestos, or old electric wiring.

Some of the recommendations have been implemented, such as monitoring program performance indicators.

- Looking forward, Enbridge is reassessing the eligibility criteria for this offer as Statistics Canada no longer updates the LICO numbers. Consequently, Enbridge is considering utilizing Low-Income Measure (LIM) as a determinant of income thresholds for program eligibility to be aligned with the LDC CDM program requirements and LEAP.
- Enbridge recognizes the need to support furnace replacements for this sector. However, it is challenging to offer a cost effective program. Enbridge will continue to explore opportunities to support furnace replacement as there is need to assist low income customers who are unable to afford a new furnace.
- Enbridge worked with Delivery Agents to develop a multi-channel marketing plan for 2017. These efforts will focus on engaging private homeowners and tenants and encourage them to participate in the Home Winterproofing Program.



6.2 Multi-Residential (Part 3)

Custom Projects and Prescriptive Measures

<p>Objectives</p>	<p>The goal of the Low Income Multi-Residential (“Affordable Housing Low Income”) offer is to enable energy savings through the reduction of space heating demand and hot water use in Low Income Part 3 Multi-Residential buildings through the installation of thermal envelope improvements, space heating, and water savings measures.</p>
<p>Target Customer</p>	<p>The Low Income Multi-Residential offer is intended for social and assisted housing providers who own and operate Part 3 buildings that provide housing to low income households. In addition, shelters and supported housing are eligible.</p> <p>The offer also targets eligible owners and property managers of privately-owned multi-unit residential buildings (MURBs), based on screening criteria established in collaboration with Enbridge’s Low Income Consultative Working Group, which provide housing to a market that includes low income customers and families.</p>
<p>Metrics</p>	<p>The primary metric for the Low-Income Multi-Residential offer is lifetime natural gas savings - CCM savings.</p>
<p>Offer Description</p>	<p>The Low Income Multi-Residential offer includes the following:</p> <ul style="list-style-type: none"> • Custom incentives are determined based on projected annual natural gas savings at a rate of \$0.40/m³ saved, up to 50% of the cost of the retrofit. Eligible measures that would result in gas savings include, but are not limited to: <ul style="list-style-type: none"> ○ Boilers – Space and Water Heating; ○ Ventilation Systems; and, ○ Building Controls.



	<p>As with Commercial custom projects, the savings for each custom project are calculated on an individual basis. Each custom project includes a project documentation checklist that outlines key parameters for the project and applicable supporting documentation to support gas savings calculations.</p> <ul style="list-style-type: none"> • Prescriptive incentives calculated based on a fixed dollar amount. Eligible measures that would result in gas savings include: <ul style="list-style-type: none"> ○ Condensing boilers; ○ High efficiency boilers; ○ Energy recovery ventilation systems; ○ Heat recovery ventilation systems; and, ○ Condensing Water Heaters. • Free in-suite direct install measures will be as follows: <ul style="list-style-type: none"> ○ Showerheads from Enbridge supplied and installed; and, ○ Supply and installation of heat reflector panels. • Financial support is also provided to fund half the cost of an energy audit up to \$5,000 per building or \$0.01/m³ of gas consumed in the past calendar year (whichever is less); • Free Gas Savings Opportunity Assessment (similar to an ASHRAE Level 1 Building Assessment); and, • Resident engagement programs. <p>Enbridge outlines the following eligibility criteria for the Affordable Housing offer:</p> <ul style="list-style-type: none"> • Part 3 Buildings owned and operated by social housing
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	<p>providers as well as privately owned buildings identified as low income; and</p> <ul style="list-style-type: none"> • Social housing and assisted housing buildings as described in the Housing Reform Act of 2011 and 2015-2020 DSM Framework.
Cost-Effectiveness	As per the Guidelines, the Low Income program TRC-Plus screening threshold is 0.70. The Low Income Multi-Residential – Affordable Housing offer was cost-effective as supported by the TRC-Plus and PAC screening – see Table 6.4.
2016 Results	The Low Income Part 3 Multi-Residential offer achieved strong results in 2016 with 84.73 million CCM natural gas savings. This result exceeded the target of 64.90 million CCM.

Table 6.4 2016 Multi-Residential (Part 3) Low Income Results

Low Income Component	2016 Net CCM (m ³)	# of Projects ¹	# of Units ²	TRC Plus Ratio	PAC Ratio
<i>Multi Residential (Part 3)</i>	84,728,581	125	622	3.4	5.5

1. # of Projects summarizes the number of unique projects for custom offers.
2. # of Units summarizes the number of units installed for prescriptive offers.

2016 Commentary and Lessons Learned

- Despite Enbridge providing an increased financial incentive through the Low Income Multi Residential offer above the Commercial Multi-Residential offer for custom projects, the low income sector continues to face inherent financial barriers due to limited capital availability.
- In 2016, the Provincial government introduced assistance through the Green Investment Fund, which has created capital investment opportunities across the sector. Despite the increased available capital, Enbridge continues to be critical

in the implementation of projects through facilitation assistance, technical and financial support.

Enbridge Gas Distribution

Affordable Housing Multi-Residential Program

Upgrade and Save
Investing in efficient equipment will help lower your building energy costs and improve resident comfort.

Receive up to \$100,000 in Incentives
... under our Custom Program when you undertake an energy retrofit to upgrade equipment and improve efficiency.

Free In-Suite Measures
We will install in all eligible units: • Low-Flow Showerheads • Novitherm Heat Panels

Energy Audits
Do an energy audit and receive either half the cost back, up to \$5,000 per building, or \$0.01/m² of natural gas consumed in the last calendar year (whichever is less).



Contact Cam Black, your Enbridge Energy Solutions Consultant, at cam.black@enbridge.com

416-758-4748

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- The key driver for success and participation across the social housing market is the development and maintenance of strong supportive relationships with staff and management within the Municipal Housing providers. As an example, Enbridge works with Toronto Community Housing (TCH) by hosting regular working group meetings to identify needs and opportunities. Reflector panel installations for instance have provided benefits to both the tenants and the building as a whole beyond energy savings, allowing for not only increased comfort but also improved air quality due to the process of cleaning convectors.

- Delivering the Low Income Multi-Residential offer presents unique challenges, which Enbridge undertakes significant efforts to overcome. For example, there

are often a variety of languages spoken by tenants in these multi-residential buildings and Enbridge works to ensure that the residents are informed of upcoming work. The following flyer shows an entry notification in multiple languages to best accommodate the residents of the building. In this example, tenants are being notified of entry for the installation of a heat reflector panel.

<p>1234 ENBRIDGE ST. Heat Reflector and Radiator Cleaning</p>	
	<p>BENEFITS: Heat reflectors will make your units more comfortable in the winter. Radiator cleaning will help improve the indoor air quality.</p>
<p>Starting _____, 2016 We will be entering your unit to install heat reflectors and clean your radiators at no cost to you. Please move any furniture at least 4 feet (1.2 metres) away from the radiators. If you are not able to move your furniture, please let the superintendent know and we'll make alternate arrangements.</p>	
<p>Questions or comments? Please contact your building's superintendent or email EnergyServices@enbridge.com</p>	
<p>1234 ENBRIDGE ST. Reflector de calor y Limpieza de los radiadores</p>	
	<p>BENEFICIOS: Los reflectores de calor harán que sus unidades sean más confortables en el invierno. La limpieza de los radiadores ayudará a mejorar la calidad del aire interior.</p>
<p>A partir de _____, 2016 Entraremos ingresando a su unidad para instalar los reflectores de calor y limpiar los radiadores sin costo alguno para usted. Traslade los muebles a una distancia de, al menos, 4 pies (1.2 metros) de los radiadores. Si no puede trasladar los muebles, informe a su superintendente y haremos planes alternativos.</p>	
<p>Preguntas o comentarios? Comuníquese al superintendente de su edificio o envíe un correo electrónico a EnergyServices@enbridge.com</p>	
<p>HAGAAJINTA XIGTA Kuleyl Gudbiyaha iyo Nadiifinta Qaboojiyaha</p>	
	<p>FAA'IDOOYINKA: Gudbiyaha kuleylka waxay qeybahaaga ka dhigi doonaan kuwa raaxo badan qaboobaha. Nadiifinta qaboojiyaha waxay caawin doontaa hagaajinta tayada hawada gudaha. ka caawin doontaa hagaajinta tayada hawada gudaha.</p>
<p>Laga Bilaabo Luuliyo _____, 2016 Waxaan geli doonaa qeybahaaga si aan u gelino gudbiyaha kuleylka waxaana kugu nadiifinaynaa doona qaboojiyaha laacag la'aan. Fadlan dhagaaji alaab walba ugu yaraan 4 fit (1.2 meter) Haddii aadan awoodin inaad dhagaajiso alaabtaada, fadlan haa ogaado kormeeraha gourd waxaan samayn doonaa diyaarin kale.</p>	
<p>Su'aalo ama faallo? Fadlan laxiriir isuduwaha sartaada ama iimail EnergyServices@enbridge.com</p>	

- Enbridge continues to recognize the importance of relationships with key stakeholders, including the Low-Income Energy Network (LIEN), Federation of Rental-Housing Providers of Ontario (FRPO), Ontario Non-Profit Housing

Association (ONPHA), and Housing Services Corporation (HSC). Enbridge utilizes these associations to promote programs through webinars, conference sponsorships, and speaking engagements at various events.

- Enbridge collaborated with Toronto Community Housing and Toronto Atmospheric Fund (TAF) to support custom projects highlighting gas absorption heat pumps. This emerging technology is part of a test initiative which will provide one year of monitoring data. Enbridge will be able to use the data and lessons learned from this initiative in order to determine the viability of this technology in future programming for both low income and commercial applications.
- Enbridge collaborated with Peel Living and Ottawa Community Housing to identify capital investments and funding opportunities. In 2016, Enbridge provided Social Housing Apartment Retrofit Program (SHARP) audit funding, which enabled these municipalities to meet SHARP application requirements.
- Enbridge partnered with Summerhill to develop and deliver the Enbridge Private Low Income Laundry Initiative, a cold water wash laundry initiative intended to change tenant behavior through engagement, education, and incentives. The initiative included seven private low income buildings and engaged tenants through education, free samples of detergent, and incentives. The lessons learned from 2016 informed continuation of this initiative. Enbridge received the award for Program Design and Implementation (Residential) at the annual Association of Energy Services Professionals (AESP) conference in February 2017.
- Enbridge will continue to deliver the Low Income Multi-Residential offer in 2017.



6.3 Low Income New Construction

<p>Objectives</p>	<p>The overarching goal of the Low Income New Construction offer is to promote the adoption of higher levels of energy efficiency among developers and builders of affordable housing. This offer is designed to encourage stakeholders to take a proactive role by providing financial incentives and enabling support in incorporating higher energy efficiency levels in affordable housing planning and design.</p> <p>The Low Income New Construction offer aims to increase the efficiency of new construction developments to a level that is above current building code. Affordable housing builders and developers benefit through needed financial support to offset the costs of implementing energy efficiency. In addition, the Low Income New Construction offer provides added benefit to offset the energy costs that are ultimately borne by low income residents or social housing providers.</p>
<p>Target Customer</p>	<p>The offer is specifically directed to builders and developers of residential and multi-residential affordable housing projects.</p> <p>Eligible participants must meet the following criteria:</p> <ul style="list-style-type: none"> • Developers and builders of new “affordable housing” as qualified by a municipal, provincial and/or federal housing program. • Developers and builders of both single family Part 9 houses and multi-residential Part 3 buildings are eligible to participate.
<p>Metrics</p>	<p>Affordable housing projects enrolled by builders and developers to participate in the offer are eligible to be counted towards performance targets.</p>



<p>Offer Description</p>	<p>The Low Income New Construction offer was originally informed by the Company’s Savings By Design offers. However, due to the wide range of builders, types and project sizes, certain offer elements have been modified to meet the needs of the target market. The offer provides financial incentives and extends technical support to assist affordable housing builders in exceeding Ontario Building Code requirements by at least 15%. Enbridge engages the affordable housing community to encourage adoption of energy efficiency measures and technologies as a means to maintain housing affordability. Specifically, in 2016 the Low Income New Construction offer incorporated the following:</p> <ul style="list-style-type: none"> • Step 1 - Plan Review: The Participant will provide copies of the design plans including mechanical, electrical and lighting drawings and specifications, as available, to Enbridge and its consultants for review and modelling analysis. A plan review summary report is generated for further discussions during the Design Consultation Process. • Step 2 - Design Consultation Phase (DCP): During the DCP, the Participant will participate in a building design team meeting to identify the optimal mix of design elements and technologies to encourage maximum energy efficiency. <ul style="list-style-type: none"> ○ \$7,500 for Part 3 developments ○ \$5,000 for Part 9 developments • Step 3 – Part 3 Developments <ul style="list-style-type: none"> ○ Energy Efficiency Design Implementation: Following construction, an “as-built” energy model is completed and an energy performance report is provided to confirm incentive payout, up to a maximum of \$120,000 per building as follows:
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Building Energy Efficiency Achieved Above OBC	Energy Efficiency Implementation Incentive
15%	\$600.00/unit
15%-20%	\$750/unit
21%-25%	\$850/unit
>26%	\$1,000/unit

- Step 3 – Part 9 Developments

 - Energy Performance: A further incentive of \$5,000 will be paid to Participants who commit to move forward and design Part 9 OBC residential units which meet the requirements of the ENERGY STAR for New Homes program.
- Step 4 - Part 3 Developments

 - Commissioning: A building commissioning incentive up to \$15,000 is available to participants. A final commissioning report provided by commissioning agent will initiate the payment.
- Step 4 – Part 9 Developments

 - Energy Efficiency Design Implementation: An incentive of \$1,500 for each residential home that achieves an ENERGY STAR certification, up to a maximum of \$120,000 per project.



	<p>Enrollment entails a signed application with an eligible builder or developer committing to participate in the Low Income New Construction offer. Modelling reports for each DCP are maintained to provide a record of information on preliminary estimated savings for each project.</p>
<p>2016 Results</p>	<p>Enbridge was successful in enrolling six affordable housing developments in the Low Income New Construction offer in 2016 that met eligibility requirements and completed the IDP process. This result reached the target.</p>

2016 Commentary and Lessons Learned

- This offer, which was included in 2015-2020 Plan to come into market in 2016, was created as a response to the Federal-Provincial Investment in Affordable Housing (IAH) Program. Through the IAH Program, municipal governments own and develop their own affordable housing plans, and can prescribe action to ensure energy efficiency is a consideration for their affordable housing projects. The Low Income New Construction offer was developed because the IAH Program presented an opportunity to support design and construction of these newly financed projects to achieve increased levels of energy efficiency.

- Due to the multi-year nature of this offer from enrolling a participant through to construction completion, expenditures related to a specific participant are not realized within the same program year. This poses two challenges, as follows:
 - Spending on this offer in 2016 was limited to costs associated with supporting participants through the design phase. However, most of the funding available in the offer is directed towards financial incentives that will be paid upon building completion of the units. As a result, the majority of the budget has yet to be paid out. This underspend has a significant

impact on the Target Adjustment Mechanism (TAM). Specifically, Enbridge's target for 2017 is artificially inflated and unrealistic.

- The Company had proposed a variance account to hold the funds that remained in the budget, which were intended to pay participant incentives as outlined above. In the Board's Decision, however, this fund was denied and as a result, the 2016 surplus in the Low Income New Construction budget will be returned to the ratepayer as part of the 2017 clearance of accounts. Moving forward, given the nature of the offer, the Company cannot accurately forecast in which year buildings and projects may be completed over 3 to 5 years and receive incentive payments. In a situation where incentive payments materially exceed amounts budgeted, the Company would necessarily have to direct funds intended for new program participants to continuing participants thereby undercutting Enbridge's ability to meet the current year's targets. Enbridge is left in the position to determine how to access the funds to pay participants upon completion of their projects. Enbridge is considering possible options to help remedy this challenge in the 2017 Low Income New Construction offer.

- As the offer is still relatively new, Enbridge retained a process improvement consultant, C2C Strategies. The C2C Strategies report can be found in Appendix D. The consultant conducted interviews with modelers and participants to determine potential improvements for the offer. Some of the consultant's recommendations included the following:
 - Engaging builders and developers during the earliest stages of project development, before the architects have finalized the design of the building, would improve offer efficiency. In this way, any changes that may be required can be implemented as the architects are creating the design.
 - Participants in the Low Income New Construction offer would benefit from the introduction of a charrette component, similar to those provided through the Company's Savings by Design offers. First, in the Design



Consultation Phase Meeting, Enbridge's consultant will develop three options for the project based on the Plan Design Meeting. After the developer picks an option, a full-day charrette will take place, involving all experts in order to finalize the outcome of the design.

- After project consultants complete the project's final energy savings verification and applicants apply for the final incentive, it would be beneficial to review the applicant's experience with ongoing technical support from a project consultant during the Energy Efficiency Design Implementation phase. This feedback will provide insight into the level of necessary support from project consultants through the entire process of the offer.

- Enbridge will move forward in 2017 with consideration of these recommendations and other learnings from participants and stakeholders to continue to refine the offer in its second year in market.

New Construction Program for Affordable Housing



Multi-Residential?

Enbridge Gas Distribution is providing financial incentives and technical support to help affordable housing builders exceed Ontario Building Code requirements by at least 15% and build more energy efficiently. The first step is to complete your application for the New Construction Program.

There are four stages to the program:

Plan Review. Participants provide design plans and specifications to Enbridge for review and analysis. A report is generated for discussions during the Design Consultation Process.

Design Consulting Phase. Teams identify design elements and technologies to maximize energy efficiency. Participants receive a Technical Assistance incentive up to \$7,500* to help offset consultation fees.

Energy Efficiency Design Implementation. Depending on the achieved energy performance of the building once constructed, receive financial incentives depending on the number of housing units, up to \$120,000.*

Commissioning. Participants receive an incentive up to \$15,000* when they meet the requirements for the Energy Efficiency Design Enbridge Implementation incentive and submit their final commissioning report to Enbridge.

Act now! Contact Cam Black at cam.black@enbridge.com

416-758-4748

enbridgegas.com/affordablehousing

* Incentives are based on the building performance as a percentage above the Ontario Building Code. For complete terms and conditions please visit the website.



7. Market Transformation and Energy Management Scorecard

MTEM programs are designed with the aim of influencing consumer behaviour and attitudes in support of reducing energy consumption. MTEM activities focus on enabling fundamental changes that lead to increased acceptance and market share of energy efficient products, services, and practices, and on influencing consumer behaviour and attitudes that support reductions in natural gas consumption.

Enbridge's MTEM program is comprised of five offers. Savings by Design – Residential and Savings by Design – Commercial are directed to the new construction sector, Run it Right (RiR) and Comprehensive Energy Management (CEM) focus on supporting the adoption of a culture of energy efficiency at existing Commercial and Industrial facilities, and the School Energy Competition promotes energy efficiency education by building awareness in the younger generation. The Savings by Design offers and Run it Right are being continued from 2015. The School Energy Competition and Comprehensive Energy Management are new additions to the MTEM scorecard in 2016.

All MTEM offers are aimed at continuing to build awareness and recognition in the marketplace, with the objective of educating and influencing the respective target market groups in support of reductions in natural gas consumption.

Enbridge is pleased to report that 2016 was a successful year with respect to the overall performance of the MTEM Program. Individual offer results are provided below in Table 7.0.



Table 7.0 2016 Market Transformation and Energy Management Scorecard

Market Transformation						
Component	Metric	Weight	Targets			2016 Result
			Lower Band	Target	Upper Band	
Residential Savings by Design	<i>Builders</i>	10%	25	33	50	31
	<i>Homes Built</i>	15%	2,063	2,751	4,127	2,206
Commercial Savings by Design	<i>New Developments</i>	25%	25	33	50	43
School Energy Competition	<i>Schools</i>	10%	41	55	83	25
Run it Right	<i>Participants</i>	20%	62	83	124	84
Comprehensive Energy Management	<i>Participants</i>	20%	5	7	11	7

All of the offers will be continued in 2017. Details regarding individual offers are discussed below.

7.1 Savings by Design – Residential

Objectives	<p>The goal of the Savings by Design (SBD) Residential offer is to demonstrate to builders the potential for achieving higher levels of energy and environmental performance through the application of alternative design approaches through the use of an Integrated Design Process (IDP). In order to realize the potential that the IDP demonstrates to the builder, performance incentives are provided. These incentives encourage the construction of new homes to an energy efficiency standard 25% above the level prescribed in the 2012 OBC. The Residential SBD offer is intended to help builders see the value of the IDP approach, and encourage adoption of higher efficiency design on an ongoing basis.</p>
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<p>Target Customer</p>	<p>The offer targets builders and designers of new, Part 9 residential low rise houses (townhouses, semi-detached and detached homes) in the Enbridge franchise area. The intent is to engage builders who construct multiple homes in a given year. Ultimately, Rate 1 Residential customers who purchase these properties will be the beneficiaries of better designed, more energy efficient homes.</p>
<p>Metrics</p>	<p>There are two metrics for SBD Residential. The first metric tracks the number of eligible builders/developments that enroll and take part in the IDP process; the second metric tracks the number of homes built to the SBD specifications over the course of the year.</p>
<p>Offer Description</p>	<p>SBD Residential is designed to provide a variety of support activities for builders of new homes from the early design phase through to construction. The primary means to educate and change the marketplace remains the IDP. The SBD offer incorporates a total energy approach, as opposed to a gas only approach in encouraging builders to build to higher levels of energy efficiency. Savings by Design is a process-based approach involving:</p> <ul style="list-style-type: none"> • Visioning Session – to define the builder’s sustainability priorities and opportunities; • Integrated Design Process Session – to identify and evaluate strategies to meet the builder’s sustainability goals and the SBD energy reduction target of 25% beyond 2012 OBC through application of energy modelling; • Building Energy Modelling – to evaluate energy performance baselines and proposed improvements. <p>This SBD consultation process involves connecting participating design teams with leading industry experts and other stakeholders to encourage improved approaches to energy and environmental</p>



	<p>performance.</p> <p>Through this process, the team works with the builder to explore opportunities to achieve higher energy performance. Starting with the building envelope (windows, wall structure, insulation) and moving inward with HVAC mechanicals and lighting, the Savings by Design team guides the builder through a design process to achieve a modelled building that performs to at least 25% better than the 2012 OBC.</p> <p>In addition, depending on the specific priorities identified during the visioning session, experts from fields such as lighting, storm water management, sustainable land-use planning, indoor air quality and renewable energy can be engaged to provide further value to the IDP.</p> <p>Channel Consultants maintain regular contact with builders to follow up on builder commitments, to ensure energy audits are completed, and required documentation is submitted as required for the builders to receive incentives.</p> <p>Commitment letters and eligibility documents along with IDP reports are tracked for all participants and a third-party service provider undertakes testing and verification to ensure that constructed homes are built with 25% greater energy efficiency than required under the 2012 OBC to support incentive payments.</p> <p>As introduced in the 2015-2020 DSM Plan, beginning in 2016, builders are permitted to participate in SBD for identified subdivisions or developments. The Company has established a descending incentive scale for continued participation. Performance incentives for the offer are as follows:</p> <ul style="list-style-type: none"> • Builders that complete the IDP portion of the offer for the first time are eligible to receive \$2,000 per home completed to the SBD standard (up to 50 homes);
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	<ul style="list-style-type: none"> • Builders that complete the IDP portion of the offer for the second time are eligible to receive \$1,000 per home completed to the SBD standard (up to 100 homes); • Builders that complete the IDP portion of the offer for the third time are eligible to receive \$500 per home completed to the SBD standard (up to 200 homes). <p>A repeated incentive over time better supports the sustainability of a market change. An incentive that is reduced each time a builder goes through the SBD process allows participants to apply the IDP across their portfolio considering different communities or developments.</p>
<p>2016 Results</p>	<p>As illustrated in Table 7.0, Residential SBD was successful in enrolling 31 builders who completed the IDP process in 2016. In addition, for builders who have enrolled in SBD and completed the IDP process, there were 2,206 new homes constructed in 2016 through this initiative with features consistent with SBD standards of 25% above 2012 OBC (as illustrated in the builder’s IDP) in relation to the completed units metric.</p>

2016 Commentary and Lessons Learned

- The overarching goal of the Savings by Design Residential offer has been to encourage the design and construction of more efficient homes. In 2016, the effort expanded from educating builders and encouraging the building of better homes to designing and building better communities. To support this goal, the offer was revised (as outlined in the Board approved Plan) to permit builders to participate in the SBD process for successive developments.
- Builders who participate in the IDP benefit from educational content and design considerations that are customized for each builder’s development. Specifically, the visioning session is intended to help identify the technologies suitable for

each development. In turn, the appropriate panel of experts is assembled to explore opportunities and design considerations.

- SBD experts are providing education, technical expertise, and incentives to assist builders in the challenging task of moving toward Net Zero. In the meantime, Enbridge is supporting the builder in preparing for the next building code change by transforming the market before code changes come into effect.
- In 2016, Savings by Design won the Quality Urban Energy Systems of Tomorrow (QUEST) Smart Energy Community Award for Utility and Energy Service Providers. QUEST presented the award to recognize leadership and innovation in advancing Smart Energy Communities in Canada.
- Ontario, and in particular the GTA, has experienced a seller's real estate market in recent years. New housing has been in high demand, and consequently builders have not appreciated the value in building to specifications beyond code requirements. The SBD team has worked to inform builders of the advantages of the offer and has been successful convincing builders that improving energy efficiency above building code can be a competitive market tool with added value to the consumer.
- In some municipalities, builders participating in the SBD offer have benefitted from the added value of experiencing a reduction in processing time for building permits as the municipality has recognized that these builders are designing and building homes that are above the required building code as a result of the SBD offer.



Get the support you need to build more energy efficient homes.

The demand for energy efficient homes is increasing and building codes are getting stricter. Enbridge can help. Our **Savings by Design (SBD) program** gives you the support you need to construct sustainable homes beyond code requirements.

To get started or to learn more, visit residential.savingsbydesign.ca

Build  **SAVINGS BY DESIGN™**

 **ENBRIDGE™**
Life Takes Energy™

To qualify for the program, your project must be located in the Enbridge Gas Distribution franchise area. Participation is a three-year commitment. During that time, builders are expected to design and construct at least one new construction home based on resulting recommendations. In order to receive incentive payments, you must agree to all program terms and conditions, must fully participate in all stages of the program and must meet all program requirements.

- SBD has been well received by the builder community Feedback from participants continues to confirm that the SBD offer provides builders with an effective and focused facilitation and encourages builders to achieve energy efficient building goals. In addition to the IDP process, funding has assisted the efforts of builders to continually improve. In January 2017, Ontario Building Code requirements will increase energy efficiency from the 2012 Code. As a result, the Savings by Design Residential offer will continue in 2017 as it becomes more difficult to build to code, let alone above code, however, Enbridge will change the offer requirement to 15% greater energy efficiency than required under the 2017 OBC as outlined in the Company’s Multi-Year DSM Plan 2015-2020.⁷

⁷ EB-2015-0049, Exhibit B, Tab 2, Schedule 1, Page 57 of 100



7.2 Savings by Design – Commercial

<p>Objectives</p>	<p>The goal of the Commercial Savings by Design offer is to use the Integrated Design Process to demonstrate to builders of commercial and multi-residential buildings the potential for achieving higher levels of energy and environmental performance through the application of alternative design approaches. The offer supports participants in this process with incentives that encourage builders to use the knowledge gained in the IDP to design and build buildings that are more energy efficient. Enbridge expects that Commercial SBD will help builders see the value of the IDP approach, and encourage adoption on an ongoing basis. In 2016, the goal of SBD Commercial is to increase the number of buildings built to 25% above the 2012 OBC in the new construction market, while also preparing builders for the upcoming Code update in 2017.</p>
<p>Target Customer</p>	<p>This offer is targeted at builders and designers of new, Part 3 commercial buildings in the Enbridge franchise territory. Enbridge targets its promotional activity to owners, builders and developers, design teams including architects, design engineers and energy modelers.</p>
<p>Metrics</p>	<p>Builders and developers who enroll in the offer and complete the IDP process are eligible to be counted towards performance targets. Metrics are based on the number of projects to which a developer commits. Eligibility criteria include the following:</p> <ul style="list-style-type: none"> • Commercial, multi-residential or industrial buildings covered under the Ontario Building Code Part 3; • A minimum threshold of 50,000 square feet per project (including aggregate multi-location projects);



	<ul style="list-style-type: none"> • Building(s) must be within Enbridge’s franchise area, or for aggregate projects 75% of the project square footage must be in the franchise area; and, • Building(s) must be in the design phase such that they have the flexibility of making design changes as recommended through the process.
<p>Offer Description</p>	<p>The SBD Commercial offer is delivered by an internal sales team directly to builders and developers.</p> <p>The offer consists of an Integrated Design Process and continues with post charrette support. The IDP is comprised of a Visioning Session and a charrette, which addresses energy efficiency, site sustainability, sales and marketing, design commissioning, energy modelling, and additional educational support as required. The IDP culminates with a final SBD report.</p> <p>The offer also provides for performance incentives. With the finalization of a pre-construction certified energy model demonstrating that the building will be built 25% above the 2012 Code, along with final design stage plans and specifications, builders are eligible to receive \$15,000. Upon completion of a post-construction certified model demonstrating that the building has been built 25% above the 2012 Code, along with the final certified commissioning report, builders are eligible to receive \$15,000.</p> <p>Enrollment entails a signed memorandum of understanding with a builder or developer containing a commitment to participate in the Commercial Savings by Design offer and participate in the IDP. The builder commits to constructing building(s) to the IDP standard within five years in order to receive performance incentives. Enbridge Channel Consultants maintain regular contact with builders to track project status to project completion. Charrette reports for each IDP</p>



	are maintained to provide a record of information on preliminary estimated savings for each project.
2016 Results	As illustrated in Table 7.0, Enbridge was successful in enrolling 43 new developments in 2016 that met eligibility requirements and completed the IDP process. This result exceeded the target.

2016 Commentary and Lessons Learned

- Extensive promotion throughout the industry on behalf of Enbridge consultants has resulted in increased recognition of the Savings by Design Commercial offer within the new commercial construction sector. Participation in the offer has become a marketable achievement to showcase the pursuit of energy efficiency and can be a selling feature for properties.
- The offer continues to receive positive feedback from builders. For example, a letter was received from a participant, who shared the following: *“... we are very grateful to the program as well as all of the support that has been provided by it. The one-day design charrette proved extremely valuable in helping us to develop an exceptionally energy efficient design for our building, and the incentives that have been made available from this program have allowed us to further validate our participation in the program, and in our energy efficient design choices.”*
- In an effort to continue to build offer awareness throughout the building community, Enbridge has undertaken significant efforts to build relationships through industry associations and sponsorship support as a primary channel to market. SBD has been offered for five years and has evolved to include projects across the building industry, such as multi-residential buildings, academic and government facilities, and hospitals. Enbridge also increased its focus on adult lifestyle and long term care facilities in light of increased government support in this sector.

- In 2016, SBD was particularly successful in enrolling apartment building projects due to the increasing need to keep utility costs down for owners and operators. Working with these developers in the early design stages of their projects, when changes have a lower associated cost, has been a successful strategy for achieving higher energy efficiency.
- The SBD offer aims to inform participants that achieving higher energy efficiency can be both economical and sustainable. Builders want to take steps to be more energy efficient, particularly in light of increased pressure from local municipalities, but many do not have the knowledge to construct energy efficient buildings. The Savings by Design Commercial offer provides education and expertise to highlight existing and new technologies to achieve energy efficiency for Commercial new construction stakeholders.
- As noted previously, in 2016, Savings by Design won the Quality Urban Energy Systems of Tomorrow (QUEST) Smart Energy Community Award for Utility and Energy Service Providers. QUEST presented the award to recognize leadership and innovation in advancing Smart Energy Communities in Canada.
- Introduced in 2013, “Net Zero” is a label that is being adopted by stakeholders of the building industry, including municipalities, the Home Builders Associations, and the Canadian Green Building Council. Enbridge recognizes there will be a growing need to support builders and developers who are open to investigating moving towards Net Zero, which focuses on buildings that produce as much energy as they use. Initially, the concept of Net Zero was applied to single homes, but now includes six storey wood buildings and will eventually progress to larger buildings. Through the SBD Commercial offer, Enbridge is supporting builders in navigating the path to Net Zero.



- In addition to Energy Quest software, which is the industry standard in new construction modelling, in 2016 Enbridge supported Integrated Environmental Solutions software for increased flexibility in modelling. As well as providing drawings, this software can be used to consider weather conditions, improving successful design with all Part 3 buildings.

- With the impending Ontario Building Code change, builders in 2016 were highly receptive to learn how to achieve greater energy efficiency. In January 2017, Ontario Building Code requirements increased energy efficiency by approximately 13% from the 2012 Code. As a result, the Savings by Design Commercial offer will continue in 2017, however, consistent with Savings by Design Residential, Enbridge will change the offer requirement to 15% greater energy efficiency than required under the 2017 OBC as discussed in the Company's Multi-Year DSM Plan 2015-2020.



We make better energy performance possible.

Building for energy efficiency doesn't need to be costly and complicated. The Enbridge **Savings by Design (SBD) program** gives you free access to industry experts and performance incentives for constructing energy efficient buildings beyond code. **Plus, smaller projects can now qualify – we've changed the square footage requirements from 100,000 to 50,000.**

Up to **\$60,000 in incentives** and benefits are available.

The Savings by Design program supports you with expertise and rewards you with performance incentives through the three primary stages of your project:

1. Integrated Design Process (IDP) Benefit – up to \$30,000

The IDP is a full-day workshop with a team of experts, to determine the optimal mix of design elements and technologies to maximize energy and environmental performance. Savings by Design covers all costs of the IDP, up to a \$30,000 value, including:

- Visioning session and report
- Preliminary energy model and IDP energy model
- Integrated Design Process logistics, catering facilitation and design expert fees
- Final IDP report

2. Energy Performance Incentive – \$15,000

Implementing the recommendations from the IDP can qualify you for valuable incentives. Receive **\$15,000** upon the completion of a pre-construction certified energy model that demonstrates that the building will be **built 25% above code**, along with final design stage plans and specifications.

3. Commissioning Incentive – \$15,000

The commissioning process confirms that design, construction and system operations meet the project requirements. Receive **\$15,000** upon the completion of a post construction certified energy model that demonstrates that the building has been built 25% above code, along with the final certified commissioning report.

To get started or to learn more, visit commercial.savingsbydesign.ca



To qualify for the program, your project must be a minimum of 50,000 square feet or aggregate buildings to equal 50,000 square feet or greater. Building(s) must be in the Enbridge Gas Distribution franchise area. In order to receive incentive payments, you must agree to all program terms and conditions, must fully participate in all stages of the program and must meet all program requirements.



7.3 School Energy Competition

<p>Objectives</p>	<p>This offer is aimed at educating and empowering students to take action on energy use within their schools, homes and communities. The offer builds on the premise that students are the future leaders of society and influencing energy management awareness, education, and behavior from a young age will help to permeate deeper values of conservation in society.</p>
<p>Target Customer</p>	<p>This offer is targeted to primary and secondary schools, which are primarily Rate 6 customers.</p>
<p>Metrics</p>	<p>Participants eligible for this offer are schools that register, implement activities, and have access to an Energy Management Information System (EMIS) to track natural gas consumption. Participating schools must be part of a school board within one of the publicly funded systems in the Enbridge franchise area in Ontario.</p>
<p>Offer Description</p>	<p>The School Energy Competition (SEC) was launched in 2016 to increase engagement in conservation initiatives. The offer focused on students and teachers, providing them with information on energy use generally, and natural gas in particular, including safety, conservation, and greenhouse gas emissions. Educational efforts are intended to build awareness of energy efficiency and begin to influence behavioural modification. At the high school level, for grades 9 -12, Enbridge sponsors an annual competition to encourage participation through a combination of engaging activities, behavioural changes, and educational challenges.</p> <p>To facilitate the offer, Enbridge employs an EMIS to provide a web-based dashboard that illustrates the school’s gas consumption, its baseline usage prior to enrolling in the competition, and gas usage</p>



	<p>relative to conservation goals. The objective is to have students gain a deeper understanding of how their school consumes energy and how their actions can reduce energy consumption. Marketed under the Energy School Challenge (the “Challenge”), which engaged schools in a friendly competition, the offer has five main elements:</p> <ul style="list-style-type: none"> i. Education – An educational component was developed for grades 9-12 for the 2016/2017 school year. The curriculum was developed to focus on real world energy consumption and follows two young adults moving into their first apartment. The curriculum covers everything from natural gas safety to understanding how consumers utilize and are billed for natural gas. An interactive website and energy dashboard provided participants with energy efficiency tips at school and at home. In addition, educational materials were developed to highlight residential consumption for the students to consider in their own homes. ii. Behavioural Change – Community based social marketing (CBSM) research indicates that goal-setting and providing rewards and community awareness is an effective behaviour change tool. In addition to promoting events such as Sweater Day in schools to encourage reduction in heating, specific actions and topic areas that were targeted include: <ul style="list-style-type: none"> o Building envelope – reducing consumption via windows/door openings; o Safety – natural gas safety in schools and homes; o Water conservation; and, o Utilization of social media and dashboards to keep students engaged in the competition. iii. Implementation of Activities – Students were encouraged to complete an Activities List to achieve points in the Challenge.
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	<p>Activities included:</p> <ul style="list-style-type: none"> ○ Participation in or staging an event for Earth Day; ○ Completion of home energy audits by students; ○ Creation of an Energy Savings Plan for the school ○ Creation of a Communications Strategy to implement the energy savings plan, utilizing various posters, assemblies, or guest speakers to encourage energy and water conservation; ○ Participation in Earth Hour events; and, ○ Submissions for Enbridge to utilize and promote participating schools' engagement on social media <p>iv. Monitoring – Upon registering, schools were provided access to an EMIS dashboard and meters were supplied by Enbridge to support consumption tracking. Dashboard information provided historical consumption comparisons for participating schools.</p> <p>v. Performance – Individual schools were scored on the implementation of activities and the achievement of energy savings in the school.</p> <p>Enrollment entails a signed application from the school board and a signed participation agreement from the individual school (the participant).</p>
<p>2016 Results</p>	<p>As detailed in Table 7.0 above, 25 schools participated in 2016, representing 7 different school boards across the Enbridge franchise.</p>

2016 Commentary and Lessons Learned

- SEC launched in 2016 with great success. In order to accommodate available URLs, the offer launched under the banner of Energy School Challenge.
- Participating schools received a welcome package, including prizes to support student activities. The three winning schools were selected based on their final points achievement in the Challenge. The top schools completed multiple recommended activities, including:
 - Conducting a School Energy Audit;
 - Creating a Communications Strategy;
 - Creating an EcoTeam;
 - Developing an Energy Savings Action Plan; and,
 - Completing an Art Project.

The graphic features a central illustration of an owl wearing a yellow graduation cap. To the right of the owl are several colored pencils pointing right, each with a text label: a green pencil labeled 'Create a Green Team', a dark grey pencil labeled 'Natural Gas Safety Day', an orange pencil labeled 'Student Home Energy Audits', a yellow pencil labeled 'Earth Day Activities/Events', a dark blue pencil labeled 'Ugly Sweater Day', and a red pencil labeled 'Tracking Energy Performance'. To the right of these pencils are two dark grey boxes. The top box is titled 'Additional Activities Include:' and lists: 'Energy Savings Action Plan', 'Ongoing Energy Performance Walkthrough', 'Art Projects: What does conservation mean to me? Offsite Energy Efficiency Day.', 'Leverage various communication mediums', 'Natural Gas Educational workshop', and 'Completing Enbridge Curriculum'. The bottom box is titled 'Connect With Us!' and contains the text: 'During the Challenge you can gain extra points by using key hashtags—keep an eye on our Twitter and Instagram accounts!' followed by the Instagram handle '@EnbridgeGas' and the Twitter handle '@EnbridgeGasNews'. At the bottom of the graphic is a dark blue banner with the website address 'www.energyschoolchallenge.com' in white text.



- Overall, engagement in Challenge activities was excellent and participants provided positive feedback. As an example, one of the school's Green Team student leads submitted *"On behalf of the students and staff at ... we would extend a big thank you for supporting our efforts with the Enbridge Energy Challenge. The BBQ was a big success and our students got a chance to see their peers as leaders capable of creating change in their own community. The Eco team is already planning for next year's challenge with great enthusiasm. Events ... inspire students to get involved in leadership opportunities which promote self-confidence and stewardship."*
- Through the offer, the schools were provided templates to support activities, for example the development of a Green Team Communications plan and submissions from the schools were unique and well thought out. Schools were encouraged to complete art projects, in one case, a school developed a video, while another school created an art installation within their main lobby. An innovative and tech savvy school created an online quiz for students to take as part of their Earth Day events supported by prizes provided through the offer.
- Enbridge has shared some of the competition submissions on their Instagram and Twitter feeds (@enbridgegas). By utilizing social media as a tool, the Challenge has appealed to its youth participants. Students were encouraged to share posts that had been approved by the schools, school boards, and Enbridge.
- Enbridge was keenly interested in feedback from first year participants so the Company solicited and received suggestions for further improvement. For example, teachers suggested compressing audits to one page or making audits available online to reduce printing costs for teachers and schools. In addition, teachers suggested creating an online enrollment for teachers and green teams.



- Since this was the first year Enbridge offered SEC, there were many lessons learned.
 - Of note, the time required for school boards to approve the Energy School Challenge was much longer than originally estimated. This delay limited opportunities for the schools to participate due to the registration deadline and school year limitation. Moving into 2017, Enbridge is better able to meet the school board's schedule requirements.
 - It is clear that students and teachers are better engaged with programs that focus on online, interactive platforms. Enbridge put significant efforts into interactive website development for the Challenge. Enbridge will utilize social media and online platforms wherever possible to appeal to the younger demographic and remain mindful of school's monetary restraints.
 - Enbridge provided the schools with an energy dashboard, which students were able to use to view their natural gas consumption online. However, Enbridge was unable to track the schools that were accessing the energy dashboard due to the limitations of the software provider. In addition, meter limitations caused some schools to access delayed data. In 2017, Enbridge will explore leveraging school boards to provide their own dashboards and work with them to improve these systems by upgrading meters with wireless automatic meter readers where necessary.
 - One of the key findings in 2016 was that students should be the champions of this program, whether through their classes or their Green Teams. Students have little to no control over the operation of the school, therefore increasing the emphasis on the activity portion of the Challenge can allow students to feel empowered to make a positive change.



- Enbridge is exploring potential changes to the Challenge in 2017, such as:
 - Making participation more inclusive, by allowing all schools (elementary as well as secondary school) to participate in 2017.
 - Introducing elementary school curriculum based activities where energy efficiency is a focus.
 - Altering the points scoring system for the Challenge to put more emphasis on the engagement of students through the implementation of activities. This will be significant in promoting energy conservation awareness and behaviour changes, and will allow the schools with high participation to be rewarded for their efforts.

7.4 Run it Right

<p>Objectives</p>	<p>The goal of the Run it Right offer is to engage Commercial and smaller Industrial customers in the pursuit of enhanced energy performance. RiR supports this outcome through the identification of low cost/no cost operational improvement opportunities, monitoring, measurement, and benchmarking.</p> <p>Along with energy savings opportunity assessments and the identification of low cost/no cost operational improvement measures, this offer promotes the awareness and visibility of building consumption patterns through an EMIS. Ultimately, this offer aims to lead customers toward data-driven decision-making.</p> <p>The objective of RiR is to align with the Board’s identified priority for the utilities’ 2015 – 2020 Program, as outlined in the Framework, specifically implement DSM programs that are evidence-based and rely on detailed customer data.</p>
<p>Target Customer</p>	<p>This offer is available to customers in the Rate 6, 110, 115, 135, 145, and 170 classes. More specifically, the offer is designed for energy</p>

	<p>managers and building operators of commercial and small industrial buildings where daily consumption data is accessible.</p>
<p>Metrics</p>	<p>As part of the MTEM scorecard, the RiR offer includes a participant metric. In addition, gas savings resulting from operational improvements identified through this offer also contribute to the CCM metric in the RA scorecard in the year following implementation.</p>
<p>Offer Description</p>	<p>Run it Right supports building managers through the identification and implementation of no cost/low cost operational improvements and facilitates continuous monitoring to increase and maintain efficiency. Efforts can help lower operating costs, improve occupant comfort and functionality of building systems, as well as identify future capital improvements. The RiR offer is designed to motivate customers to optimize the operation of their buildings. The provision and analysis of detailed energy data aims to allow building operators and managers to make strategic data-driven decisions regarding energy savings and future capital investments.</p> <div style="text-align: center;"> <p style="text-align: right; color: orange;">Support Every Step of the Way</p> </div> <ul style="list-style-type: none"> • <i>Free</i> Building Investigation by our Investigation Agents • Receive an Investigation Report including: <ul style="list-style-type: none"> • Energy consumption analysis & load profile • List of operational opportunities & recommendations • Implementation incentive between \$2,500 to \$10,000* depending on building consumption and complexity. • Receive a customizable checklist and calculation tool to select measures with your Service Provider/Contractor • <i>Free</i> access to an Energy Management Information System (EMIS) for the 12 month monitoring term • Training and Support <p>Following enrollment, Enbridge’s Investigation Agents take participants through a facility investigation. Upon completion, an</p>



	<p>Investigation Report is generated outlining facility specific measures (low cost/no cost operational improvements) recommended for the achievement of energy savings. In support of this effort, Enbridge provides incentives to offset the implementation cost of identified improvements. RiR participants are provided free access to an EMIS, which allows for the analysis of consumption data (relative to a baseline) to illustrate the impact of improvements over a one year monitoring period. Ongoing consumption data tracking occurs through a 3rd party EMIS for all participants.</p> <p>The 2016 participant results captured in the MTEM scorecard are based on customers that implemented measures identified in the RiR offer during the 2016 calendar year. Gas savings associated with improvements undertaken by customers who enrolled in 2015 and completed the implementation of measures are included in 2016 towards the CCM metric of the Resource Acquisition scorecard.</p> <p>Applicant information includes site address and building details, also consumption information and meter type are tracked. In addition, details regarding recommendations made by the investigation agent conducting the assessment, milestone dates, measures implemented and incentive amounts are recorded.</p> <p>A third party firm is retained to determine the claimed savings for the RiR offer. Gas consumption data for the 12 months prior to implementation (the base year) is used as the base case. Gas consumption is then monitored for 12 months following implementation (the reference year). Gas savings results are weather normalized and are based on a standardized statistical regression analysis for each participant. Final regression analysis reports for each participant are completed and calculated savings are tracked.</p>
<p>2016 Results</p>	<p>As outlined in Table 7.0 above, 84 participants enrolled and</p>



	<p>completed implementation in the RiR offer in 2016, exceeding the MTEM scorecard participant target. Gas savings achieved through the operational improvements implemented by these customers will be assessed in 2017 following the monitoring period.</p> <p>For RiR participants who enrolled in the offer and implemented measures in 2015, a total of 1,937,342 CCM of net natural gas savings was achieved contributing to the RA scorecard CCM metric, as outlined in Table 7.1. The volumetric savings of 1.94 million CCM were achieved by 39 eligible participants. A further 24 participants were deemed ineligible for savings verification as they either undertook capital projects (19 participants) or were statistically insignificant (5 participants). In 2016, average savings were 6.1%.</p>
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Table 7.1 2016 Run it Right Results


Resource Acquisition	2016 Net CCM (m ³)	# of Projects	TRC-Plus Ratio	PAC Ratio
<i>Run It Right</i>	1,937,342	39	0.7	0.7

2016 Commentary and Lessons Learned

- RiR is a highly resource intensive offer. Beginning with customer engagement, enrollment, investigation of facilities, implementation of measures, provision of data and investigation reports, through to consumption monitoring and the calculation of gas savings, the offer demands a significant commitment from customers and utility staff alike. Further, the offer spans multiple calendar years and, in order to quantify only operational improvement, requires that customers do not plan to undertake capital improvements during the monitoring period. Operational improvements do not generally drive significant gas savings. For this reason, it is important to recognize that beyond the CCM savings generated through the offer, the education provided to participants, their increased understanding of energy usage, and the identification of further energy efficiency

opportunities, provides significant value in influencing customers towards energy awareness and data driven decision making.

- Customers have responded positively to RiR, as the process encourages participants to achieve gas savings through the implementation of low cost/no cost operational improvements. Despite the perceived ease of identifying such opportunities, improvements recommended through the identification process would have gone undiscovered without RiR's focus on building optimization.
- In previous years, Enbridge identified that despite many customers who showed initial interest and had an investigation completed, some of these customers were unable or unwilling to follow through and complete implementation. As an example, in 2015, there were 49 customers who agreed to participate in investigations, but did not proceed with the implementation of measures. In 2016, Enbridge continued to work to mitigate this challenge by increasing participant engagement through training, follow up visits from investigation agents, and increased support from Enbridge ESCs. Improved outreach has had a positive impact on ensuring customers follow through with implementation of measures.



The graphic features a background of vibrant autumn leaves in shades of orange, yellow, and red. In the top left corner is the ENBRIDGE logo with the tagline "Life. Texas Energy." below it. In the top right corner, the text "Run it Right" is displayed in a white, sans-serif font. The main text "Back to Heating Season" is written in a large, bold, white font across the center of the image.

Hard to think with the current temperatures, that in just a few weeks we will be back into the heating season. During the heating season approximately **80%** of your natural gas bill will be from heating your facility. We can help you to reduce your consumption through low cost/no cost operational improvements.



- In an effort to further improve converting enrolled customers through to implementation, processes were revised in 2016. The incentive structure was modified to streamline payments after all implementation is completed.
- Enbridge has focused efforts on training customers on the value of the EMIS to encourage continuous energy savings throughout the monitoring term. The offer provides participants with monthly performance updates, in addition alerts are sent to participants when their consumption exceeds expected usage to provide an opportunity for investigation. Participants who utilize the system have a better understanding of their energy consumption to facilitate adjustments for improvements throughout the monitoring term.
- Training and webinars remain a positive engagement piece with participants. In 2016, Enbridge developed and delivered Builder Operator training to four municipalities in ten different sessions. This training is intended to provide municipal building operators with the understanding of how to ensure learnings through RiR persist beyond the scope of the offering.
- Assessing and interpreting metered data to determine RiR savings remains challenging. Although metered data reflects building consumption, it does not necessarily reflect the building and operating conditions that can change daily, monthly, or yearly. Because operational improvements only generate small savings relative to capital improvements, isolating those savings can be challenging using metered data.
- Participation in the RiR offer requires customers do not undertake capital projects. This expectation remains a large barrier to offer participation and calculating savings. Enbridge continues to explore how to appropriately apply a methodology to capture concurrent operational and capital savings.



- For 2017, delivery of the offer will be modified. Third party contractors (Efficiency Partners) will have the ability to work with their existing customers to deliver the offer. Previously, participation was limited to requiring use of an Enbridge contracted Investigation Agent assigned to complete the investigation. Moving forward, Enbridge customers will have flexibility to work with the Efficiency Partner of their choice for all steps of the offer.

- RiR will continue to be an important facet of the 2017 portfolio. The offer not only provides important educational benefits and training for commercial building operators but the objectives of the RiR offer align with the Board's identified priority for the utilities' 2015 – 2020 Program, as outlined in the Framework, specifically, *“Implement DSM programs that are evidence-based and rely on detailed customer data.”*



7.5 Comprehensive Energy Management

<p>Objectives</p>	<p>The goal of Enbridge’s Comprehensive Energy Management (CEM) offer is to help customers reduce operational costs by presenting energy as a controllable input cost, and seek to create a sustainable culture of energy efficiency. This offer intends to build and expand on the Company’s existing offers to guide and help customers with a structured approach to identifying, quantifying and implementing energy efficient measures.</p>
<p>Target Customer</p>	<p>The CEM offer is targeted to Commercial and Industrial consumers in the rate classes 6, 110, 115, 135, 145, and 170. The primary target market is Industrial and Institutional customers.</p>
<p>Metrics</p>	<p>As part of the MTEM scorecard, the CEM offer has a participant metric. In addition, gas savings results identified through participation in CEM also contribute to the CCM metric in the RA scorecard following implementation.</p>
<p>Offer Description</p>	<p>As a facilitator and educator, Enbridge leads and assists customers through a set of tools, guidelines, resources and technical expertise, to support a sustainable culture of energy efficiency for the client.</p> <p>Enbridge works with participants in the offer by examining their unique energy usage, creating an energy model, and guiding customers to undertake recommended actions suitable to their operation, including:</p> <ul style="list-style-type: none"> • Make energy usage a specific performance goal; • Provide resources to follow through with energy management; • Create energy or sustainability teams (at least one dedicated energy manager or champion who allocates some time towards energy efficiency activities);



	<ul style="list-style-type: none"> • Demonstrate commitment to improve operations and maintenance practices; • Provide the data for Enbridge to create an energy consumption model and be willing to invest in energy management tools, as applicable, to better control and manage their energy; and, • Participate in training to support sustained energy management. <p>Energy Solution Consultants have established relationships with the majority of the target customer base. Therefore, the ESCs serve as the primary point of contact for customers. Through the CEM offer, ESCs further engage with participants both at the energy manager and senior management levels to develop and reinforce their corporate energy plans and identify energy goals. Depending on the requirements of each CEM participant, ESCs help customers justify energy management activities and resource needs based on their business.</p> <p>CEM offers financial incentives as follows:</p> <ul style="list-style-type: none"> • Funds to offset the cost of energy assessments and monitoring systems where necessary • Incentives for gas savings achieved through identified projects • Funds to promote energy awareness and encourage energy efficiency training
<p>2016 Results</p>	<p>As outlined in Table 7.0, seven participants enrolled in the CEM offer in 2016, achieving the target.</p>

2016 Commentary and Lessons Learned

- In 2016, Enbridge's ESCs enrolled seven customers to participate in the Comprehensive Energy Management offer. As a first step, Enbridge undertook a



detailed analysis of the energy consumption of each participant with the objective of creating a representative energy model for each facility based on energy use, production data, and weather data. This model served as the basis to determine where energy management efforts should be focused as well as identifying specific opportunities for potential improvements.

- The overriding objective of CEM is to help customers reduce operational costs by presenting energy as a controllable input cost that can be monitored through energy management practices. As a starting point, participation in CEM provides customers with a roadmap to guide them through energy based decisions and to support building a culture of sustained energy efficiency at the customer facility. Commitment to energy efficiency investments, however, is often dependent on the customer's operational cycle, which can be several years. Energy management is a transformational process, which requires a multi-year commitment in effort, time, and funding. As a result, through the offer, ESCs will continue to work with participants to support actionable energy improvements beyond the first year of participation.

- In some cases, where energy use is complex, Enbridge has recommended that there is value in installing an EMIS system. Enbridge has learned, however, that some customers have had difficulty obtaining corporate approval for the funding of these systems despite the assistance of Enbridge incentives, particularly when compared to undertaking other capital investments. In these cases, for modelling and monitoring purposes, Enbridge and the customer have continued to utilize existing on-site metering and data collection infrastructure. Though not optimal, this has reduced some of the financial commitment while also involving the customer in energy management practices.

- For first year participants, while working with existing data has allowed Enbridge to create natural gas consumption models on a facility level, looking forward, ESCs will focus on identifying any additional metering structure needed to create

energy models on a smaller scale. It is anticipated this may be more impactful in allowing detailed day-to-day operations to be analyzed and further identify opportunities for improvements.

- Customers often do not recognize the value of adopting a formal energy management plan. Looking forward, Enbridge will need to continue to leverage opportunities to educate target customers about CEM and the benefits of creating a sustainable culture of energy efficiency. In 2016, Enbridge gave presentations on the CEM offer at the following events:
 - The Enbridge sponsored bi-annual Energy Summit
 - The feature presentation at the Energy Into Action forum
 - The Canadian Manufacturers & Exporters (CME) Energy Conference
 - The Greening Healthcare workshop
 - Enbridge hosted Customer Workshops

Our Approach

Comprehensive Energy Management Program

Whether for environmental stewardship, emission reduction or cost savings purposes, managing energy is becoming increasingly important in industrial settings.

Succeeding in energy management requires the ability to set the right strategy and make it happen. Enbridge Gas Distribution's Comprehensive Energy Management (CEM) Program is designed to help you do just that. Through the program, you will gain a better understanding of your key energy drivers so you can shape your energy goals and set the right strategy.

The program will also help you "make it happen" by ensuring you put an action plan in place that is flexible and responsive enough to withstand changing business conditions.

CEM Program participants will:

- Identify key energy drivers and establish baselines
- Identify areas of improvement and set targets to:
 - Reduce energy consumption and emissions
 - Improve process efficiencies and productivity
 - Save money across the organization
- Empower and engage employees to work together towards a common energy saving goal





- As Enbridge continues to refine this offer and determine how to best assist customers, the Company's intention ultimately is to change energy management in participant's facilities from a transactional activity to a transformational one. Enbridge will accomplish this by making energy a visible, and therefore controllable, input for the customer. Success with the offer will also entail setting up a structure within the customer's operation, which adds an energy element to all existing jobs rather than a single job function. Recognizing this is not a one year effort, Enbridge's ESCs will continue to help CEM participants to achieve this in years ahead.



8. Lost Revenue Adjustment Mechanism Variance Account

The Lost Revenue Adjustment Mechanism (LRAM) allows the Company to recover the lost distribution revenue associated with DSM activity. The LRAMVA is a mechanism to adjust for margins the utility loses/gains if its DSM program is more/less successful in the period after rates are set than was planned in setting the rates. As outlined in the Guidelines, LRAMVA is used to track, by rate class, the impact of DSM activities undertaken in relation to the forecasted impact included in distribution rates.

LRAM is calculated using the volumetric impact of the measures implemented on a monthly basis over the course of the program year. The LRAMVA amount is an adjustment which may be an amount refundable to, or receivable from, the Company's customers (depending on whether the actual natural gas savings resulting from the natural gas utility's DSM activities are less than or greater than what was included in the forecast for rate-setting purposes). The 2016 LRAM calculation is provided in Table 8.0.

Table 8.0 2016 LRAM Calculation

2016 Annual Report LRAM Calculation						
Rate Class	Based on		Volume Variance	56,548,757 Distribution Margin	FE m3 built into rates LRAM Allocation \$	Actual LRAM \$
	Budget Net Partially Effective	Actual Net Partially Effective				
Rate 110	1,776,378	498,134	(1,278,243)	1.8530	(\$23,685)	\$9,230
Rate 115	1,130,422	122,241	(1,008,181)	0.9782	(\$9,862)	\$1,196
Rate 135	0	17,840	17,840	1.6703	\$298	\$298
Rate 145	1,921,039	16,542	(1,904,497)	1.9652	(\$37,428)	\$325
Rate 170	3,956,478	499,760	(3,456,717)	0.7217	(\$24,947)	\$3,607
Totals	8,784,317	1,154,518	(\$7,629,799)		(\$95,625)	\$14,656
					Amount to be paid back to Ratepayers	\$95,625
* Rate 1 and Rate 6 are not included in the LRAM amount for clearance above as these rate classes are covered under the Average Use True-Up Variance Account (AUTUVA)						



9. DSM Shareholder Incentive

Enbridge earns a shareholder incentive based on its performance against targets outlined for Resource Acquisition, Low Income and Market Transformation scorecards. The DSM Incentive provides that incentive to the Company in relation to its DSM activities. Further to approved amounts outlined in EB-2015-0049, Table 9.0 summarizes how the maximum incentive available in 2016 is allocated across each program.

Table 9.0 2016 DSM Maximum Incentive Allocation

Program	Maximum Incentive Available
<i>Resource Acquisition</i>	\$6,787,943
<i>Low Income</i>	\$2,361,462
<i>Market Transformation</i>	\$1,300,595
	\$10,450,000

Scorecard results and the corresponding DSMI earned for each program is detailed in the following tables.

Table 9.1 2016 Resource Acquisition Scorecard & DSMI

Resource Acquisition						
Component	Metric	Weight	Targets			2016 Result
			Lower Band	Target	Upper Band	
Large Volume Customers	<i>Cumulative Savings (million m³)</i>	40%	249.1	332.2	498.3	328.75
Small Volume Customers	<i>Cumulative Savings (million m³)</i>	40%	224.2	298.9	448.4	394.82
Deep Residential Savings	<i>Participants</i>	20%	6,194	8,259	12,389	12,986
Total Weighted Scorecard Target Achieved						123.9%
Scorecard Incentive Achieved						\$4,658,886



Table 9.2 2016 Low Income Scorecard & DSMI

Low Income						
Component	Metric	Weight	Targets			2016 Result
			Lower Band	Target	Upper Band	
Single Family (Part 9)	Cumulative Savings (million m ³)					28.81
Multi-Residential (Part 3)	Cumulative Savings (million m ³)					84.73
New Construction	Participants					6
Total Weighted Scorecard Target Achieved						109.5%
Scorecard Incentive Achieved						\$1,214,842

Table 9.3 2016 Market Transformation Scorecard & DSMI

Market Transformation						
Component	Metric	Weight	Targets			2016 Result
			Lower Band	Target	Upper Band	
Residential Savings by Design	Builders	10%	25	33	50	31
	Homes Built	15%	2,063	2,751	4,127	2,206
Commercial Savings by Design	New Developments	25%	25	33	50	43
School Energy Competition	Schools	10%	41	55	83	25
Run it Right	Participants	20%	62	83	124	84
Comprehensive Energy Management	Participants	20%	5	7	11	7
Total Weighted Scorecard Target Achieved						98.6%
Scorecard Incentive Achieved						\$492,023

Table 9.4 2016 DSMIDA Summary

Program	DSMIDA by Program
Resource Acquisition	\$4,658,886
Low Income	\$1,214,842
Market Transformation	\$492,023
TOTAL	\$6,365,751



10. 2016 Budget and Program Spending

10.1 Budget

Table 10.0 provides the 2016 DSM budget as outlined in the 2015-2020 Multi-Year DSM Plan (EB-2015-0049). The Board approved a 2016 budget of \$56,361,117 in its Decision on January 20th, 2016.

Table 10.0 2016 DSM Plan Budget

Program	Program Budget	Overheads	Total Budget
<i>Resource Acquisition</i>	\$29,303,625	\$5,033,048	\$34,336,673
<i>Low Income</i>	\$10,201,788	\$1,743,622	\$11,945,410
<i>Market Transformation</i>	\$5,614,683	\$964,351	\$6,579,034
Total Program Budget	\$45,120,096	\$7,741,021	\$52,861,117
<i>Portfolio Overheads</i>			\$3,500,000
Total 2016 DSM Budget			\$56,361,117



10.2 2016 Spending

Table 10.1 2016 OEB Approved Budget vs. Spending

Program	OEB Approved Budget (Built Into Rates)	2016 Spending	Variance
Resource Acquisition	\$34,336,673	\$38,867,717	\$4,531,044
Home Energy Conservation	\$12,148,317	\$22,057,458	\$9,909,141
Residential Adaptive Thermostats	\$876,371	\$1,666,753	\$790,382
Commercial & Industrial Prescriptive	\$2,196,952	\$1,001,671	-\$1,195,281
Commercial & Industrial Custom	\$7,020,664	\$6,746,119	-\$274,545
Commercial & Industrial Direct Install	\$4,955,421	\$2,390,902	-\$2,564,519
Small Commercial New Construction	\$396,933	\$0	-\$396,933
Energy Leaders (Large & Small C/I)	\$400,000	\$73,775	-\$326,225
Run it Right (RA)	\$1,260,162	\$300,962	-\$959,200
Comprehensive Energy Management (RA)	\$48,805	\$0	-\$48,805
Overheads	\$5,033,048	\$4,630,077	-\$402,971
Low Income	\$11,945,410	\$8,732,572	-\$3,212,838
Home Winterproofing	\$5,806,064	\$4,543,350	-\$1,262,714
Low-Income Multi-Residential - Affordable Housing	\$3,279,028	\$2,326,325	-\$952,703
Low-Income New Construction	\$1,116,696	\$258,877	-\$857,819
Overheads	\$1,743,622	\$1,604,019	-\$139,603
Market Transformation	\$6,579,034	\$6,377,381	-\$201,653
Residential Savings by Design	\$3,250,842	\$3,469,121	\$218,279
Commercial Savings by Design	\$1,345,890	\$1,398,940	\$53,050
School's Energy Competition	\$302,197	\$289,555	-\$12,642
Run it Right (MT)	\$250,824	\$225,819	-\$25,005
Comprehensive Energy Management (MT)	\$464,930	\$106,806	-\$358,124
Overheads	\$964,351	\$887,140	-\$77,211
Program Cost Subtotal	\$45,120,096	\$46,856,434	\$1,736,338
Overhead Subtotal	\$7,741,021	\$7,121,236	-\$619,785
Portfolio Overheads	\$3,500,000	\$1,670,616	-\$1,829,384
Total	\$56,361,117	\$55,648,285	\$712,832

As outlined in Table 10.1 above, total spending in 2016 amounted to \$55,648,285.

10.3 Collaboration and Innovation Fund

In the DSM Multi-Year Framework (2015-2020), released December 22, 2014, the Board gave strong indications to the gas utilities to pursue greater coordination and integration with electric distributors on key energy efficiency and conservation programming. In Enbridge's Multi-Year Plan, the Company highlighted its current

involvement in discussions with electric Local Distribution Companies LDCs for collaborative Conservation and Demand Management programs and pilots, as well as the Company's intent to explore greater integration with CDM activities throughout the 6-year Plan.

In the Plan, the Company proposed the creation of a Collaboration and Innovation Fund (CIF) that would give the Company flexibility to commit to pilot funding opportunities from electric LDCs and other ongoing developments of innovative initiatives and research. In the Decision and Order, released January 20, 2016, the Board approved Enbridge's proposal for a \$6 million fund to be spent over the term of the 2015-2020 Multi-Year DSM Plan.⁸

Spending in 2015 was limited and largely focused on identification and planning of collaborative pilots and initiatives for 2016 and beyond, as the CIF had not yet been approved. In 2016, the Company was approved to spend the CIF on development and implementation of collaborative pilots and initiatives. Several initiatives funded in 2016 were focused on raising the level of awareness and engagement on joint gas and electric programming. These initiatives were undertaken to generate gas and electric savings, and serve as templates for future collaborative programming with other electric LDCs.

In collaboration with industry partners, CIF funding was also directed towards the exploration and research of new and innovative technologies with the potential for greater gas reduction to enhance future DSM programming. The introduction of Cap and Trade increased the significance of DSM for customers and as a result has created a need to expand the Company's efforts towards greater research and innovation in reducing natural gas consumption.

Table 10.2 provides an outline of the collaboration, innovation and research efforts undertaken by Enbridge in combination with various electric LDCs and industry partners

⁸ Decision and Order (EB-2015-0049); Ontario Energy Board, page 82.



throughout 2016. It is not a comprehensive listing of all collaboration and innovation efforts undertaken by the Company, but rather the initiatives and pilots that received funding from the CIF in 2016.

Table 10.2 CIF Overview

Partner	Customer Segment/ Topic	Overview
IESO and Union Gas	Residential	On June 10, 2016 the Ministry of Energy directed the IESO to deliver a province-wide whole home CDM pilot in coordination with natural gas distributors. ⁹ Enbridge, Union Gas and the IESO partnered to deliver the Whole Home Pilot. Leveraging the program infrastructure of the Home Energy Conservation offer, the pilot offers a province wide delivery offering of both gas and electric savings.
Toronto Hydro	Residential	Enbridge collaborated with an electric LDC to deliver Enbridge’s Adaptive Thermostats program. The dual-fuel savings generated by the technology makes it ideal to collaborate on an integrated CDM and DSM program offer.
Toronto Hydro	Low Income	Enbridge and an electric LDC pursued a collaborative delivery model for two separate programs with similar customer eligibility criteria and administrative requirements. Through a joint procurement process, a single delivery agent for the two programs was identified, aiming for cost efficiencies for each utility and enhanced customer experience.

⁹ June 10th, 2016; Ministry of Energy Directive to the Independent Electricity System Operation, Re: Conservation First Framework.



Partner	Customer Segment/ Topic	Overview
Multiple LDCs	Commercial	<p>Enbridge participated in a regional electric LDC energy conservation information and networking event in the Greater Toronto Area. The event connects customers, industry partners and utilities to share industry trends and enhance knowledge sharing and networks.</p> <p>Enbridge participated to provide perspective and influence to a predominately electric conference for a more holistic energy understanding.</p>
Multiple LDCs	Commercial	<p>Enbridge participated in a regional electric LDC energy conservation information and networking event in the Hamilton/Niagara Area. The event connects customers, industry partners and utilities to share industry trends and enhance knowledge sharing and networks.</p> <p>Enbridge participated to provide perspective and influence to a predominately electric conference for a more holistic energy understanding</p>
Multiple LDCs	Commercial	<p>Enbridge partnered with the 13 electric LDCs representing the Greater Toronto Hamilton Area to form an ‘Energy Sales Force.’ The Energy Sales Force developed an online web portal for each utility to provide LDC/gas utility contact and program information, and to encourage leads and opportunities sharing between utilities. The web portal will increase collaboration and knowledge sharing between utilities thus improving the efficiency of program delivery for both DSM and CDM program offerings.</p>
PowerStream	Commercial	<p>Enbridge and an electric LDC collaborated to create a co-branded DCKV campaign for the food service</p>



Partner	Customer Segment/ Topic	Overview
		industry. DCKV is a dual savings technology.
Toronto Hydro	Commercial	Enbridge developed a Combined Heat and Power (CHP) Tool that screens CHP project viability. Enbridge partnered with an electric LDC to give it user rights over the tool. In exchange the LDC provides data and feedback to Enbridge to help refine the tool for accuracy and inform the Company's research on CHP gas savings.
Enersource	Commercial	Enbridge partnered with an electric LDC to deliver energy audits for small and medium Commercial and Industrial customers to identify energy efficiency opportunities for electric and gas savings.
Multiple Industry Partners	Combined Cooling and Heating technology	Multiple industry partners have collaborated to test and validate an in-field demonstration of the May Ruben Thermal Solutions (MRTS) Combined Heating and Cooling technology. Enbridge is looking to test modifications that may increase the overall efficiency of the natural gas components.
Multiple Industry Partners	Canmet ENERGY's Energy Efficiency Workshops	Natural gas utilities provide funding to deliver six workshops across Canada. Enbridge provided funding for the workshop in Ontario to showcase innovative natural gas heating equipment to Canadian homebuilders, including a 'Design Guide' that will demonstrate natural gas equipment for an energy efficient home.
Multiple Industry Partners	Combined Heat and Power	Enbridge is participating in a CHP consortium with a focus on debate and understanding of issues surrounding CHP technologies by a group of key and



Partner	Customer Segment/ Topic	Overview
		diverse industry stakeholders.
Multiple Industry Partners	Micro Combined Heat and Power (MCHP)	A project to test and measure the performance of a micro combined heat and power unit for residential applications. MCHP lends itself well in a heat and power micro-grid system.
Multiple Industry Partners	Natural Gas Heat Pumps	Field tests to inform the potential inclusion of natural gas heat pumps as a cost effective custom DSM measure.

It is important to note that developing a collaborative pilot or testing a new technology can take several years of resources and funding commitments to achieve full implementation. After identifying an opportunity, the time required for the Company to implement a pilot or new technology into the market can extend to several years as initiatives need time to develop a business case, sort process compatibilities, develop comparable evaluation and measurement metrics, sort attribution of savings, and execute legal contracts. Having available budget over a period of time will be paramount to the success of the Company’s collaborative and innovative initiatives. The Company anticipates that CIF spending post-2016 will steadily ramp up as increased work will be needed to fully develop these collaborative templates and research partnerships. The 2016 spending associated with the CIF was \$248,279.

10.4 Demand Side Management IT (DSMIT)

In 2016, Enbridge began working to reach the goal of implementing a new IT application. Following the RFP process that began in 2015, a contract was awarded to start design and blueprint activities in June 2016.

As per the Board's Decision, Enbridge has an annual \$1 million chargeback for DSMIT. In 2016, Enbridge spent \$100,000 in O&M and \$7,000 in capital on DSMIT, primarily on project management and Business Requirement Gathering and Documentation. It is understood that Enbridge may underspend in some years but overspend in other years. Enbridge expects the bulk of the expenditure to take place in 2017, and will include activities such as technical design, development, configuration, and testing.

10.5 Demand Side Management Variance Account

As specified in the Guidelines, the DSMVA "should be used to track the variance between actual DSM spending by rate class versus the budgeted amount included in rates by rate class."¹⁰

The DSM budget built into rates for the 2016 calendar year was \$56,361,117. This amount was provided to Enbridge by the Board in its Decision and Order in EB-2015-0049 on January 20th, 2016.

Table 10.3 shows the variance between the DSM budget built into rates and the 2016 DSM spending (as summarized previously in Table 10.1). The resulting DSMVA for 2016 is \$712,832 (payable to ratepayers).

¹⁰ EB-2014-0134. Filing Guidelines to the Demand Side Management Framework for Natural Gas Distributors (2015-2020), OEB, December 22, 2014, page 38.



Table 10.3 DSMVA Determination: 2016 Spending vs. Amount Built Into Rates

DSM Budget Previously Built Into Rates	2016 DSM Spending	Variance = DSMVA
A	B	Variance = B-A
\$56,361,117	\$55,648,285	-\$712,832

10.6 Demand Side Management Cost-Efficiency Incentive Deferral Account

As noted in the OEB’s revised Decision and Order, dated February 24, 2016, “The purpose of the DSMCEIDA is to record, as a credit in Deferral Account No. 179-046, the differences between Enbridge Gas Distribution Inc.’s (Enbridge or the Company) annual approved DSM budget and the actual amounts spent to achieve the total aggregate annual lifetime savings (cumulative cubic meters of natural gas, or CCM) targets made up of all 100% CCM targets across all programs, in accordance with the program evaluation results.”¹¹

For the 2016 program year, Enbridge is not proposing any amount be recorded in the DSMCEIDA.

¹¹ EB-2015-0049, Decision and Order, OEB, February 24, 2016, page 6.



10.7 DSM Rate Allocation

Table 10.4 illustrates the allocation to rate classes of the DSM Variance Accounts.¹²

Table 10.4 2016 Rate Allocation

Rate Class	DSMIDA	LRAMVA ^{1 2}	DSMVA	TOTAL
Rate 1	\$4,351,434	N/A	\$8,533,554	\$12,884,989
Rate 6	\$1,745,165	N/A	-\$7,697,178	-\$5,952,013
Rate 9	\$208	\$0	-\$726	-\$517
Rate 100	\$0	\$0	\$0	\$0
Rate 110	\$127,420	-\$23,685	-\$135,140	-\$31,406
Rate 115	\$54,497	-\$9,862	-\$740,365	-\$695,731
Rate 125	\$7,815	\$0	-\$39,641	-\$31,827
Rate 135	\$8,753	\$298	-\$222,707	-\$213,656
Rate 145	\$8,638	-\$37,428	-\$422,424	-\$451,213
Rate 170	\$58,591	-\$24,947	\$23,041	\$56,685
Rate 200	\$2,709	\$0	-\$9,433	-\$6,723
Rate 300	\$521	\$0	-\$1,814	-\$1,293
Total	\$6,365,751	\$95,625	\$712,832	\$5,557,294

1. Rate 1 and Rate 6 are not included in the LRAM amount as these rate classes are covered under the Average Use True-Up Variance Account (AUTUVA).

2. Rates 9, 125, 200 & 300 do not have any LRAM component in the rate allocation since customers in these rate classes are not eligible for DSM programs. These rate classes will however be subject to rate allocations for DSMVA and applicable DSMIDA related to Low Income Program.

¹² As in prior years, Low Income DSM spending is allocated to all rate classes, to be consistent with the electricity conservation framework, as well as the LEAP Emergency Financial Assistance program. Allocation for the LEAP fund was outlined in EB-2008-0150 Report of the Board: Low Income Energy Assistance Program, Section 5.1.1 Funding LEAP, page 11.

Appendix A: Input Assumptions

On December 16th, 2015, Enbridge Gas Distribution Inc. and Union Gas Limited submitted a joint application which sought approval from the Ontario Energy Board for new and updated Demand Side Management measures. The Board assigned file number EB-2015-0344 to this application.

Input assumptions for the 2016 program year were based on EB-2015-0344. In the application, Enbridge and Union stated that a Technical Reference Manual (TRM) would be finalized and submitted to the Board in 2016. In anticipation of that upcoming submission, the Board issued a letter on April 26th, 2016, stating that a review of the December 16th, 2015 joint application was not required and instead the Board would provide further direction once the TRM was filed, including all substantiation documents as well as net-to-gross adjustment factors and any other assumptions.

The contents of EB-2015-0344 were again included in the December 21st, 2016 submission (EB-2016-0246) which included the full TRM, The Board approved those original input assumptions in its Decision on June 22nd, 2017.



Appendix B: 2016 Avoided Costs

The 2016 Avoided Costs used in the determination of 2016 results are included here for reference in the following charts:

2016 Gas Avoided Costs								
Year	Water Heating		Space Heating		Combined Space & Water Heating		Industrial	
	Baseload (\$/m ³)		Baseload (\$/m ³)		Baseload (\$/m ³)		Baseload (\$/m ³)	
	Rate	NPV	Rate	NPV	Rate	NPV	Rate	NPV
1	0.1400	0.1438	0.1600	0.1740	0.1560	0.1688	0.1420	0.1460
2	0.1710	0.3055	0.1890	0.3527	0.1870	0.3457	0.1730	0.3096
3	0.1970	0.4817	0.2210	0.5503	0.2160	0.5388	0.1990	0.4875
4	0.1940	0.6457	0.2170	0.7338	0.2130	0.7189	0.1970	0.6541
5	0.1998	0.8055	0.2235	0.9125	0.2194	0.8944	0.2029	0.8164
6	0.2058	0.9611	0.2302	1.0866	0.2260	1.0652	0.2090	0.9744
7	0.2120	1.1127	0.2371	1.2561	0.2328	1.2316	0.2153	1.1283
8	0.2183	1.2603	0.2442	1.4213	0.2397	1.3937	0.2217	1.2782
9	0.2249	1.4041	0.2516	1.5821	0.2469	1.5516	0.2284	1.4242
10	0.2316	1.5442	0.2591	1.7388	0.2543	1.7054	0.2352	1.5665
11	0.2386	1.6806	0.2669	1.8914	0.2620	1.8552	0.2423	1.7050
12	0.2458	1.8134	0.2749	2.0400	0.2698	2.0010	0.2496	1.8399
13	0.2531	1.9429	0.2831	2.1847	0.2779	2.1431	0.2570	1.9713
14	0.2607	2.0689	0.2916	2.3257	0.2863	2.2815	0.2648	2.0993
15	0.2685	2.1917	0.3004	2.4631	0.2948	2.4163	0.2727	2.2240
16	0.2766	2.3112	0.3094	2.5968	0.3037	2.5476	0.2809	2.3454
17	0.2849	2.4277	0.3187	2.7271	0.3128	2.6755	0.2893	2.4637
18	0.2934	2.5411	0.3282	2.8540	0.3222	2.8000	0.2980	2.5789
19	0.3022	2.6516	0.3381	2.9775	0.3318	2.9213	0.3069	2.6911
20	0.3113	2.7592	0.3482	3.0979	0.3418	3.0395	0.3161	2.8003
21	0.3207	2.8641	0.3587	3.2152	0.3521	3.1546	0.3256	2.9068
22	0.3303	2.9662	0.3694	3.3294	0.3626	3.2666	0.3354	3.0105
23	0.3402	3.0656	0.3805	3.4406	0.3735	3.3758	0.3454	3.1114
24	0.3504	3.1624	0.3919	3.5489	0.3847	3.4822	0.3558	3.2098
25	0.3609	3.2568	0.4037	3.6544	0.3962	3.5857	0.3665	3.3056
26	0.3717	3.3486	0.4158	3.7572	0.4081	3.6866	0.3775	3.3989
27	0.3829	3.4381	0.4283	3.8573	0.4204	3.7849	0.3888	3.4897
28	0.3944	3.5253	0.4411	3.9548	0.4330	3.8806	0.4005	3.5782
29	0.4062	3.6102	0.4543	4.0498	0.4460	3.9738	0.4125	3.6645
30	0.4184	3.6929	0.4680	4.1422	0.4594	4.0645	0.4248	3.7484

The Nominal Inflation Rate used in the table is 2.0%

The Discount factor used in the table is 4.0%



2016 Water and Electricity Avoided Costs																				
Year	Water Heating			Space Heating			Combined Space & Water Heating			Industrial										
	Electricity (¢/kwh)			Water (\$/1000 litre)			Electricity (¢/kwh)			Water (\$/1000 litre)			Electricity (¢/kwh)			Water (\$/1000 litre)				
	Rate	NPV	Rate	NPV	Rate	NPV	Rate	NPV	Rate	NPV	Rate	NPV	Rate	NPV	Rate	NPV	Rate	NPV		
1	0.1225	\$0.12	0.8936	\$0.89	0.1225	\$0.12	0.8936	\$0.89	0.1225	\$0.12	0.8936	\$0.89	0.1225	\$0.12	0.8936	\$0.89	0.1225	\$0.12	0.8936	\$0.89
2	0.1249	\$0.24	0.9114	\$1.76	0.1249	\$0.24	0.9114	\$1.76	0.1249	\$0.24	0.9114	\$1.76	0.1249	\$0.24	0.9114	\$1.76	0.1249	\$0.24	0.9114	\$1.76
3	0.1276	\$0.35	0.9310	\$2.59	0.1276	\$0.35	0.9310	\$2.59	0.1276	\$0.35	0.9310	\$2.59	0.1276	\$0.35	0.9310	\$2.59	0.1276	\$0.35	0.9310	\$2.59
4	0.1310	\$0.47	0.9555	\$3.40	0.1310	\$0.47	0.9555	\$3.40	0.1310	\$0.47	0.9555	\$3.40	0.1310	\$0.47	0.9555	\$3.40	0.1310	\$0.47	0.9555	\$3.40
5	0.1337	\$0.57	0.9750	\$4.18	0.1337	\$0.57	0.9750	\$4.18	0.1337	\$0.57	0.9750	\$4.18	0.1337	\$0.57	0.9750	\$4.18	0.1337	\$0.57	0.9750	\$4.18
6	0.1365	\$0.68	0.9954	\$4.93	0.1365	\$0.68	0.9954	\$4.93	0.1365	\$0.68	0.9954	\$4.93	0.1365	\$0.68	0.9954	\$4.93	0.1365	\$0.68	0.9954	\$4.93
7	0.1393	\$0.78	1.0159	\$5.65	0.1393	\$0.78	1.0159	\$5.65	0.1393	\$0.78	1.0159	\$5.65	0.1393	\$0.78	1.0159	\$5.65	0.1393	\$0.78	1.0159	\$5.65
8	0.1421	\$0.87	1.0369	\$6.36	0.1421	\$0.87	1.0369	\$6.36	0.1421	\$0.87	1.0369	\$6.36	0.1421	\$0.87	1.0369	\$6.36	0.1421	\$0.87	1.0369	\$6.36
9	0.1451	\$0.96	1.0584	\$7.03	0.1451	\$0.96	1.0584	\$7.03	0.1451	\$0.96	1.0584	\$7.03	0.1451	\$0.96	1.0584	\$7.03	0.1451	\$0.96	1.0584	\$7.03
10	0.1481	\$1.05	1.0805	\$7.69	0.1481	\$1.05	1.0805	\$7.69	0.1481	\$1.05	1.0805	\$7.69	0.1481	\$1.05	1.0805	\$7.69	0.1481	\$1.05	1.0805	\$7.69
11	0.1512	\$1.14	1.1030	\$8.32	0.1512	\$1.14	1.1030	\$8.32	0.1512	\$1.14	1.1030	\$8.32	0.1512	\$1.14	1.1030	\$8.32	0.1512	\$1.14	1.1030	\$8.32
12	0.1544	\$1.22	1.1260	\$8.93	0.1544	\$1.22	1.1260	\$8.93	0.1544	\$1.22	1.1260	\$8.93	0.1544	\$1.22	1.1260	\$8.93	0.1544	\$1.22	1.1260	\$8.93
13	0.1576	\$1.30	1.1496	\$9.51	0.1576	\$1.30	1.1496	\$9.51	0.1576	\$1.30	1.1496	\$9.51	0.1576	\$1.30	1.1496	\$9.51	0.1576	\$1.30	1.1496	\$9.51
14	0.1609	\$1.38	1.1736	\$10.08	0.1609	\$1.38	1.1736	\$10.08	0.1609	\$1.38	1.1736	\$10.08	0.1609	\$1.38	1.1736	\$10.08	0.1609	\$1.38	1.1736	\$10.08
15	0.1642	\$1.46	1.1981	\$10.63	0.1642	\$1.46	1.1981	\$10.63	0.1642	\$1.46	1.1981	\$10.63	0.1642	\$1.46	1.1981	\$10.63	0.1642	\$1.46	1.1981	\$10.63
16	0.1677	\$1.53	1.2231	\$11.16	0.1677	\$1.53	1.2231	\$11.16	0.1677	\$1.53	1.2231	\$11.16	0.1677	\$1.53	1.2231	\$11.16	0.1677	\$1.53	1.2231	\$11.16
17	0.1712	\$1.60	1.2487	\$11.67	0.1712	\$1.60	1.2487	\$11.67	0.1712	\$1.60	1.2487	\$11.67	0.1712	\$1.60	1.2487	\$11.67	0.1712	\$1.60	1.2487	\$11.67
18	0.1748	\$1.67	1.2748	\$12.16	0.1748	\$1.67	1.2748	\$12.16	0.1748	\$1.67	1.2748	\$12.16	0.1748	\$1.67	1.2748	\$12.16	0.1748	\$1.67	1.2748	\$12.16
19	0.1784	\$1.73	1.3015	\$12.64	0.1784	\$1.73	1.3015	\$12.64	0.1784	\$1.73	1.3015	\$12.64	0.1784	\$1.73	1.3015	\$12.64	0.1784	\$1.73	1.3015	\$12.64
20	0.1821	\$1.80	1.3287	\$13.10	0.1821	\$1.80	1.3287	\$13.10	0.1821	\$1.80	1.3287	\$13.10	0.1821	\$1.80	1.3287	\$13.10	0.1821	\$1.80	1.3287	\$13.10
21	0.1860	\$1.86	1.3565	\$13.54	0.1860	\$1.86	1.3565	\$13.54	0.1860	\$1.86	1.3565	\$13.54	0.1860	\$1.86	1.3565	\$13.54	0.1860	\$1.86	1.3565	\$13.54
22	0.1898	\$1.91	1.3849	\$13.97	0.1898	\$1.91	1.3849	\$13.97	0.1898	\$1.91	1.3849	\$13.97	0.1898	\$1.91	1.3849	\$13.97	0.1898	\$1.91	1.3849	\$13.97
23	0.1938	\$1.97	1.4138	\$14.38	0.1938	\$1.97	1.4138	\$14.38	0.1938	\$1.97	1.4138	\$14.38	0.1938	\$1.97	1.4138	\$14.38	0.1938	\$1.97	1.4138	\$14.38
24	0.1979	\$2.03	1.4434	\$14.78	0.1979	\$2.03	1.4434	\$14.78	0.1979	\$2.03	1.4434	\$14.78	0.1979	\$2.03	1.4434	\$14.78	0.1979	\$2.03	1.4434	\$14.78
25	0.2020	\$2.08	1.4736	\$15.16	0.2020	\$2.08	1.4736	\$15.16	0.2020	\$2.08	1.4736	\$15.16	0.2020	\$2.08	1.4736	\$15.16	0.2020	\$2.08	1.4736	\$15.16
26	0.2062	\$2.13	1.5044	\$15.54	0.2062	\$2.13	1.5044	\$15.54	0.2062	\$2.13	1.5044	\$15.54	0.2062	\$2.13	1.5044	\$15.54	0.2062	\$2.13	1.5044	\$15.54
27	0.2106	\$2.18	1.5359	\$15.89	0.2106	\$2.18	1.5359	\$15.89	0.2106	\$2.18	1.5359	\$15.89	0.2106	\$2.18	1.5359	\$15.89	0.2106	\$2.18	1.5359	\$15.89
28	0.2150	\$2.23	1.5680	\$16.24	0.2150	\$2.23	1.5680	\$16.24	0.2150	\$2.23	1.5680	\$16.24	0.2150	\$2.23	1.5680	\$16.24	0.2150	\$2.23	1.5680	\$16.24
29	0.2195	\$2.27	1.6008	\$16.58	0.2195	\$2.27	1.6008	\$16.58	0.2195	\$2.27	1.6008	\$16.58	0.2195	\$2.27	1.6008	\$16.58	0.2195	\$2.27	1.6008	\$16.58
30	0.2240	\$2.32	1.6343	\$16.90	0.2240	\$2.32	1.6343	\$16.90	0.2240	\$2.32	1.6343	\$16.90	0.2240	\$2.32	1.6343	\$16.90	0.2240	\$2.32	1.6343	\$16.90

The Nominal Inflation Rate used in the table is 2.0%

The Discount factor used in the table is 4.0%



Appendix C: DSM Conservation Programs Process Evaluation – Home Energy Conservation & Home Winterproofing, Econoler

DSM CONSERVATION PROGRAMS PROCESS EVALUATION HOME ENERGY CONSERVATION & HOME WINTERPROOFING

ENBRIDGE GAS DISTRIBUTION

Final Report

January 20, 2017



ECONOLER



ABBREVIATIONS

CCM	Cumulative Cubic Meters
CEA	Certified Energy Auditors
CRA	Corporate Research Associates
DA	Delivery Agent
DWHRS	Domestic Water Heat Recovery System
EGD	Enbridge Gas Distribution
HEC	Home Energy Conservation
HVAC	Heating, ventilation and air-conditioning
HWP	Home Winterproofing
IESO	Independent Electricity System Operator
LDC	Local Distribution Company
OEB	Ontario Energy Board
OESP	Ontario Electricity Support Program
PG&E	Pacific Gas and Electricity Company
SHP	Social Housing Providers
SO	Service Organization
SRM	Supplier Relationship Management
TAPs	Thermostats, Aerators, Pipe Insulation and Shower Heads
TRC	Total Resource Cost



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EXECUTIVE SUMMARY

This report presents the results of the process evaluation of the Enbridge Gas Distribution (EGD) Home Energy Conservation (HEC) and Home Winterproofing (HWP) programs. The programs were designed to help residential customers in Ontario improve their homes' natural gas energy efficiency. Specifically, the HEC program offers (1) a rebate to conduct pre-retrofit and post-retrofit energy audits in homes and (2) financial incentives based on the modelled energy savings achieved by implementing two or more eligible energy-efficiency upgrades. The HWP program offers free energy audits and direct install of basic energy-efficiency upgrades (i.e., insulation and air sealing) as well as health and safety measures as warranted to eligible low-income households.

SUMMARY OF EVALUATION MANDATE

The process evaluation's objectives are to assess the HEC and HWP programs' overall effectiveness over the period from January through June 2016 and identify opportunities for process improvements. To do so, Econoler (hereinafter the "Evaluator") completed the following evaluation activities:

- › A program database and documentation review.
- › A benchmarking study of similar programs.
- › Interviews with partial participants, certified energy auditors (CEAs), contractors, delivery agents (DAs), and social housing providers (SHPs).
- › A survey with participants.

SUMMARY OF PROCESS EVALUATION FINDINGS

Home Energy Conservation Program

From January through June 2016, a total of 2,372 households participated in the HEC program. Each household installed on average 2.2 eligible upgrades. The typical projects consisted of a furnace upgrade and air sealing improvement (83%). The overall average natural-gas savings achieved was 1,316 m³ per home.

Main Findings from the Program Database and Document Review

- › The program database review indicated that the database works well overall and contains the main information necessary for the process evaluation and program-monitoring.
- › The overall level of consistency among the various database entry fields was good, but irregularities were found regarding audit date entries and formats.
- › Additional participant information could be relevant to track in the database.



- › The program plan was found to be well structured and contained relevant information useful for both the program staff and the Evaluator.
- › The program plan included a logic model, which shows how the program is expected to work and how it contributes to the intended or observed outcomes.
- › Defining and monitoring performance indicators would improve program management.
- › The program's micro-website provided a concise description of the participation process and the incentives available. However, the Evaluator suggests that some elements be better clarified. The CEAs' websites did not all present the most up-to-date information about the program.

Main Findings from the Benchmarking Study

- › The benchmarking study revealed that residential energy assessment programs use either a performance-based design (based on the energy savings) or a prescriptive design (with rebates associated with energy-efficiency measures). Some programs benchmarked use a combination of both types of design.
- › The upgrades, eligibility criteria, and incentives available vary among the programs:
 - Some programs offer more than one program path depending on a customer's type of home and ownership.
 - Most programs' incentives are based on the energy savings achieved or have prescriptive rebates associated with specific energy-efficiency measures. One program provides an incentive that covers a certain percentage of the overall project cost. One program adjusts the incentive amount allowed for a specific upgrade depending on the total number of upgrades implemented.
 - Some utilities offer additional financial support for conducting upgrades through a low-interest loan granted to participants who apply and are eligible.

Main Findings from the Participant Survey

- › HEC participants found out about the program mostly through word of mouth (36%) and contractors (29%). These results are not surprising given that HVAC contractors play a central role in recruiting participants. Promotional activities conducted by EGD also contribute to raising awareness about the program: 27 percent of the participants heard about the program through EGD's communication tools.
- › When asked to rate the importance of different reasons for participating in the program, participants primarily cited the reduction of their energy bills, the increased comfort at home, and the incentive or money back offered by the program. These survey results indicate the appropriateness of the messages conveyed by EGD's in promoting the HEC program.
- › As for the information participants received through the program:
 - 90 percent recalled having received information from a CEA about their homes' energy consumption and recommendations on energy-efficiency upgrades they could install.
 - 72 percent recalled having received an audit report from the CEA.



- 37 percent recalled having received a new energy-efficiency rating for their home after having implemented the upgrades.
- › Many participants (43%) did not install more than two upgrades for financial reasons and quite a percentage of participants (26%) thought that their homes did not need any other upgrade.
- › After taking part in the program, the majority of participants knew more about energy efficiency (87%) and were influenced to change how they use energy at home (75%). Three quarters of the participants (77%) also noticed an improvement in the comfort level at home.
- › Nearly all the participants (96%) were satisfied with the HEC program primarily because of their lowered energy bills (28%) and program incentives (28%). All the participants were also satisfied with their overall experience with CEAs.
- › Nearly all the participants (97%) would recommend the program offered by EGD to others.

Main Findings from the Interviews with Partial Participants

- › Partial participants are those customers who did not complete an Audit E after their Audit D. They represent only five percent of the program participants,¹ which is a very low drop-out rate.
- › Most partial participants found the participation process easy and were satisfied about their experience with CEAs and what they learned about their potential energy savings. However, about one half of the partial participants were dissatisfied with the time allowed to complete the upgrades and the responsiveness of the CEA to their requests.
- › Of the six respondents, five said that they had implemented or were implementing some of the recommended energy-efficiency upgrades. The respondent who decided not to install any of them was skeptical about their validity and wanted some assurance that he would definitely receive the rebate after completing the upgrades.
- › The participants who had implemented upgrades explained they did not complete the second audit because they did not install all the recommended upgrades and questioned whether having the second audit conducted was worthwhile or had difficulty scheduling the second audit.

Main Findings from the Interviews with Contractors

- › Contractors first learned about the HEC from EGD, a CEA, or by word of mouth from other contractors. All the contractors interviewed were either very or somewhat satisfied with HEC overall and its different aspects. A few contractors asked to take part in the evaluation process were however dissatisfied with the program and refused to answer the Evaluator's questions.
- › One half of the contractors interviewed promote the HEC program among all their customers. The other half promote the program only among those customers that could potentially qualify.
- › Overall, once a customer learned about the existence of HEC, contractors relied on CEAs to provide detailed information about the program and other energy-efficiency upgrades.

¹ This proportion was calculated by dividing the number of participants (563) who completed only an Audit D in 2014 or 2015 by the total number of participants who completed an Audit E during the same period (5,213 in 2014 and 5,646 in 2015).



- › One half of the contractors mentioned that some customers are concerned about the possibility of their energy savings failing to meet program requirements.
- › The contractors interviewed indicated that they were very satisfied with their relationship with the CEAs, who are described as available, professional, knowledgeable, and able to complete their work on time.
- › The contractors all received information from CEAs about the program, mostly regarding the eligibility criteria or the changes to the program. One half of the contractors said they would like to receive additional information on the HEC program.
- › According to one half of the contractors, raising awareness about the program among customers before they meet with a contractor would help improve their understanding of the HEC program as a whole-house approach.

Main Findings from the Interviews with Certified Energy Auditors

- › All the CEAs were very satisfied with their communication and relationship with EGD, which offered plenty of opportunities for CEAs to provide input on the program.
- › All the CEAs were either very or somewhat satisfied with the HEC's incentive structure and eligibility requirements. One CEA was very satisfied with the marketing and outreach activities initiated by EGD, while two CEAs were somewhat dissatisfied. The opinions expressed were that the program is mainly driven by HVAC contractors instead of having EGD target customers directly. Also, the traditional marketing channels are highly saturated and may not be the best way to promote the program.
- › The CEAs work with a large number of contractors and generally have a satisfying experience working with them. The CEAs mentioned, however, the issue that some contractors impart the wrong expectations among homeowners by describing the incentive as automatically available.
- › The CEAs generally faced the challenges to effectively delivering the program in its whole-house approach. Indeed, contractors are the main drivers of the HEC program, but since they promote a specific type of measure, this can easily lead to the impression among homeowners that HEC is more of a prescriptive program featuring the installation of high-efficiency furnaces.
- › According to the CEAs, those participants that contacted a CEA after hearing about the program from EGD's marketing activities or materials (instead of from HVAC contractors) were generally more receptive to recommendations about additional upgrades beyond those they were initially considering.

Overall, the Evaluator found the HEC program effectively managed and delivered. The program is satisfying for all the parties involved (participants, contractors, and CEAs) and generates strong interest and high participation in the residential market. In order to improve the program, the Evaluator has made some recommendations, as presented in Section 1.4.



Home Winterproofing Program

From January through June 2016, a total of 334 households participated in the HWP program. Most projects (80%) were conducted in low-income private homes and the remaining projects took place in homes managed by social housing providers. The average natural gas savings achieved was 868 m³ in low-income private home and 688 m³ in social housing.

Main Findings from the Database and Documentation Review

- › The program database review indicated that the database is clear and effective and that the level of consistency among the various entry fields is good.
- › The database contained the main information necessary for process evaluation and monitoring, but additional participant information could be relevant to track.
- › The program plan was found to be well structured and contained relevant information useful for both the program staff and the Evaluator.
- › The program has a logic model which shows how the program is expected to work and how it contributes to the intended or observed outcomes.
- › Defining and monitoring performance indicators would improve program management.
- › The program website presents clear and concise information that summarizes well the eligibility criteria and participation process.

Main Findings from the Benchmarking Study

- › A benchmarking study was conducted to provide general insight on how other programs similar to HWP are being delivered elsewhere. Although the upgrades offered and the eligibility criteria vary among the programs, the HWP's program design and delivery were found to be largely consistent with similar programs offered by other jurisdictions, as summarized below:
 - Most jurisdictions offer free upgrades following an energy audit, although some prefer to offer prominent rebates to facilitate implementation of energy-efficient upgrades in low-income households.
 - The range of upgrades offered varies from one program to another, but overall, most utilities offer at least insulation and air sealing.
 - Upgrades which do not require renovation work are often given or installed during the energy audit (efficient lighting, appliance replacement, water-saving devices, smart power bars, and CO detectors).
 - Most programs target homeowners, tenants, and landlords, while others include apartment building owners or social housing providers.
 - In general, eligibility requirements include at least the criteria on the household income level (income or assistance program participation) and pertain to one or more of the following elements: the house (type, age, size, value, and/or year-round occupation), the applicant



(bill payer, tenant, active account with the utility, and previous participation), and the energy source.

Main Findings from the Participants Survey

- › HWP participants found out about the program mostly through word of mouth (27%) and bill inserts (27%). EGD’s promotional activities contributed to program awareness: 52 percent of the participants heard about the HWP program through EGD’s communication tools.
- › The main reasons for participants to take part in the HWP included improving house insulation (39%), saving money/reducing the energy bill (29%), increasing comfort in the home (10%) and receiving the service at no cost (10%).
- › Speaking about the barriers pertaining to energy-efficiency upgrades in general, 54 percent of the participants identified the financial constraint as the major barrier and 10 percent mentioned a lack of information, which proves the importance of a program such as HWP to offer free upgrades and information about energy efficiency to participants.
- › Most of the participants (80%) recalled having received information from the DA about the upgrades implemented in their homes and about the impact it could have on their energy bills. These participants found the information provided by the DA useful and easy to understand.
- › 74 percent of the participants reported knowing more about their homes’ energy efficiency after participating in the program. Moreover, for 56 percent of the participants surveyed, the information received through the program changed in some way their perspective on how to use energy at home.
- › The satisfaction level among participants surveyed was extremely high, with 77 percent of them saying they were “very satisfied” and 19 percent “somewhat satisfied”. The main reasons for high satisfaction were the improvement in comfort at home (30%), work or upgrades of high quality (26%) and money saved (22%).
- › Nearly all the participants (97%) would recommend the program to others.

Main Findings from the Interviews with the Delivery Agents

- › In general, the two DAs interviewed were very satisfied with the overall program and considered their involvement in the program as straightforward.
- › The DAs were very satisfied with their communication and relationship with EGD.
- › The DAs’ relationship and experience with the SHPs was usually described as positive, though both DAs agreed that bureaucracy and time required to go through the process requires patience and “hand-holding”. The experience with contractors was also described as positive overall.
- › According to the DAs, successful outreach strategies vary over time and from one region to another, but referrals, postal drops, and bill inserts were mentioned as tools consistently sparking interest. The program website was also mentioned as a useful communication tool.



- › It was mentioned that EGD understands the importance of keeping the program's participation process as easy and simple as possible, and develops friendly and attractive communication, which is a great advantage when engaging with a high-barrier group such as the low-income households.
- › The DAs considered that the HWP had an impact on each participating household by improving their comfort and financial situation and increased awareness about energy efficiency among program participants.

Main Findings from the Interviews with the Social Housing Providers

- › The two SHPs interviewed were very satisfied with the HWP. One mentioned being very familiar with the program while the other was somewhat familiar.
- › The SHPs decided to participate in the HWP since it provided a very interesting opportunity for energy savings and for retrofitting buildings of a certain age. They both also found the program very informative and said it was easy to have tenants participate in the program.
- › Some tenants were uncomfortable about letting people come into their homes; others were concerned about the dust that would be created by the work; others were worried about health-related consequences of the work to be done. However, overall, all the eligible units in the two SHPs interviewed participated in the program.
- › The two SHPs were satisfied with their overall experience with the DAs, the responsiveness of the DA to the requests and enquiries in a timely manner, the time to complete the work and the quality of the work completed. The DAs were described as very helpful.
- › Both SHPs were very positive about their experience with the program and would recommend the program to other organizations without hesitation.

Overall, the Evaluator found the HWP program to be effectively managed and delivered. Low-income customers are recognized as a hard-to-reach customer group. The HWP program had succeeded in reaching out to this group by partnering with experienced DAs to deliver the program. The program is satisfying for all the parties involved (DAs, private participants and SHPs). In order to improve the program, the Evaluator makes some recommendations in Section 2.4.



INTRODUCTION

Evaluation Scope

Econoler (hereinafter the “Evaluator”) was mandated by Enbridge Gas Distribution (EGD) to perform the process evaluation of its Home Energy Conservation (HEC) and Home Winterproofing (HWP) programs. The evaluation involved conducting a review of program documentation and databases, benchmarking against similar programs, in-depth interviews and surveys to achieve the following key research objectives:

- › Evaluate the programs’ offerings and delivery.
- › Evaluate the programs’ database and documentation.
- › Identify the programs’ sources of awareness and evaluate their customer recruitment efforts.
- › Determine the levels of program satisfaction.
- › Identify the barriers and motives influencing and affecting program performance and attitudes toward the programs.
- › Provide recommendations on how to improve the HEC and HWP programs.

This evaluation covers the period from January 2016 through June 2016.

Presentation of the Team

To complete this evaluation, Econoler worked together with Corporate Research Associates (CRA). The tasks were divided as follows:

- › Econoler served as the team leader and was responsible for coordinating and supervising all the evaluation activities, developing the data-collection instruments, as well as preparing and reviewing the evaluation report. Econoler conducted the database and documentation reviews, benchmarking against similar programs and the interviews with contractors and program partners.
- › CRA conducted the participant survey and interviews with unconverted participants.



1 HOME ENERGY CONSERVATION PROGRAM

This chapter describes the HEC program, the evaluation methodology and the process evaluation results for the January-June 2016 period.

1.1 PROGRAM OVERVIEW

The HEC program aims to improve natural gas energy efficiency among Ontario households. Specifically, HEC offers incentives to eligible customers to motivate them to complete a pre-retrofit energy audit, install the requisite energy efficiency upgrades to qualify for further incentives, and finally conduct a post-retrofit energy audit. Launched in 2012, the program is overseen by an EGD program manager. So far, the program's results have been largely driven by the program's approved Certified Energy Auditors (CEAs) and HVAC companies (which provide referrals in the EGD franchise area). HEC uses Natural Resources Canada's ecoENERGY program as its foundation and strives to follow a holistic approach to upgrading energy efficiency in residential homes. The financial incentives offered depend on the modelled natural gas consumption savings achieved by participants following implementation of energy-efficiency upgrades.

The interested customer must first contact one of the program's Certified Energy Auditors (CEAs). The CEA asks the customer a set of questions over the phone to complete a pre-screening process. A pre-retrofit energy audit (Audit D) is then booked if the house has sufficient natural gas reduction potential to meet the program's minimum savings requirements. Based on the pre-retrofit energy audit, the customer receives a report recommending applicable energy upgrades, the customer then hires an HVAC or an insulation contractor to implement at least two of the upgrades recommended. Upon completion of the upgrades, the customer contacts the same CEA that completed the pre-retrofit energy audit to conduct a post-retrofit energy audit (Audit E) to determine the level of gas savings achieved. The CEA then sends an email informing the participant about their new home's energy rating, using the Natural Resources Canada's EnerGuide Rating System. An EnerGuide rating is a standard measure of the home's energy performance.

Participants must install at least two of the following nine energy upgrades or products:

- › Attic insulation
- › Wall insulation
- › Basement wall insulation
- › Exposed floor insulation
- › Air sealing (minimum reduction of at least 10 percent in the air leakage of the home as determined by a blower door test)
- › Window replacements
- › High-efficiency space heating system installation (natural gas furnace or boiler)



- › High-efficiency water heating system installation (natural gas)
- › Drain water heat recovery system installation

Whether a customer is living in or renting out a home, he or she can participate. The HEC program is only available for detached residential homes, townhouses and semi-detached homes and is not available to multi-residential buildings or condos. To qualify, the following criteria must be met:

- › Reside in one of the designated communities specified for 2016.
- › Have an active EGD account in good standing (no arrears) and their primary source of heat must be natural gas.
- › Use an EGD-approved CEA.²
- › Complete a pre- and post-energy audit.
- › Complete the installation of two or more eligible measures recommended by the CEA, striving to achieve at least 15 percent savings. The program offers \$500 covering the full (pre and post) energy audit costs (not including HST). An instant \$150 rebate is offered at the time of the pre-retrofit energy audit. The remaining \$350 is reimbursed when the final incentive is paid out following the upgrade completion. The first incentive tier is \$500 for achieving 15 to 24 percent energy savings (for a total of \$1,000 including the audit rebate). The program funds up to \$1,100 to help cover the retrofit for a house achieving between 25 and 49 percent natural gas savings as per the final energy audit (for a total of \$1,600 including the audit rebate). The highest incentive tier is \$1,600 and is obtained if a house achieves 50 percent or more energy savings (for a total of \$2,100, including the audit rebate).

The average annual gas savings across all participants in the HEC program achieve at least 25% of combined baseline space heating and water heating usage.

1.2 EVALUATION METHODOLOGY

1.2.1 Methodological Model

Figure 1 illustrates the research strategy used to conduct the HEC program process evaluation. The data-collection activities carried out in the evaluation are then further described in detail.

² Visit the HEC website for an up-to-date list of the eligible CEAs: <http://knowyourenergyscore.ca/home-energy-conservation/>

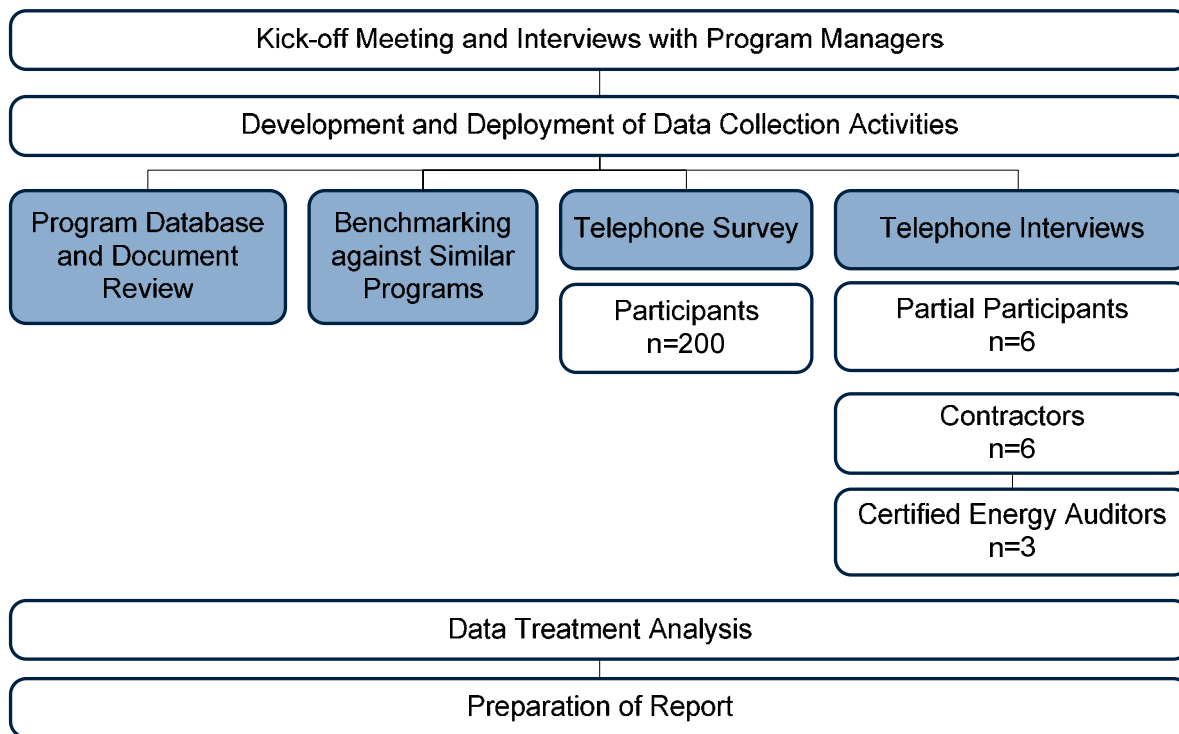


Figure 1: HEC Program Methodological Model

1.2.2 Program Database and Document Review

As part of the evaluation, the Evaluator reviewed the HEC’s program database to assess its components and mechanisms. More specifically, the review was done to achieve the following objectives:

- › To verify whether it provides the complete information needed for program monitoring and evaluation by following the industry’s best practices.
- › To assess the level of consistency among the various data-entry fields and detect abnormalities that need to be addressed.

The Evaluator also reviewed such HEC documentation as the marketing and outreach guidelines and brochures, the program’s website, logic model, and process map and participant pre-screening script.

1.2.3 Benchmarking against Similar Programs

The Evaluator conducted a benchmarking study to compare the HEC program with other similar North American residential audit programs by focusing on key design elements, such as the eligibility criteria, the incentive levels, and the measures and products rebated. The benchmarking study included an overview of the practices and approaches employed by those programs similar to HEC and the differences among these practices and approaches.



1.2.4 Participant Survey

In December 2016, CRA conducted a telephone survey with a total of 200 participants, using computer-assisted telephone interviewing technology. The average length of the survey was 16.5 minutes.

The participant survey was meant to collect feedback on the following aspects of the HEC program:

- › Sources of program awareness
- › Reasons for participation
- › Information received and upgrades recommended
- › Barriers to participation
- › Impact of the program
- › Satisfaction with the program
- › Recommendations for improvements

With 200 respondents, the corresponding margin of error at a 90 percent confidence level is ± 5.8 percent.

1.2.5 Interviews with Partial Participants

In December 2016, CRA conducted six phone interviews with HEC participants, who each had a pre-retrofit energy audit conducted for their homes more than 18 months ago, but did not complete a post-retrofit energy audit. These customers either decided not to implement any of the recommended upgrades or implemented them outside the program. These interviews were meant to collect feedback regarding the following aspects:

- › Sources of program awareness
- › Information received
- › Upgrades implemented and barriers to participation
- › Satisfaction with the program
- › Recommendations for improvements

1.2.6 Interviews with Contractors and Certified Energy Auditors

In December 2016, Econoler conducted interviews with program partners, including six contractors and three representatives of CEA organizations, to collect feedback regarding the following aspects of the HEC program:

- › Involvement in the program and satisfaction with it
- › Communication among the contractors, CEAs and EGD



- › Interaction with customers and program outreach
- › Barriers and program delivery
- › Program influence on the residential market
- › Recommendations for improvements

1.3 PROCESS EVALUATION

1.3.1 Program Participation

The HEC program has had a large uptake. From January through June 2016, a total of 2,372 projects were completed, all with their E Audit completed during this period, regardless of when the D Audit or the retrofit work was conducted.

Figure 2 shows a breakdown of completed projects by the number of the upgrades installed in each individual project. More than four out of five (83%) participants installed the minimal number of upgrades required by the program. On average, 2.2 upgrades were installed in each project.

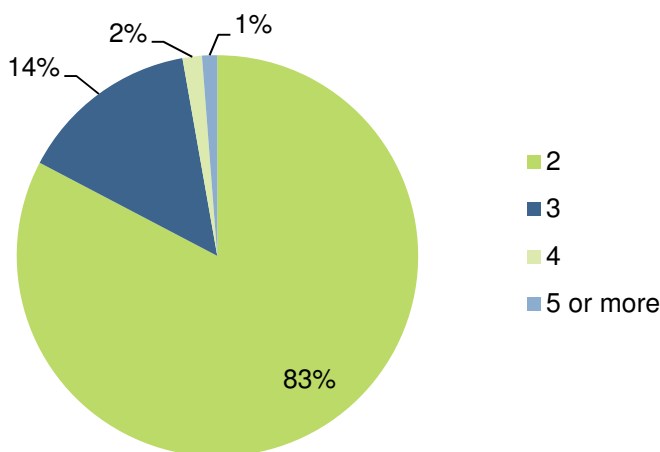


Figure 2: Breakdown of HEC Projects by Number of Upgrades in Each Project

Figure 3 shows a breakdown of participant proportions by the type of two-measure-pairing implemented by participants in fulfillment of the program requirement. Overall, the vast majority of energy-efficiency projects included a furnace upgrade (99%). The typical projects implemented consisted of a furnace upgrade along with air sealing improvement (83%).

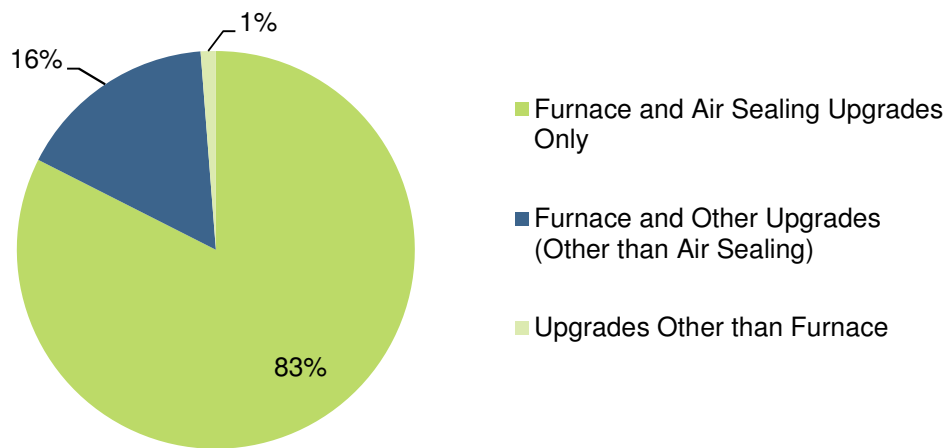


Figure 3: Breakdown of Participant Proportions by Type of Two-measure-pairing across the HEC Projects Implemented

The majority of participating houses (52%) were built between 1976 and 2000. The overall average natural gas savings achieved in a house was 1,316 m³ (an average of 30% energy savings compared to the original energy consumption). The energy savings ranged from 235 m³ to 6,277 m³.

The average time taken to complete the program process was 39 days. The shortest period occurred when the two audits were conducted in the same day or in two days in a row (2%), whereas the longest period spanned two years. Customers who did not complete an E Audit after their D Audit represent a small proportion of the program participants (5%)³, indicating a very low drop-out rate.

In the previous years, a key focus of the program was put on extending the offerings across the Enbridge franchise area and making the program available to a broader customer base. As indicated by the Evaluator’s analysis of the program database, the program succeeded in extending its offerings among the wider customer base located beyond the York region, the first area targeted when the program was launched in 2012. The statistics compiled by the Evaluator based on the program’s database show the following breakdown by region of the households that completed an Audit D during the January-June 2016 period:

- › 42% in the metropolitan Toronto area, including the Greater Toronto Area (GTA)
- › 27% in York region
- › 21% in Peel region
- › 8% in Durham region
- › 3% in the Niagara and Ottawa areas

³ This proportion was calculated by dividing the number of participants (563) who completed only an Audit D in 2014 or 2015 by the total number of participants who completed an Audit E during the same period (5,213 in 2014 and 5,646 in 2015).



1.3.2 Program Database and Document Review

Program Database

Good-quality data-tracking and reporting is crucial for not only effective program management but also program evaluation purposes. The Evaluator reviewed the contents of the HEC program database provided by EGD and found them overall well organized and effective. Except for certain acronyms, the program database was clear and easy to understand from a third-party perspective.

The HEC program database is an Excel spreadsheet containing data about residential customers involved at different stages of the program. The HEC program database serves as the centralized repository of the participants' information gathered from the four main Service Organizations (SOs). The Evaluator did not review the SOs' tracking reports; however, ideally, SOs should use the same template to facilitate EGD's work in consolidating the information and avoiding data-handling errors.

The program database contained five tabs, including the "Master Audit E Files" tab for customers who completed their E Audit. This tab included the participants' contact information, E Audit file number, EGD account number, house details (year built and surface area), along with the type and number of energy-efficiency upgrades implemented (air sealing, window upgrade, etc.), the SO that completed the D and E Audit, the dates the D and E Audits were conducted, and the pre and post annual gas consumption and gas savings values.

The program database also contained columns for internal validation purposes. For example, the participant's contact information is cross-referenced with EGD's SRM system (Supplier Relationship Management) before the rebate is paid. There is also a column for validating the savings results entry. Overall, the data compilation seems accurate since this validation column identified only six participants with inconsistent savings results, who represented less than 0.5 percent of all the participants in the program database.

The Evaluator noted that the status of each participant was up-to-date. The Evaluator also observed that the overall level of consistency among the various data-entry fields of the database was good. The database contained almost no irregularities, except for the energy audit dates. For example, audit date entries such as "2022" and "1901" were found and several dozens of Audits E were tracked as if they had happened before Audit D. Moreover, the dates were entered in numerous formats, using dashes or slashes, or using various orders for the day, the month and the year. The Evaluator suggests standardizing the data entry format in the SOs' template for better consistency by using, for example, an input mask. This method would make it easier to conduct analyses, such as sorting out the data, calculating the number of days separating the two dates, etc.

The gross gas savings are calculated in the database by deducting the natural gas consumption values calculated by Certified Energy Auditors using HOT2000 simulations (NRCan's accredited modelling software), before and after the energy-efficient upgrades were installed. EGD reports the gas savings results in both percentages and cubic meters. A summary tab also provides an overview



of the gas savings achieved in total for each month and by each SO. The cumulative cubic meters (CCM) of lifetime natural gas savings are also calculated along with the savings specifically associated with the furnace upgrades.

Although the main participants' information needed for monitoring purposes and conducting evaluation activities are documented in the HEC database, the Evaluator's previous experience suggests that adding the following kinds of relevant information could help improve data consolidation and management or further facilitate follow-up and evaluations:

- › The D Audit file number: The HEC energy audits are based on the EnerGuide protocol and HOT2000 software offered by NRCAN. An EnerGuide file number is usually assigned to each participant for the D and E Audits, thereby allowing NRCAN to track those simulation files. The Evaluator noticed that only the E Audit file number was included in the "Master E Audit Files" and suggests adding the NRCAN D Audit file number as well.
- › The participant's email address: Provided along with other contact information, email addresses are useful contact information which facilitates reaching participants to book visits for quality assurance or conduct other evaluation activities.
- › Incentive amount: Incentive amounts can be helpful to evaluators in selecting samples or conducting surveys. Providing respondents details about the incentive they have received following their participation in a program provides context and a prompt, especially if the participation was completed some time ago.
- › Recommended measures and savings potential: The measures installed by participants are reported in the database. Documenting the measures recommended in the audit report along with those installed can provide useful insight on program results analysis and the design of follow-up and marketing strategies. The savings potential indicated in the D Audit report could also be tracked to provide similar insights on how to better analyze and interpret program results.

Overall, the Evaluator thinks that the HEC program database works well, is consistent and contains the information needed for the evaluation and monitoring. If EGD implements the suggested improvements, the database will become even more informative and useful for enabling more effective and extensive program evaluation and monitoring in the years to come.

Program Plan

The HEC program has a plan which describes key program elements such as the rationale, objectives, implementation and marketing strategies, participation process map, and financial analysis. The program plan is well structured and contains relevant information useful for both the program staff and the Evaluator. One good element observed was the revision date on the front page, which makes it easier to track program updates.



The program plan also features an evaluation plan section. When this evaluation was being carried out, this section was left blank. The Evaluator suggests filling in the evaluation plan section with at least the following information:

- › Past evaluations: date, type of evaluation (process, market, impact or other types), internal or external evaluation.
- › Future evaluations: expected date and scope.

A logic model of the program can also be found in the appendix of the program plan. A logic model is a diagram representation of the program theory which describes how the program is expected to work and how it contributes to the intended or observed outcomes. A logic model should reflect the current program strategy and is therefore expected to evolve in order to reflect program changes and adapt to the ever-changing policy environment. Illustrating the program logic can reveal deficiencies in program focus or effort and helps ensure that all those involved know what the program seeks to accomplish. In addition, a logic model for which performance indicators have been established becomes a relevant management tool for monitoring the intended outcomes.

The HEC logic model shows the causal links between program activities and the likely outputs and outcomes in the market. Developed in 2016, it illustrates the current program strategy. As a way to improve program management, the Evaluator recommends defining and monitoring performance indicators such as the numbers of customer contacts, audits completed, awareness level, and measures installed. Since the HEC program relies heavily on the work of CEAs and contractors, it would be interesting to monitor the participants' satisfaction over time and analyze the satisfaction ratings for each of the CEAs and contractors in order to detect potential problems in service delivery and ensure a good customer experience. The performance indicators selected should be included in the program plan.

Program Marketing and Outreach

Activities undertaken by EGD, service organizations and contractors play a central role in raising customers' awareness of the HEC program and recruiting participants. The marketing and outreach activities conducted by EGD during the evaluation period included magazine advertisements, online banner advertisements, social media, bill inserts, trade shows, etc. Most of EGD's activities are directed toward customers, but some activities such as email blasts are aimed at contractors.

Generally speaking, the key messages conveyed in EGD's marketing communication included: improvements to residential customers' gas consumption resulting in the increased energy efficiency of the home, lower their energy bills, increase comfort at home, and educate the customer on the benefits of home energy conservation. One of the strengths of the marketing strategy is that it promotes not only energy benefits but also non-energy benefits.

To inform customers about the HEC program, EGD uses not only its corporate website (enbridgegas.com), but also the program's micro-site "knowyourenergyscore.ca". EGD provided



snapshots of the previous HEC micro-site associated with the evaluation period (January through June 2016), since the webpage has been modified since. The previous HEC webpage was succinct, giving an informative description of the participation process and the incentives available. However, the webpage was densely filled with texts without enough visual elements to accompany them, and the font used was quite small.

1.3.3 Benchmarking against Similar Programs

As part of this evaluation, the Evaluator conducted a benchmarking study of four Canadian and three American utilities. The Evaluator investigated the eligibility criteria, eligible upgrades, and incentive structure of residential audit programs offered in these jurisdictions. They were compared to the HEC program offered between January and June 2016. The benchmarking study was conducted to provide general insight on how other similar programs are being delivered elsewhere.

When similar programs were selected, priority was given to those targeting natural gas customers and those targeting both natural gas and electricity customers. Certain programs intended for electricity customers were also considered because these programs presented similarities with the HEC program. The Union Gas residential audit program was included to provide an overview of another natural gas energy-efficiency program offered in the province.

The following programs were covered by the benchmarking study:

- › Union Gas – Home Reno Rebate
- › Manitoba Hydro – Energy Evaluations
- › *Énergie et ressources naturelles Québec* – Rénoclimat
- › Efficiency Nova Scotia – Home Energy Assessment
- › Efficiency Maine – Home Energy Savings
- › Mass Save – Home Energy Assessment
- › Pacific Gas & Electricity Company (PG&E) – Home Upgrade, Multifamily Rebates

APPENDIX I shows a table with details about these selected programs and their main characteristics. As shown in that table, some jurisdictions offer more than one program path depending on the customer's house (single-household or multi-family units) or ownership (homeowners, landlords, or renters). This is the case with Massachusetts (Mass Save) and California (PG&E). The eligibility criteria, upgrades, and incentives then vary with the specific program path chosen and followed.

The programs feature either a performance-based design where the incentive is based on the energy savings calculated or a prescriptive design where the rebates are associated with specific energy-efficiency measures up to a maximum incentive amount. Two exceptions have been found; the Mass Save's multi-family units program path provides incentive that covers a certain percentage of the overall cost of custom projects; the Rénoclimat program in Quebec combines both designs (a house's EnerGuide score must be increased by at least one point to be eligible for prescriptive rebates). PG&E



in California offers two paths under its Home Upgrade program, with smaller projects following a prescriptive path and homeowners aiming for more than 45% energy savings following the performance-based Advanced Home Upgrade path. Since October 2015, Efficiency Nova Scotia has been offering a new incentive structure for its Home Energy Assessment program, which is meant to encourage homeowners to perform as many upgrades as possible. Under this new incentive structure, the incentive amount allowed for a specific upgrade varies depending on the total number of upgrades implemented. As the total number of upgrades implemented increases, so does the prescriptive rebate amount.

As for energy audits, performance-based programs like the HEC, Quebec's Rénoclimat, and PG&E's Advance Home Upgrade path, involve conducting both a pre-retrofit and a post-retrofit audit (D and E respectively). Other programs providing prescriptive rebates only require conducting an Audit D. This is the case for house upgrade programs in Maine (Efficiency Maine), Massachusetts (Mass Save) and California (PG&E's Home Upgrade path). On the other hand, Efficiency Nova Scotia and Union Gas offer prescriptive rebates, but still require conducting two energy audits. In Manitoba, an online energy audit provides customers with recommendations on applicable upgrades for their homes, but rebates are available through other Manitoba Hydro programs.

Each approach has its advantages and disadvantages. While a performance-based program requiring conducting two energy audits employs a more holistic approach aiming to achieve global energy savings objectives for a house, it usually leads to greater confusion among customers concerning the final incentive amount they qualify for, compared to programs offering prescriptive rebates for specific measures.

It has been found that programs targeting both energy sources (natural gas and electricity) tend to offer a variety of upgrades other than building envelope and heating measures, including one program offering free-of-charge installation of electrical upgrades, such as efficient light bulbs, water-saving devices (faucet aerators and low-flow showerheads) and advanced power strips during Audit D. Some jurisdictions provide a free-of-charge pre-renovation audit (Quebec and Massachusetts). Most jurisdictions offer a rebate, but some do not (California) and the full cost is then covered by the participants. Some jurisdictions also offer a free online energy audit to be conducted at home by consumers themselves to identify potential energy-saving opportunities for their homes.

Finally, the Evaluator has noticed that some utilities (Efficiency Maine, PG&E, and Efficiency Nova Scotia) offer additional financial support through low interest financing. A loan is granted to participants who apply for such support to enable them to conduct upgrades. Usually, the customer must meet a set of requirements to be eligible for a loan. The maximum amount varies between \$25,000 and \$30,000 and has to be reimbursed over a period varying between five and fifteen years. In Quebec, participants can be eligible for an income tax credit for their retrofit work.

1.3.4 Participant Survey

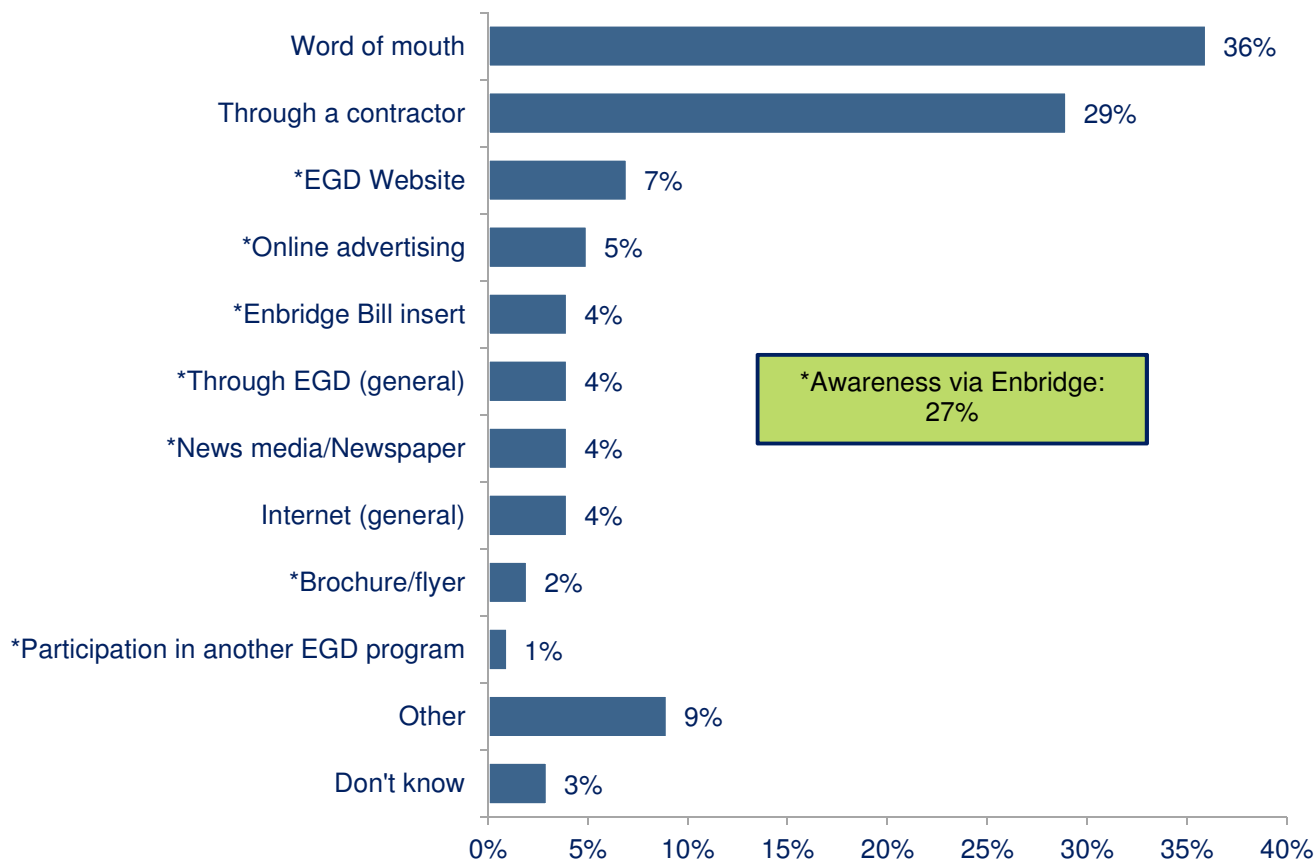


As part of the HEC evaluation, a survey was conducted with 200 participants. The following subsections present the main findings of this survey.

The single-detached house (72%) was the primary type of residence where energy upgrades were undertaken and nearly all the participants lived in their own homes (94%).

Sources of Awareness and Reasons for Participation

HEC’s participants found out about the program mainly through word of mouth (36%) and contractors (29%), which is consequent with program delivery strategy. As shown in Figure 4 below, EGD also contributed to program awareness through its website, advertising, bill inserts, or other EGD programs.



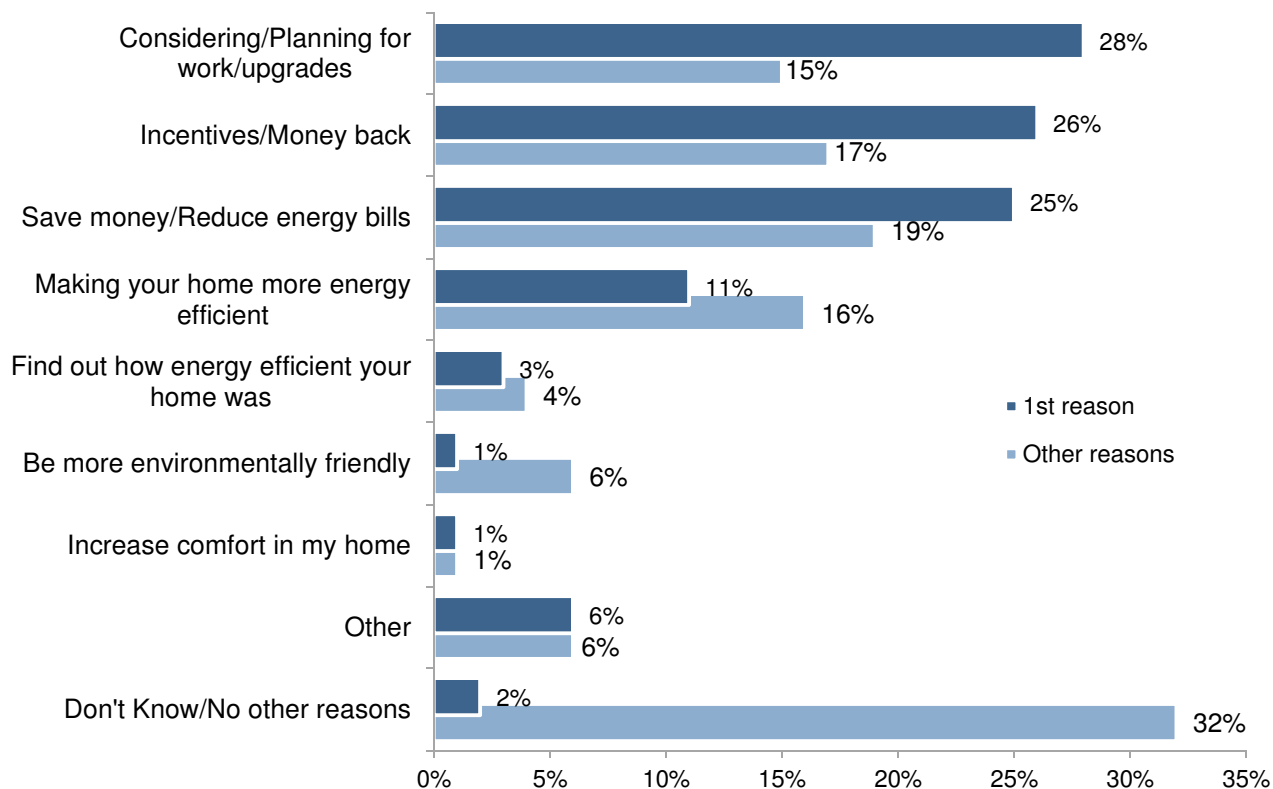
Source P1: How did you first learn about the Enbridge Home Energy Conservation Program? (n=200)
Total exceed 100% due to multiple responses

Figure 4: Awareness of the HEC Program

The three main reasons for participating in the HEC program were because customers were already considering upgrades for their homes (28%), to receive a financial incentive (26%) and to reduce their



energy bills (25%). A performance-based audit program allows engaging households who have already identified retrofit works to be done in their homes to go through a holistic approach to identifying all the energy-efficiency improvement opportunities in their homes.



Source P2: Now I'm going to ask you to think back to when you decided to participate in the program. What was the SINGLE most important reason you were interested to do so? (n=200)
 Source P3: Were there any other reasons? (n=200)
 Total exceed 100% due to multiple responses

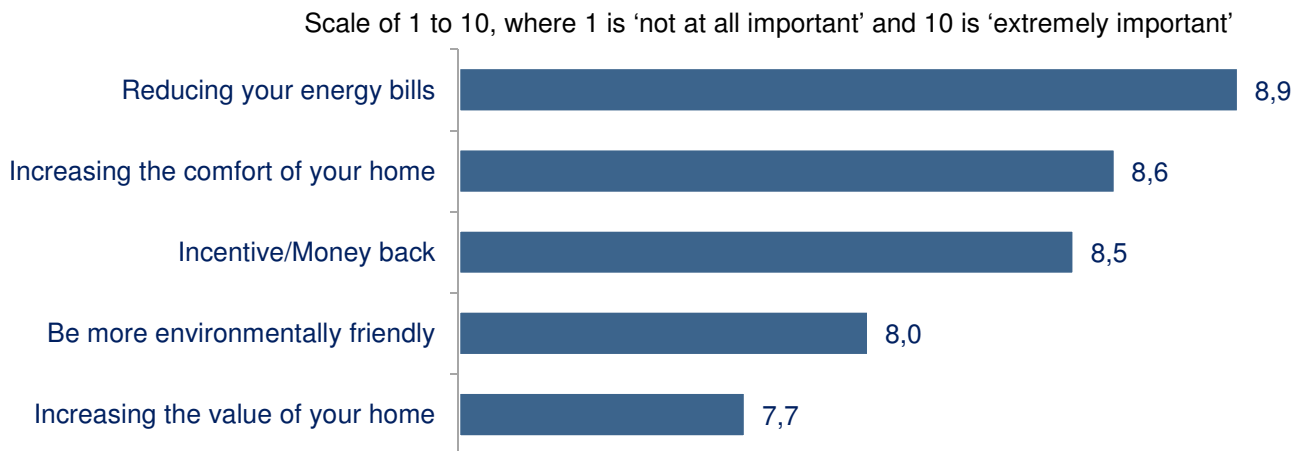
Figure 5: Reasons for Participating in the Program

Participants were asked to rate the importance of the reasons in influencing their decision to participate in the program. As shown in Figure 6, the participants provided a high average rating for three of the five reasons assessed, namely reducing their energy bills (8.9/10), increasing the comfort of their home (8.6/10) and getting an incentive or money back (8.5/10). Being environmentally friendly and increasing the value of their home received a somewhat lower average rating (8.0/10 and 7.7/10 respectively), but were nonetheless considered as having a big influence on their decision by a significant proportion of the participants surveyed.

These survey results indicate the appropriateness of the messages conveyed by EGD's when promoting the HEC program. Indeed, the marketing messages about such themes – as the reduction of energy bills, the possibility of earning incentives, the reduction of the home's impact on the



environment and increasing home comfort are all popular and persuasive arguments among the participants interviewed. In program communication, a bigger emphasis could be put on the theme of greater comfort at home due to its great importance for participants, as shown in this survey’s findings.



Source P9a-e: On a scale of 1 to 10, where 1 is 'not at all important' and 10 is 'extremely important', how important, if at all, were the following when deciding what upgrade(s) to make to your household? (n=200)
Don't know removed from calculation

Figure 6: Reasons Influencing Decision-making on Home Upgrades

Information Received through the Program

Among the participants, 90 percent recalled having received information about their homes’ energy consumption and recommendations on energy-efficiency upgrades they could install. As for the energy audit report, 72 percent recalled having received an audit report from the CEA, while 28 percent did not recall or reported having received none. Among those who reported receiving the energy audit report, 83 percent read it.

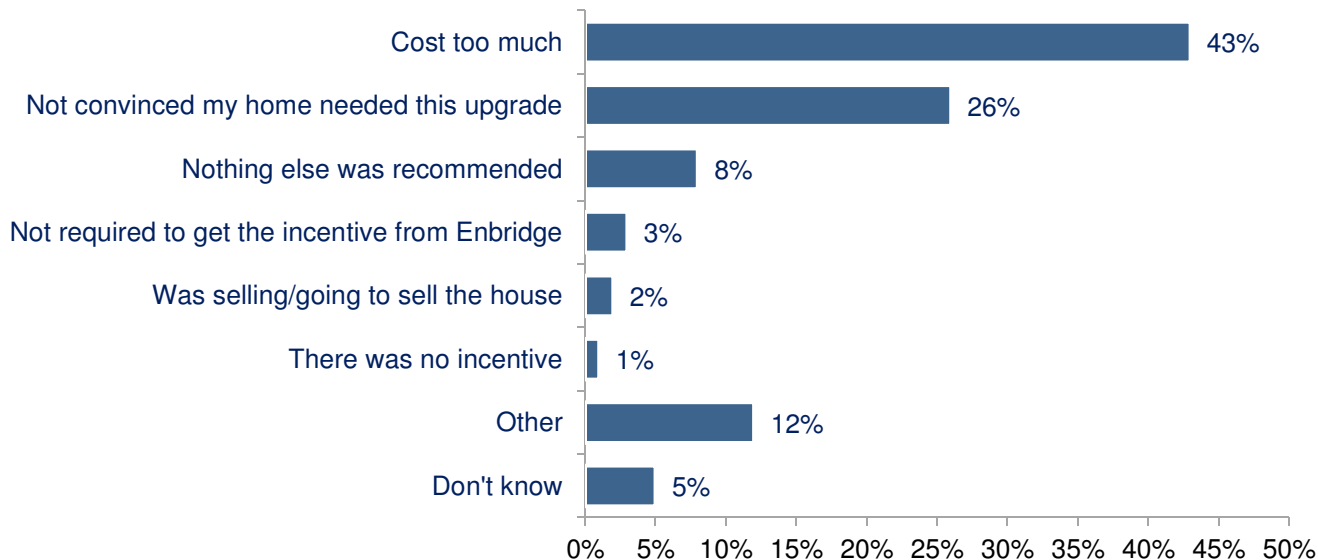
The survey results suggest that improvements could be made to inform program participants about their homes’ new energy performance after the upgrades are implemented in their homes. In fact, only 37 percent of the participants said they had received a new energy-efficiency rating for their home, while 31 percent said they had not received it and 33 percent did not remember receiving any information about their new energy-efficiency rating.

Upgrades Recommended and Barriers to Participation

As mentioned in Section 1.3.1, the majority of participants implemented only two upgrades in their home as part of the HEC program. Among these participants, 44 percent had considered implementing more than two upgrades at a certain point in their participation process, while 46 percent had not considered this option. The respondents explained that they had not implemented more upgrades mainly because of the high cost of the upgrades and their belief that their home did not need



these upgrades (see Figure 7).



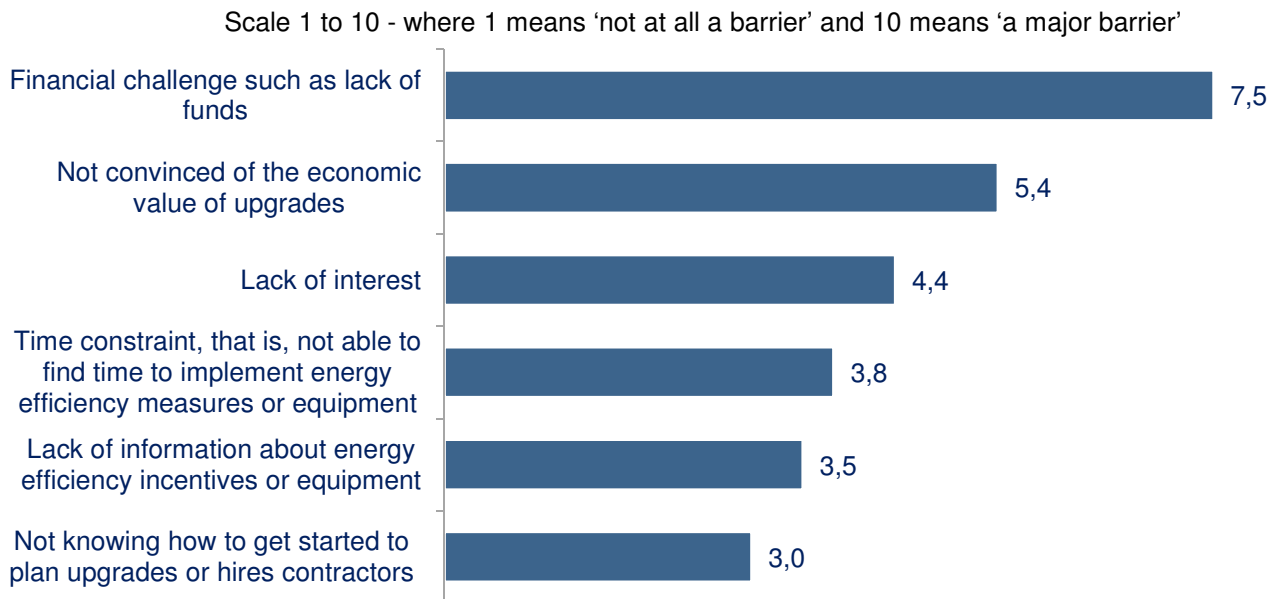
Source U5b: What was the main reason you decided not to implement more than two upgrades through the program? (n=145)

Base: Participants who implement only two upgrades

Figure 7: Barriers to Participation

Respondents were asked to rate six barriers so that the Evaluator could gain a better understanding about what had prevented the participants from implementing some of the recommended upgrades for their home. As shown below, financial challenges such as a lack of funds were seen as the biggest barrier by participants, followed by the scepticism about the economic value of the upgrades.

The survey responses about these barriers highlighted the valuable role that a program such as HEC can play in providing participants with financial incentives and the energy audit report illustrating the potential cost-effectiveness of the recommended upgrades.



Source U3a-f: Now, I would like to ask you about the reasons why you chose not to implement those upgrades. I will read you a list of barriers and for each one, please answer on a scale of 1 to 10, where 1 means 'not at all a barrier' and 10 means 'a major barrier'. (n=61)

Don't know removed from calculation

Base: Participants who chose to not implement some of the upgrades recommended

Figure 8: Reasons for Choosing Not to Implement the Upgrades Recommended

Impact of the Program

The program had a big impact in terms of educating customers about energy efficiency. More than four out of five participants (87%) felt they knew more about their home's energy efficiency after participating in the program (with 61% reporting "very much more" and 26% reporting "a little more").

Thanks to the information received through the program, the participants reported that they were now more aware of power usage. Indeed, 75 percent of participants surveyed reported that the program changed their perspective on how to use energy at home, by a little bit (with 39% reporting) or a lot (with 36% reporting).

Three quarters of the participants (77%) also noticed an improvement in the comfort level at their home, which is a high proportion considering most of them implemented the upgrades less than one year ago. The following improvements were mentioned:

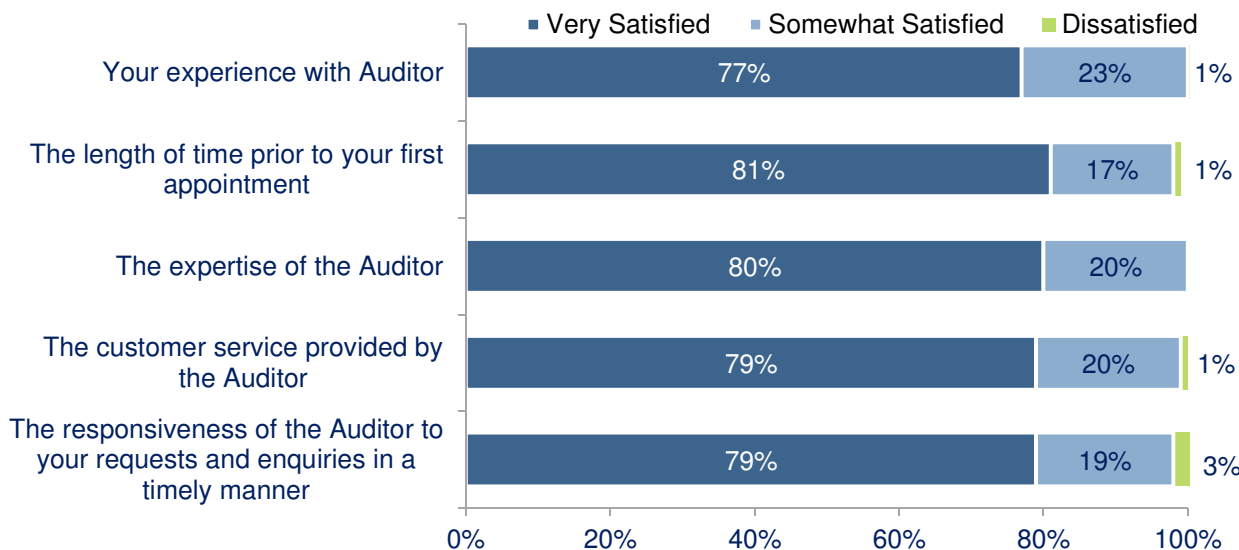
- › Even temperatures throughout the home (33%)
- › Warmer house (33%)
- › More comfortable temperature throughout the home (14%)
- › Noise reduction (14%)



Experience with the Certified Energy Auditor

All the participants were satisfied about their overall experience with the CEA, with the majority (77%) reporting being very satisfied.

Respondents were asked about their satisfaction with specific aspects of their contact with the CEA. As displayed in the chart below, nearly all the participants were satisfied with the length of time allowed to complete the upgrades, the expertise of the CEA, the customer service provided by the CEA and the CEA’s responsiveness to their requests and enquiries.



Source S5f -S6a-d: Now talking about your experience with the Certified Energy Auditor – How satisfied would you say that you are with...(n=200)
Don't know and not applicable removed from calculation
The total may exceed 100% due to rounding.

Figure 9: Satisfaction with the Certified Energy Auditor

Satisfaction with the Program and its Aspects

HEC achieved a very high level of satisfaction. Indeed, nearly all the participants were very satisfied (71%) or somewhat satisfied (25%) with HEC overall. The two primary reasons cited by the participants for their satisfaction were because they reduced energy bills (28%) and they received an incentive (28%) for implementing energy upgrades. Others noticed an improvement in comfort at home (14%); they found that the HEC was a great program and offered great upgrades (13%); and they found their home more energy-efficient (12%).

“I saved money on the monthly bill and the house is warmer”.

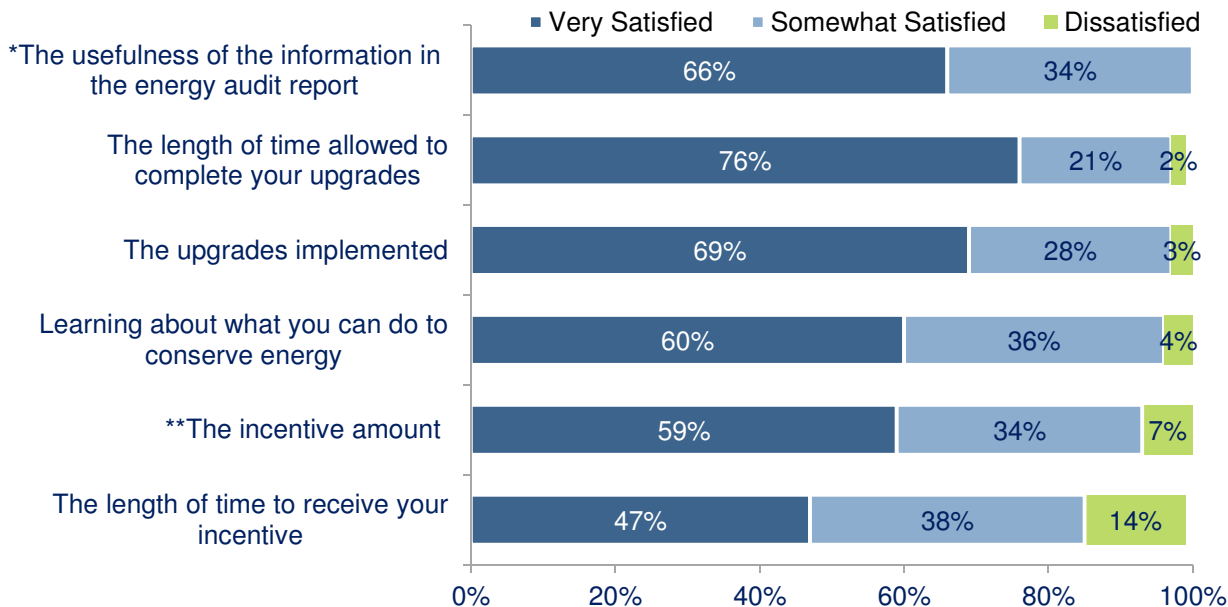
“I saved a lot of money on the work done. I would not have done it if it weren’t for the program”.

“I think the program helped me a lot. The auditor gave me useful information for my home”.



Among the few participants reporting being less satisfied, some had not noticed any savings or reduction of their energy bill (5%); others could not afford to implement all the upgrades (5%); and the incentive was deemed too small (5%).

Respondents were asked about their satisfaction with specific aspects of HEC. As shown in the chart below, the participants were mostly very or somewhat satisfied. All the participants who read their energy audit report were satisfied with the usefulness of the information in the report. The survey results also showed a high level of satisfaction with the length of time allowed to complete the upgrades, the upgrades implemented and the information about how to conserve energy. The incentive amount and length of time to receive it generally received positive ratings, although somewhat less positive than those received by other program aspects. Some dissatisfaction toward incentive amounts and their processing time are common in all program evaluations.



Source S5a-e: How satisfied would you say that you are with the following aspects of your participation in the program? How about... (n=200)

Don't know and not applicable removed from calculation

* Base: Participants who read the energy audit report

** Base: Participants who had received their incentive from EGD at the time of conducting the survey

Figure 10: Satisfaction with Aspects of Program Participation

The participation process seemed easy for the majority of participants, with 69 percent considering the process as “very easy” and 21 percent as “somewhat easy”. The small number of participants who reported having difficulties in taking part in the program mentioned that there was a lack of information (3 respondents), the participation process took too long (2 respondents) and there were too many steps or people involved (2 respondents).



Based on their personal experience with the program, nearly all the participants (97%) said that they would recommend the program offered by EGD to others. This result is consistent with the high satisfaction level described previously.

Recommendations for Improvement

Over a half of the participants had no recommendations on how to improve the program (56%). The participants who did make suggestions recommended advertising the program more or in a better way (9%), offering higher incentives (9%), offering more information on the products or upgrades recommended (6%) and improving communication such as better follow-up (6%).

1.3.5 Interview with Partial Participants

This section discusses the results from six in-depth telephone interviews conducted with homeowners who had initiated participation in the HEC program, but then did not complete the final audit. Four of the respondents lived in single-detached homes and two in semi-detached. Except for one respondent, the participating homes were where the respondents lived themselves.

Sources of Awareness

One of the first interview questions asked about how the respondent had first learned about the HEC program. The sources of awareness are similar to those found in the participant survey (section 1.3.4). Three of the six partial participants reported hearing of the program through a contractor as they were planning to have some work done. One respondent mentioned hearing about the program from a friend and another learned about it from an EGD bill insert. Other sources each mentioned by one respondent were a newspaper advertisement, a Google search for rebates and a Toronto municipal website.

The contractor was also mentioned as a source of influence on the decision to have an energy audit conducted through the HEC program. Three respondents said that the decision was made following a discussion with their respective contractors. One said it was suggested by the insurance company so that this company could assess the home's value using some of the audit findings such as how well it was insulated.

Information Received through the Program

All the respondents said a CEA informed them about their home's energy consumption and provided recommendations on energy-efficiency upgrades. According to respondents, the CEA usually pointed out issues observed during the audit in the homeowner's presence. Then, the CEA sent a written report covering these same issues. Of the six respondents, four reported receiving an energy audit report; one reported receiving a verbal summary; one could not remember. When asked if they read the energy audit report, three said they had. However, it seemed that these reports contained information similar to what the CEA had shared with the homeowner during the audit; so, the report was really quickly browsed.



Only one of the respondents mentioned having questions that the CEA or EGD could not answer. This homeowner wanted some assurance that he would definitely receive the rebate after completing the upgrades; neither the CEA nor EGD offer that guarantee.

Upgrades Implemented and Barriers to Participation

Of the six respondents, five said that they had implemented or were implementing some of the recommended energy-efficiency upgrades. One respondent who was skeptical about the validity of the recommended upgrades decided not to install any of them, thinking that some retrofits had recently been done (insulation) and there was no need to repeat them. In addition, he was not sure that he would receive any rebate even if he completed the recommended upgrades.

The following table lists the upgrades completed by all the respondents except one. This list also includes the upgrades that one respondent was still working on at the time of the phone interviews.

Table 1: Upgrades Implemented

Upgrade	# Who Have Implemented
Wall Insulation	2
Attic Insulation	3
Exposed Floor Insulation	1
Basement Insulation	2
Drain Water Heat Recovery System	0
Water Heater Tank	2
Windows	2
Air Sealing	4
High-efficiency Furnace	4

As previously noted in this report, contractors had a strong influence. This influence can be seen in the number of high-efficiency furnaces installed; four of the six respondents each had a high-efficiency furnace installed. Air sealing was also mentioned by four of the six respondents.

The participants who completed (or were completing) upgrades were asked to rate the level of influence that the audit and the report had on their decision on a scale from 0 to 10 (with 0 indicating “no influence” and 10 “a great deal of influence”). One respondent indicated that there was no influence (with a rating of 0), since he was already considering doing the exact same ones. Two indicated that there was some influence (with both giving a 5) and particularly some influence on the smaller upgrades such as air sealing. One indicated that the audit and the report were highly influential (with a rating of 8).

Among the various reasons cited for not completing the second audit varied; two consistent themes were identified. Two of the respondents had not completed all the recommended upgrades and as a result, they did not think it was worthwhile to complete the second audit. Two respondents mentioned



difficulties with scheduling. One of these two said that the second audit was booked, but the CEA never showed up; the other said it was difficult to schedule the second audit. The remaining two respondents had not yet tried to complete the second audit; one was in the process of completing most of the upgrades and the other decided not to install any upgrades.

Experience with the Certified Energy Auditors

The respondents were asked to evaluate their satisfaction with their CEAs on the attributes shown in the Table 2 below. There was mixed reaction to the question of the CEA’s responsiveness. Three of the respondents said they were very satisfied with the responsiveness and the other three were somewhat dissatisfied (two) or very dissatisfied (one). One of the respondents giving a lower rating had a delay on the project and tried to reach the CEA to see if it would be possible to have an extension. Another said the CEA did not come at the scheduled time and was then difficult to reach. The issues with responsiveness occurred toward the end of the participation process rather than at the beginning. This issue was not mentioned in the participant survey results, which showed quite a high level of satisfaction with the CEA’s responsiveness to the participants’ requests and enquiries.

The wait time between the first contact and the visit received good ratings, with most respondents reporting “very satisfied” and one reporting “somewhat satisfied”. Most reported that the CEA’s visit happened within a week following the contact.

Table 2: Satisfaction with Certified Energy Auditors

Title	Very Satisfied	Somewhat Satisfied	Neither	Somewhat Dissatisfied	Very Dissatisfied	Not Applicable / Do not Know
The responsiveness of the CEA to your requests	3	0	0	2	1	0
Length of time prior to first appointment	4	1	0	0	0	1
Expertise of the CEA	3	0	0	1	1	1
Customer service provided by CEA	4	0	0	1	1	0
Experience with CEA	4	0	0	0	2	0

The CEA’s expertise was given a “very satisfied” rating by three of the respondents. Two reported being dissatisfied (one “somewhat dissatisfied” and one “very dissatisfied”) because one CEA never showed up at the scheduled time, and the other was skeptical about the recommendations made by the CEA from the very beginning.

The same two respondents who expressed dissatisfaction with the CEA’s expertise were dissatisfied with the customer service and their overall experience with the CEA. All the other four respondents



were very satisfied. At least two respondents noted that there was a follow-up/reminder from their CEA as they approached the deadline to complete the final audit, which they appreciated.

Satisfaction with the Program and its Aspects

The respondents were also asked to rate their level of satisfaction with three aspects of the program. Learning how to conserve energy was the highest rated element of the program. Three said they were very satisfied and two said they were somewhat satisfied.

The time allowed to complete the upgrades was an issue for three of the respondents, who had not completed their upgrades in the time allowed. They were somewhat dissatisfied (two) or very dissatisfied (one). The other two respondents said they were very satisfied with the time allowed.

As mentioned previously, the energy audit report often only received a cursory review from the respondents. Not surprisingly, the satisfaction ratings were then not that strong: three respondents said they were somewhat satisfied with the audit report; one was very satisfied; and one was very dissatisfied.

Table 3: Satisfaction with HEC

Aspect Rated	Very Satisfied	Somewhat Satisfied	Neither	Somewhat Dissatisfied	Very Dissatisfied	Not Applicable
Learning how to conserve energy	3	2	0	0	1	0
Time allowed to complete upgrades	2	0	0	2	1	1
Usefulness of energy audit report	1	3	0	0	1	1

Of all the six respondents, four said it was very easy to take part in the HEC program; one said it was somewhat easy, and one said it was very difficult because he had not yet completed the program participation steps due to the difficulty in reaching the CEA to complete the final audit. The CEAs interviewed did mention how particularly busy they were over certain periods of the year, especially in the fall when many participants try to complete their audit E before the end of the year.

Recommendations for Improvement

Toward the end of the interview, respondents were asked to make recommendations on how to improve the HEC program. Two questioned the program deadline for completing the projects and thought it should be extended. In fact, they wondered if it was still possible for them to complete the program following the retrofit work they had done. One respondent did not make any recommendations. Other recommendations from the participants’ perspectives are listed below:

- › The program should allow smaller projects, like air sealing, to be completed by the homeowner as long as the final inspection confirms that the work has been done.
- › Thermal spectrographic imagery should be included.



- › More follow-up should be performed by EGD to ensure that final audits are completed.
- › EGD should guarantee that if the work is done, then homeowners will definitely receive a rebate.

None of the respondents said that they were so discouraged by their experience that they would avoid participating in future EGD programs, although several said that they would be more cautious in their future participation. Two said they were very likely to participate in a future program, three said they were somewhat likely and one said “neutral”. All the respondents said their future participation would depend on the specifics of the program and how it applies to them. The two respondents who gave the most negative evaluation of the program and the CEA said that they would want a guarantee from EGD that if they install upgrades, then they will be granted the rebate.

1.3.6 Interviews with Contractors

This section presents the findings from six in-depth interviews with contracting companies that implemented HEC projects between January and June 2016. The interviews were conducted with sales, marketing and installation managers in these companies (hereafter referred to as contractors). All the contractors interviewed mainly implemented HVAC measures.

It is worth noting that the findings discussed in this section have been made based on the interviews with those contractors who accepted to answer the Evaluator’s questions and they may not represent the points of view of all the other contractors. During the process of booking the interviews, some contractors refused to be interviewed and expressed deception or animosity toward the program. A contractor said they did not want to have anything to do with the HEC program. Another said there was not much to say because the only thing they had done was to provide a CEA with the contact information of those customers interested in receiving a rebate for a furnace. One contractor said they had not succeeded in recruiting any customer for the program, mostly because of the program’s demanding requirements; however, it seems that this contractor did not have a good understanding of the program’s requirements.

Program Awareness and Satisfaction

The interviewees were involved in the program for various periods of time, starting from the beginning of 2012 up to the spring 2016. They first learned about the HEC program from EGD, a CEA, or by word of mouth from other contractors. One contractor reported taking the initiative to visit EGD’s website and contact a CEA to start getting involved in the program. Two contractors reported being very familiar with the HEC: one has been involved since the program was launched; and the other has had direct contact with EGD. The four other contractors said they were somewhat familiar with the program.

Overall, all the contractors reported being either very satisfied or somewhat satisfied with the program and its different aspects. Half of the contractors were very satisfied with the eligibility requirements, while the other half were somewhat satisfied. Four contractors were somewhat satisfied with the HEC incentive structure, while the two others did not express any concern on this topic. Costs alleviation,



energy savings, efficient management, and the whole-house energy efficiency approach (domestic hot water, heating, and insulation) were cited as the HEC program's strengths.

Communication with Certified Energy Auditors

All the contractors received information from CEAs about the HEC program, mostly regarding eligibility requirements or changes to the program. One contractor reported having received training. The contractors received promotional materials from CEAs, but these materials were mostly for internal use and were not distributed to customers. Three contractors said they would like to receive additional information, such as technical information about audits or details about the upcoming changes to the program. Brochures were mentioned as something that would be useful for distributing and better informing customers, instead of only relying on face-to-face talking with customers.

The contractors indicated that they were very satisfied with their relationship with CEAs. Most of them established a good working relationship with CEAs over time. The CEAs were described as available, professional, knowledgeable, and able to complete their work on time. The few limited concerns cited were related to delays in file processing, which was also considered as beyond the CEAs' control.

Customer Interaction and Program Outreach

According to the contractors interviewed, generally customers did not know about the HEC program before meeting with them. Homeowners who were already aware of the HEC program had received EGD's promotional materials or had been informed by other contractors when gathering quotes from multiple contractors. Indeed, as indicated by the participant survey findings, one third of the participants first heard about the program through a contractor. All the six contractors promoted the HEC on their organizations' websites without using any other promotional materials. They generally referred customers to EGD's website or relied on the CEAs to provide more information downstream.

Half of the contractors reported promoting the HEC program among all their customers. The other half reported promoting the program only among those customers who were potentially eligible, for example those homeowners with no high-efficiency furnace. One contractor recommended different types of equipment depending on whether the customer was an HEC participant or not, namely by recommending higher-efficiency yet less affordable furnaces to participants. The other five contractors mentioned they recommended the same equipment to all the customers, because most furnaces in the market are now high-efficiency or because the contractor believed in introducing customers to the best technology option regardless of their participation in a program.

Generally, the contractors did not think that it was their role to help customers decide on the kinds of upgrades to implement. It is well understood that it is the CEA's responsibility to recommend energy-efficiency upgrades. One of the contractors said it was possible providing customers with explanations about a second or a third potential measure, but no recommendations. However, the contractors did report assisting customers in selecting higher-efficiency furnaces among their products. Other roles



mentioned included facilitating communication between customers and CEAs, and providing information on incentives available and energy savings.

Overall, once a customer learned about the existence of the program, contractors relied on CEAs to provide detailed information about the HEC program and other upgrades than a furnace. The contractors provided customers with a CEA's contact information, or provided a CEA with customers' contact information.

Barriers and Difficulties Related to Program Delivery

According to the contractors interviewed, there were overall few complaints from the participants. The few complaints received concerned the visual aspect of an upgrade which did not meet the customer's expectation, installers leaving debris behind, costs of upgrades, or delays in receiving the incentive.

Three contractors mentioned that some customers were concerned about the possibility of their energy savings failing to meet program requirements. According to these three contractors, customers are: (1) often reluctant to spend money without being given a guarantee that they qualify for an incentive and (2) confused about the amount of incentive available, since it is based on the increase in energy efficiency (performance-based) instead of the upgrades installed (prescriptive based). This worry was also echoed in the CEAs' comment that performance-based programs are usually less instinctive since energy efficiency is not well understood by the general public. Even after having been involved in the HEC program for a number of years, one of the contractors indicated that the eligibility requirements were vague and that it was difficult to explain to potential participants why it was necessary to implement a second upgrade, along with the furnace upgrade, to be eligible for the HEC.

Program Influence

Five contractors described EGD's implementation of efficient furnaces as highly influential (but could not comment on other upgrades as they were HVAC contractors). They considered the program helpful in (1) increasing the number of high-efficiency units sold in the market; (2) encouraging customers sitting on the fence to install a furnace upgrade, and (3) educating customers about energy efficiency's benefits. One contractor specified that since EGD is a "big name", the company's energy-efficiency efforts encourage the market to adopt more efficient technologies or measures.

Most contractors also made positive comments on the program's impacts on their respective organizations, saying that the HEC program served as an additional marketing tool, provided them with a competitive advantage in the market, and helped generate a higher volume of sales. However, one contractor said that they did not see any impact on the market from the HEC program since the company decided to target those market segments covered by other energy-efficiency programs which generate more business and more interest among homeowners according to this contractor.



Contractors' Recommendations for Improvements

In addition to the recommendations on increasing the incentive available and reducing the time needed to process participants' files, contractors made other suggestions for improving the HEC program regarding marketing and program delivery.

The contractors expressed some concerns about the fact that contractors are practically the main program driver. Of the contractors interviewed, three voiced the opinion that increasing program awareness among EGD customers before they meet with a contractor would help improve their understanding of the HEC's whole-house approach. Contractors are excellent sales people, but since they promote a specific type of measure, this can easily lead to the impression that HEC is more of a prescriptive program featuring the installation of high-efficiency furnaces. This view was also shared by CEAs, whose points of view are further detailed in the next section.

In addition, these three contractors noticed that some customers were confused about the program. According to these contractors, customers can easily understand the program's process and requirements when these are properly explained to them; but they can get confused when they receive wrong information from other contractors. Such contractors might have tried to take advantage of the program to complete more sales or might not have been familiar with the program's requirements. The three contractors recommended that simple promotional materials be developed and provided to contractors to be handed out among customers instead of relying on verbally provided information only.

1.3.7 Interviews with Certified Energy Auditors

This section discusses the findings from three in-depth interviews with program partners. The interviews were conducted with representatives of CEA organizations.

Involvement in the Program and Satisfaction with It

All the respondents were involved in the program for at least three years and indicated high overall satisfaction with HEC, especially with its current format. CEAs were aware of EGD's recent efforts to secure program funding for the coming years and improve communication and program management. However, two CEAs still considered their own involvement in the program as complicated. The reasons for this include the program's many facets and various people involved as well as a feeling that EGD does not really use the CEAs' full capacities. One respondent added that the CEAs know their job, but think that EGD does not really understand how to make the best use of the services offered by CEAs.

All the CEAs were either very or somewhat satisfied with the HEC's eligibility requirements and incentive structure. Concerning eligibility, similar to a contractor, a CEA expressed discontent that the age of the furnace was not taken into consideration along with the efficiency level. As for the incentive



structure, one respondent mentioned that the incentives were low compared to those offered by similar programs.

One CEA was very satisfied with the marketing and outreach activities initiated by EGD, while two CEAs were somewhat dissatisfied. One CEA was concerned about the fact that traditional marketing channels are highly saturated and may not be the best way to promote the program. Therefore, it was mentioned that the marketing needs to be more streamlined and focus on channels where it is possible to create the greatest impact with a limited amount of funding. One CEA expressed some dissatisfaction with the fact that EGD targets HVAC contractors to drive the program instead of targeting directly customers. This CEA agreed that contractors are a sort of “low-hanging fruit” to help promoting the program, but mentioned that EGD should direct more marketing efforts toward homeowners. According to this CEA, the HEC program would be more what is it meant to be, i.e. a whole home approach, if the process was initiated more by homeowners and CEAs, instead of by HVAC contractors who promote their products (furnaces). A similar opinion was also expressed by some contractors. This CEA mentioned that furnace upgrade is a good way to generate energy savings, but it does not represent a whole-home approach; in this way, it is harder for CEAs to suggest additional upgrades after contractors promote high-efficiency furnaces and clients mainly consider this upgrade.

Overall, CEAs mentioned that the HEC’s strengths include resource allocation, communication with program partners and streamlined administration. CEAs also appreciated the fact that, as a performance-based program, the HEC revolves around increasing energy-efficiency knowledge among customers.

Relationship with Enbridge Gas Distribution

All the CEAs were very satisfied with their communication and relationship with EGD. The CEAs mentioned that they were in regular contact with the HEC team, which offered plenty of opportunities to provide input. CEAs felt they were listened to by EGD and appreciate EGD’s good understanding of the business challenges and long-term vision, which was not observed as much when the initiative was led by NRCan. One CEA doubted, however, how the feedback provided was really considered and implemented by EGD.

All the CEAs were very or somewhat satisfied with the information or training received from EGD on all the aspects of the program. Two of the CEAs actually mentioned they provided more training to EGD than they received from it. One CEA suggested setting up a score card covering target metrics to be reviewed at a monthly meeting as a way to create more accountability without changing targets too often. Another CEA mentioned he would like to bring the HEC team to witness an energy audit and better understand a CEA’s daily work and services to together brainstorm solutions to improve the program.



Communication with Contractors

Each CEA worked with a big number of contractors (a few hundred altogether). Overall, CEAs were satisfied with their relationship with most contractors, especially those that were well trained and understood the program and its benefits. The relationship was described as symbiotic as CEAs and contractors both benefit from each other's work. The CEAs mentioned, however, the issue that some contractors (about 10%), mainly HVAC contractors, impart the wrong expectations among homeowners and describe the incentive as automatically available, which creates disappointment and confusion among potential participants. The majority of the audits are set up with the help of contractors and CEAs were somehow concerned whether this constitute a challenge to fully delivering the program by following its whole-home approach.

Interaction with Customers and Program Outreach

The CEAs interact with customers mostly following a first contact between customers and contractors. The other customers' interactions are a result of word-of-mouth and EGD's mass-marketing activities where homeowners contact CEAs directly. As for program outreach, CEAs mostly target contractors using brochures and one-page flyers, which are provided by EGD or produced by the CEAs and approved by EGD. CEAs do not really take part in program outreach activities involving homeowners. One CEA mentioned that EGD's promotional materials had not been produced on time, which was the reason why this CEA's organization produced its own marketing materials.

The CEAs view their role as critical for providing homeowners with recommendations on how to make their homes more energy-efficient, help them qualify for the program and obtain the maximum incentive. It was mentioned how CEAs do not necessarily help select the upgrades, since there is a fine line between encouraging upgrades and being a salesperson. The homeowners' decision on which upgrades to select among the ones recommended in the energy audit report depends on budget availability and the information first received from contractors. All the CEAs mentioned that they discuss energy efficiency with homeowners. According to the CEAs, those participants that contact a CEA after hearing about the program from EGD's marketing activities (instead of from HVAC contractors) are generally more receptive to recommendations about additional upgrades beyond what was initially considered as retrofits.

The main follow-up with participants conducted by CEAs after the first energy audit is the energy audit report. CEAs do not conduct further follow-up, though they answer questions when homeowners inquire about their energy audit report and recommended upgrades.

Barriers and Difficulties Related to Program Delivery

The CEAs pre-screen homeowners to determine their eligibility. According to the CEAs, the proportion of homeowners that do not qualify after the pre-screening process is usually small. About 5% to 10% of customers who are first in contact with a contractor, which is often the case, do not qualify. The contractors were said to be helpful in the pre-screening process. The proportion of homeowners who



contact a CEA first (before getting in touch with contractors), but do not qualify for the HEC, was higher (as much as 50-60% of customers calling to investigate about the program according to CEAs). The reasons for customers failing to qualify include already having a high-efficiency furnace and living in a relatively new house (therefore without the potential for achieving the minimum savings). Also, not all the customers who qualify after the pre-screening participate in the program because of budget availability, postponed participation to a time when it would be more convenient to undertake renovations, or a lack of interest for implementing another upgrade along with the furnace upgrade.

According to the CEAs, few customers (less than 5%) do not achieve the necessary savings and therefore do not qualify for an incentive after completing Audit E. If this is the case, it is usually due to a change in circumstances since Audit D had been conducted. In general, the CEAs found that those customers who had completed an Audit D to be receptive to recommendations for additional upgrades, though in reality many do not implement more than two upgrades because of the costs.

The CEAs' experience suggests that the least popular upgrades include (in no particular order):

- › Main floor wall insulation, basement insulation and windows, since they are more expensive and require more commitment from the homeowner to undertake such upgrades
- › Heat recovery ventilation and water heaters, since they are more expensive measures and the existing systems usually work well.
- › Drain water heat recovery as it is easier to install in a new home than as part of a retrofit,
- › Exposed floor, since it does not generate many savings by itself unless it is part of a much larger renovation project.

According to the CEAs, some elements of the HEC program are not well understood by participants. All the CEAs mentioned that participants are usually confused about energy savings and energy efficiency in general. For example, some homeowners wonder how a CEA could provide recommendations on how to improve their house's efficiency without looking at energy bills. It is usually easier to understand prescriptive programs, and especially the level of incentive to be received. As for the complaints about the HEC program, the CEAs received few of them. However, some participants inquired if their file had been processed or asked when they would receive their incentive. It was mentioned by one CEA that, though it is not easy to deliver performance-based programs and there is still room to improve the HEC's program delivery, such a program is very helpful and highly valuable.

Program Influence

The CEAs presented various perspectives on the program's influence on the residential market. According to one CEA, the HEC program has a very positive impact on the market as performance-based programs can provide participants with a better understanding about energy efficiency and savings, and such a better understanding would not be achieved through prescriptive programs.



However, according to another CEA, considering the size of the program and the size of the residential market, the HEC program has a very limited influence on the overall market.

As for insulation, one CEA considered the program have much influence on the popularity of this measure as the program can easily persuade customers to install insulation in their homes, while another one mentioned it is somewhat influential since this measure is not visible and not that easy to understand. They commented that people know there is already insulation in their walls and would question why there is a need for adding more.

As for air sealing, two CEAs thought the program have a big influence on the implementation of air sealing in homes as this measure is easy to understand and implement even by participants themselves. Although air sealing received large uptake among program participants, one CEA mentioned that the measure's energy savings impact might be reduced when implemented by the participants themselves because this measure is actually more difficult to effectively implement than it seems.

As for furnaces, all the CEAs agreed that the program is extremely influential in the adoption of this measure in the residential market, since HVAC contractors are described as effective marketers and this measure has a direct impact on fuel usage and generated high savings (thus making it easy for homeowners to meet the HEC requirement). Also, there is a direct link between fuel consumption and the energy bill, and homeowners understand this very well.

Finally, all the CEAs highlighted how the HEC program is a great success for their organizations and led to more employment and business opportunities.

Recommendations for Improvements

Some specific suggestions to improve the HEC were made by respondents during the interviews. To increase measure uptake, one CEA mentioned that participants should be allowed to re-enter the program more than once, which means they could first upgrade their furnace and reduce air draft, and still be eligible for improving insulation as part of a subsequent round of participation. He also suggested providing additional bonus if participants have implemented a third and a fourth measure as part of their retrofit. Another CEA recommended there should be more incentive for windows and wall insulation.

In terms of data-tracking, CEAs consider the process mechanical, a bit rudimentary, and time-consuming, but suggested it could be a bit more automated, with more macros created to reduce the volume of manual inputting.

The CEAs also shared their perspectives on the administrative side of things. Although they consider the program to be overall well managed, some recommendations were made. One CEA has been in contact with two different teams at EGD for the HEC program and suggested having only one team in order to avoid and reduce miscommunication and facilitate effective administrative work. Another CEA



mentioned it would be a great improvement if the similar residential upgrade programs offered in Ontario were merged to offer centralized energy-efficiency services.

1.4 CONCLUSIONS AND RECOMMENDATIONS

This section presents the conclusions and recommendations concerning the key research areas covered by the HEC program process evaluation.

Program Design and Management

The HEC program was designed to make a big impact on the residential market by following a whole-house approach to achieving energy savings. The incentives structure, based on the percentage of savings achieved, helps ensuring energy savings target by household are met. Moreover, the HEC program has a logic model which enables the program administrator to think through likely program outcomes and ensure the strategic and tactical approaches will lead to the desired results.

The interviews with the CEAs showed that EGD followed a collaborative and coordinated approach to HEC's program management. The CEAs said they have plenty of opportunities to provide input on the program and are in regular contact with the HEC program team. An excellent communication channel has been established between EGD and the CEAs over time.

Recommendation No. 1: Define and monitor the program performance indicators

To improve program management, the Evaluator recommends defining and monitoring additional performance indicators (in addition to the current CCM of natural gas saved and the numbers of projects completed) based on the outcomes outlined in the logic model. The target metrics are expected to not only help quantify program objectives and outcomes, but also facilitate regular follow-up and monitoring. Such indicators could include the numbers of customers contacted, the customers' levels awareness and satisfaction related to the program, and the number of energy-efficiency measures installed and audits completed. It would be interesting to monitor the participants' satisfaction over time and analyze the satisfaction ratings for each of the CEAs and contractors in order to detect potential service-delivery problems and ensure a good customer experience. Monitoring participants' awareness and satisfaction metrics can provide support and help for developing streamlined marketing activities.

To maintain a collaborative approach, the CEAs should be involved in the process of defining program metrics. This also helps to align the program delivery more easily with the performance indicators, especially if these indicators evolve and change over time. However, a multi-year planning approach should be favoured wherever possible. All the performance indicators and monitoring approaches should be included in the program plan.



Program Database and Documentation

It was found that the HEC program database contains the main information required for program management and process evaluation purposes. Overall, it is clear and well structured. EGD uses an electronic management system to facilitate data-tracking and validation, and using such a system is considered as a best practice for operating a residential energy assessment program. The program plan was also found to be relevant and a valuable tool for both the program staff and the Evaluator.

Recommendation No. 2: Further improve the program database by introducing better uniformity and some additional participant information

The Evaluator recommends standardizing the date-entry format in the database in a more consistent manner, thereby facilitating analysis of the results. To further improve the database's content, additional participant information could be included, such as the participants' email address, the incentive amount, the D Audit file number, and savings potential. The Evaluator's previous experience suggests that adding participant could help improve data consolidation and management and facilitate follow-up and evaluations.

Recommendation No. 3: Complete the evaluation plan section of the program plan

To ensure continuity between evaluations and facilitate evaluation-planning, the Evaluator suggests completing the evaluation plan section in the program plan by providing at least the following information: (1) previous process, market, impact or other types of evaluations undertaken, their dates, and whether they were completed by in-house staff members or external third parties; and (2) plans for future evaluations, including expected dates and scopes.

Program Delivery and Participation Process

Customer education is an important aspect of programs featuring whole-house approaches. In this respect, it was found that the HEC program has yielded excellent results in increasing energy-efficiency knowledge among participants. After taking part in the program, the majority of participating customers reported knowing more about energy efficiency and changed their perspectives about energy usage at home. The program has provided a simple and easy participation process, as demonstrated by the participants' high satisfaction level. The contractors were also found to be a strong force in driving a high level of participation among customers. The HEC program provides contractors with intrinsic motivations to participate in program delivery.

Recommendation No. 4: Perform follow-up with participants as part of HEC's program delivery as the deadline approaches for completing the final energy audit

Although the HEC participation experience received good ratings from participants, the Evaluator suggests that each of the CEAs perform follow-up with participants or give them a reminder about E



Audits deadline to further improve the participation process. Performing regular follow-up is also a best practice in energy audit program delivery to encourage customers to follow through on their projects.

By contrast, according to the CEAs interviewed, they rarely conduct follow-up with participants unless a customer calls them to enquire about the recommended upgrades in the energy audit report. The interview conducted with partial participants indicated that of the six respondents, three mentioned they had not completed their upgrades before the deadline set, and were dissatisfied with the time allowed to complete the upgrades. Such follow-up could help respond to the participants' questions about the project deadline or reduce dissatisfaction with the time allowed to complete the upgrades. Performing follow-up could also help schedule Audits E more evenly throughout the year to avoid the CEAs' end-of-year rush when they have to complete a big number of final audits within a short period of time.

Recommendation No. 5: Improve homes' energy performance information delivery to HEC participants

Although a high number of participants reported that they knew more about their homes' energy efficiency after participating in the HEC program, 28 percent did not recall having received any audit report and 64 percent did not recall having received a new energy-efficiency rating for their home after having implemented the upgrades. These survey results suggest that improvements could be made to better inform participants about their homes' old and new energy efficiency levels. Providing customers with such information is a crucial component in a home energy efficiency improvement program featuring the use of pre-retrofit and post-retrofit audits. Such information, if properly presented and delivered in a timely manner, could help persuade participating customers to implement the upgrades recommended and help them understand the upgrades' impact on making the savings. The Evaluator recommends working with CEAs to identify ways to improve communication of the energy-efficiency results to participating homeowners.

Recommendation No. 6: Provide an additional incentive to encourage participants to implement more than two energy-efficiency upgrades.

The HEC program offers fixed incentives based on the range of energy savings achieved (25%-49%, or 50% or more energy savings). Despite this incentive structure, most of the HEC program participants have implemented only two recommended upgrades as part of their retrofit work. The Evaluator therefore recommends considering adding an incentive aimed at increasing the number of measures included in each project. This additional incentive would help overcome the cost barriers linked to the implementation of more upgrades. The incentive could be a small bonus awarded for implementing a third and a fourth measure. The additional incentive could be applied without modifying the current incentive structure so that the main incentive amount can continue to be granted based on the level of energy savings achieved.



Program Marketing and Outreach

Participants mostly found out about the program through word of mouth. This is a good indicator of the high satisfaction level among participants which was confirmed with the survey results. The Evaluator also noticed that the main reasons cited for participating in the HEC program were the same benefits advocated by EGD's key marketing messages (increase the energy efficiency at home, lower the energy bills, increase comfort at home, and educate the customer on home energy conservation). This shows that EGD's marketing materials convey the proper key messages, which highlighted both energy-savings benefits and non-energy-savings benefits. Among EGD's marketing tools, the HEC micro-website was the most cited by respondents as a source of program awareness. The website was also found to be very useful to CEAs and contractors. EGD's various marketing tools were found to have contributed to raising awareness about the program among HEC participants.

Recommendation No. 7: Provide a brief program description leaflet for contractors to hand out to potential participants

The Evaluator recommends providing the contractors with a simple program leaflet summarizing the participation process, eligibility criteria, eligible upgrades and incentives. Doing so would ensure that accurate and up-to-date information is delivered to customers, thereby reducing the possibility of creating false expectations among potential participants. Such a leaflet would allow contractors and potential participants to consult tangible documentation instead of only relying on verbal information only. Such a leaflet would also help increase the contractors' knowledge about the program.

Recommendation No. 8: Further increase the program micro-website's contents⁴ and keep the CEAs' websites up-to-date

To further improve the program's online marketing, the Evaluator recommends the following small changes to the "knowyourenergyscore.com" micro-website:

- › Add an explanatory video to the program's micro-website, walking the customer through the program process or presenting typical upgrades.
- › Clarify the information concerning the HEC program's incentive structure as the current description was found to be confusing.
- › Make it clear to customers that they must be a homeowner to be eligible to participate in the HEC program.
- › Turn the names of the approved CEAs listed into hotlinks leading to their respective websites.

Finally, EGD should work with the CEAs to make sure their respective websites present the most up-to-date information about the HEC program.

⁴ knowyourenergyscore.com



General Observation and Recommendation

Overall, it was found that the HEC program was satisfying for all the parties involved (participants, contractors, and CEAs), and that it generated strong interest and high participation in the residential market.

Recommendation No. 9: Consider relying on channels or networks other than contractors to recruit participants

In its current format, the HEC program relies heavily on contractors to promote and drive the program. However, since most audits are scheduled through contractors and contractors mostly promote a specific type of measure, the CEAs generally face the challenge to effectively delivering the program by following its whole-house approach. If EGD intends to bring the HEC program a step further in terms of the energy savings achieved, the number of upgrades installed per home, and energy-efficiency knowledge among participants, the Evaluator suggests relying less on the contractors to recruit participants. This potential objective could be done if more participants contact a CEA to initiate their participation process after hearing about the program through EGD's marketing activities and materials. Currently, relying on HVAC contractors to recruit participants is not necessarily favourable to the uptake of a wide range of energy-efficiency measures, apart from energy-efficient furnaces. The HEC program outreach strategies and delivery process could be improved to better identify those potential participants who have not yet planned undertaking energy retrofit in their homes. As for participants who have already planned such work, the HEC program design, however, is currently very helpful in recommending additional upgrades and expanding the retrofits' scope through the energy performance audits.



2 HOME WINTERPROOFING PROGRAM

2.1 PROGRAM OVERVIEW

In 2007, EGD launched the Home Winterproofing (HWP) program (previously known as the Low Income Weatherization program) which aims at improving the natural gas energy efficiency of low-income residences in Ontario. Specifically, the HWP program provides low-income customers with a free home energy audit and building envelope upgrades (insulation and air sealing measures).

EGD's main approach to delivering the program is to work with three primary delivery agents (DAs) who perform the energy audits and install measures. These DAs are well-established in their communities and have strong links to social service providers.

The HWP program is available for:

- › Occupants of single detached and low-rise multifamily households (3 stories or less) OBC Part 9.
- › Private homeowners and residential tenants within the EGD franchise who pay their own gas bills and whose income is at or below 135% of Statistics Canada's Low Income Cut-Off (LICO).
- › Tenants residing in social and assisted housing, regardless of gas bill payment responsibility.
- › Recipients of social assistance benefits.

Once all the eligibility requirements have been validated and the potential participant has filled out the application form, a pre-retrofit energy audit (A Audit is conducted by the DA's certified energy auditors (CEAs). During A Audit the CEAs determine which building envelope upgrades are most appropriate for each home. Also at the time of assessment, the home prequalifies for water conservation measures (e.g. showerheads and aerators), CO detectors, heat reflectors and a programmable thermostat. CEAs also calculates potential gas savings through the use of HOT2000 (NRCan's accredited modelling software) from new insulation (attic, wall and basement) and air sealing upgrades, while evaluating potential health and safety issues that could prevent the installation of these upgrades, such as high moisture, poor insulation or old wiring. Once the upgrades are installed, a post-retrofit energy audit (B Audit is conducted to verify the modelled gas savings calculated through the use of HOT2000.

In 2012, the program was modified to include additional measures, such as providing CO detectors to participants. In 2014, the marketing and outreach strategy was modified and the program was renamed Home Winterproofing. In 2015, heat reflector panels were added to the program. Otherwise, the program has not undergone any major changes.

2.2 EVALUATION METHODOLOGY

2.2.1 Methodological Model

Figure 11 illustrates the research strategy used to conduct the HWP program process evaluation. The data-collection activities carried out in the evaluation are then further described in detail.

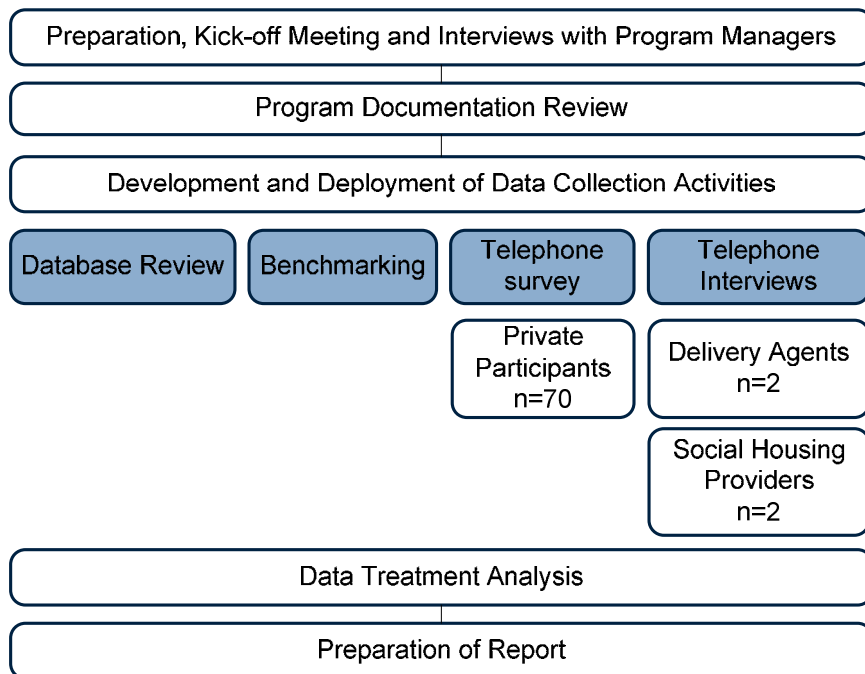


Figure 11: HWP Program Methodological Model

2.2.2 Program Database and Documentation Review

As part of the process evaluation, the Evaluator reviewed the HWP program database to assess its components and mechanisms. More specifically, the review was done to achieve the following objectives: (1) to verify whether it provides the complete information needed for program monitoring and evaluation by following the industry’s best practices; and (2) to assess the level of consistency among the various data-entry fields and detect abnormalities that need to be addressed.

The Evaluator also reviewed the program documentation such as the marketing brochure, the program website, logic model, and process map. The Evaluator also reviewed the report summarizing the participant focus groups held by EGD.

2.2.3 Benchmarking against Similar Programs

The Evaluator conducted a benchmarking study to compare the HWP program with other similar North American residential audit programs by focusing on key design elements, such as the eligibility criteria



and energy-efficiency measures offered. For comparison purposes, the Evaluator identified eight low-income programs offered by Canadian and American jurisdictions.

2.2.4 Participant Survey

In December 2016, CRA conducted a telephone survey with a total of 70 HWP private household participants. The average length of the survey was 13 minutes.

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

- › Sources of program awareness
- › Reasons for participation
- › Information received
- › Barriers to participation
- › Impact of the program
- › Satisfaction with the program
- › Recommendations for improvements

With 70 respondents, the corresponding margin of error at a 90 percent confidence level is ± 8.1 percent.⁵

2.2.5 Interviews with Delivery Agents and Social Housing Providers

In December 2016, Econoler conducted interviews with program partners, including two DA representatives and two SHP managers, to collect feedback regarding the following aspects of the HWP program:

- › Program satisfaction
- › Relationships among the DAs, SHPs and EGD
- › Interactions with customers and program outreach
- › Barriers and difficulties regarding program delivery
- › Program impact
- › Recommendations for improvements

Only two of the three program DAs were interviewed, because the third was not available to answer the questionnaire at the time of program evaluation.

⁵ The margin of error was calculated on a finite population of 220, which is the total number of participating customers provided by EGD for the period evaluated.

2.3 PROCESS EVALUATION

2.3.1 Program Participation

From January through June 2016, a total of 334 projects were completed. Figure 12 shows a breakdown of the proportions of projects implemented by the type of participant, highlighting that most participating households were private homes.

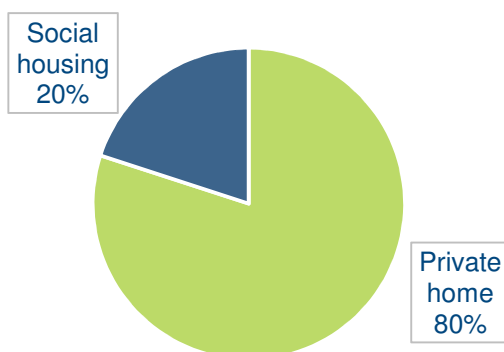


Figure 12: Projects by Type of Participant

As shown in Figure 13, air sealing and attic insulation were the most common building envelope upgrades installed at the participating households for the evaluated period. Moreover, nearly all the participants (96%) received a CO detector, which was given to the participants at the time of the B audit visit if they had not yet had one. Over half of the participants (53%) also received some products offered by EGD, such as thermostats, aerators and showerheads. The average natural gas savings achieved was 868 m³ in a private home and 688 m³ in a social housing unit.

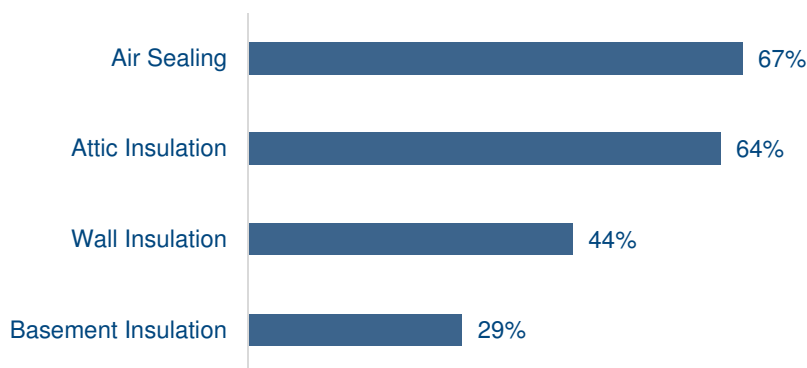


Figure 13: Types of Building Envelope Upgrades Installed

2.3.2 Program Database and Document Review



Program Database

The Evaluator reviewed the contents of the HWP program database provided by EGD and found them to be clear and effective. The program database is an Excel spreadsheet containing data about the customers that participated in the program. The program database contained five tabs, including one tab for each of the three DAs, a “MASTER” tab that consolidates the information from each DA, and a summary tab that provides an overview of the total savings achieved in each month and by each DA.

The information useful for evaluation was contained in the “MASTER” tab. This tab included the participants’ complete contact information and status, DA file and EGD account number, DA, language, housing type (private or social housing) and tenure (tenant or owner), the landlord’s or social housing provider’s contact information, house details (age, surface area and building type), as well as the audits’ and retrofits’ dates, main heating system, upgrades installed (costs and savings associated), total savings and TRC value for each project. EGD reports the total savings results in both CCM and cubic meters.

The program database also contained details concerning health and safety issues, namely columns with the health and safety work description, cost, and if any, reason for project rejection. However, this column was empty. The program database also indicated if participants received a CO detector and qualified for the TAPs program (Thermostats, Aerators and Showerheads). Finally, there are columns to present how participants heard about the program and if they were referred by their local distribution company (LDC).

The Evaluator found the status of each participant was up-to-date and observed that the overall level of consistency among the various data-entry fields of the database was good. The program database contained no irregularities. However, the Evaluator noted some differences between the different DAs’ tabs, which might have been due to different reporting templates. These differences can potentially lead to mistakes in compiling data and EGD is currently addressing the matter.

Although most participant information needed for conducting surveys and interviews, such as names and phone numbers, was already documented in the database, the Evaluator’s previous experience suggests that the following information should also be documented:

- › The house’s pre- and post-retrofit energy consumption values: The Evaluator suggests adding each project’s pre- and post-retrofit energy consumption values to the program database. Such data would help validate the energy savings achieved and support a more complete program results’ analysis.
- › The participant’s email address: Provided along with other contact information, email addresses are useful contact information which facilitates reaching participants to book visits for quality assurance or conduct other evaluation activities.

Overall, the Evaluator thinks that the HWP program database works well and is consistent while containing the information required for monitoring and evaluation.



Program Documentation

The HWP program has a plan which describes key program elements such as the rationale, objectives, implementation and marketing strategies, participation process map, and financial analysis. The program plan is well structured and contains relevant information useful for both the program staff and the Evaluator. One good element observed was the revision date on the front page, which makes it easier to track program updates.

The program plan also features an evaluation plan section. When this evaluation was being carried out, this section was left blank. The Evaluator suggests filling in the evaluation plan section with at least the following information:

- › Past evaluations: date, type of evaluation (process, market, impact or other types), internal or external evaluation.
- › Future evaluations: expected date and scope.

In 2016, the HWP program managers developed a logic model which illustrates the causal links between program activities and the likely outputs and outcomes in the market. This is a good initiative since illustrating the program logic can reveal gaps in program focus or effort and helps ensure that all those involved know what the program seeks to accomplish. The program documentation also features a participation process map, which illustrates the participation steps for the customers, DAs and EGD.

As a way to improve program management, the Evaluator recommends defining and monitoring performance indicators linked to the program activities and desired outcomes outlined in the logic model, such as the number of SHPs contacted, the numbers of applicants, the numbers of audits completed and the program awareness level.

Program Marketing and Outreach

Both EGD and DAs are involved in the program marketing and outreach. In an effort to reach as many customers as possible, EGD encourages DAs to explore a variety of promotional tactics. The DAs explained that the current program promotional approaches include brochures left behind in houses during the pre-retrofit audit, referral cards for participants to give to family or friends, posters in social housing buildings, postal drops in low-income neighbourhoods, earned media, targeting mail, booths at specific events, and relationships to get referrals from other SHP working also with low-income constituencies.

The DAs' marketing materials must follow EGD guidelines and go through EGD for approval. Marketing tactics along with their timelines are documented in the program marketing plan. The Evaluator saw no mention about the two different types of customers (private and social housing) in the marketing plan or participation process. If different marketing and delivery strategies are used, they should be documented.

To inform customers about the HWP program, EGD also used its corporate website



(enbridgegas.com). The program website pages were found to be simple and effective in providing a first good impression overall. They were mentioned as a useful marketing tool during interviews with DAs. In terms of contents, the Evaluator found the information clear and concise, which is particularly important considering the customers targeted by the program. The main navigation tabs (overview, eligibility, apply, and social housing providers) could be formatted in a slightly larger font to be more easily located and facilitate navigation throughout the website. Also, the website could be more precise about the fact that both tenants and homeowners can participate in the HWP program as long as they pay their own energy bills. The website presented dynamic content using a video of previous homeowners' testimonials.

2.3.3 Benchmarking against Similar Programs

The Evaluator conducted a benchmarking study and compared the HWP program with other residential energy audit programs targeting low-income households. The eligibility criteria and program offerings were investigated. The benchmarking study was conducted to provide general insight on how other similar programs are being delivered elsewhere.

The Evaluator selected the same jurisdictions as those in the HEC study as they were also considered relevant for a comparison with the HWP program. The only additional utility studied in the HWP benchmarking study was the Independent Electricity System Operator (IESO) to provide a complete overview of the low-income residential audit programs offered in the province.⁶ Priority was given to those programs targeting natural gas customers or a combination of natural gas and electricity customers. Certain programs intended for electricity customers were also considered because the nature of these programs was relevant for comparison purposes.

The following programs were covered by the benchmarking study:

- › Union Gas – Home Weatherization Program
- › Independent Electricity System Operator – Home Assistance Program
- › Manitoba Hydro – Power Smart Affordable Energy Program
- › *Énergie et ressources naturelles Québec* – Éconologis
- › Efficiency Nova Scotia – Home Warming
- › Efficiency Maine – Low Income Weatherization
- › Mass Save – Energy Efficiency and Weatherization Assistance Programs
- › Pacific Gas & Electricity Company (PG&E) – Energy Savings Assistance Program

APPENDIX II shows a table with details about these selected programs and their main characteristics. As shown in that table, all the utilities have their respective income grids with different levels indicating the eligible maximum household income eligible per number of household members. The amounts

⁶ The IESO offers a low-income energy assessment program similar to the HWP program, but does not offer one similar to the HEC program.



were not compared in the benchmarked study as they depend highly on the specific socio-economic context of each utility. In Ontario, the two natural gas utilities require participating houses to be built prior to a certain year. This is also the case in California (PG&E), where houses must be more than five years old. Some jurisdictions, such as Quebec and Maine, clearly specify that participants cannot have taken part in the program previously. Most programs target homeowners, tenants (with agreement of the landlord) and landlords, while others include apartment building owners (Mass Save and Manitoba Hydro) or social housing providers (EGD and IESO). Nova Scotia only allows participation by houses (no apartments). In general, the eligibility requirements include at least the criteria on the household income level (income or assistance program participation) and pertain to one or more of the following elements: the house (type, age, size, value, and/or year-round occupation), the applicant (bill payer, tenant, active account with the utility, and previous participation), and the energy source.

In terms of the upgrades available, most jurisdictions offer free upgrades following an energy audit, except for Efficiency Maine, which instead offers more prominent rebates to facilitate upgrade implementation in low-income homes. In addition to the free upgrades available under its program, Manitoba Hydro offers additional rebates to replace standard boilers or furnaces (with monthly payments over five years). In some jurisdictions, especially those which offer combined programs for natural gas and electricity, the upgrades which do not require renovation work are provided or installed during the audit (efficient lighting, appliance replacement, water-saving devices, smart power bars, and CO detectors). The range of upgrades offered varies from one program to another, but overall, most utilities offer at least insulation and air sealing.

In terms of program design, the Evaluator noticed the design of *Econologis* is distinctively different as it does not include any house energy audit; but it includes a visit by an energy advisor to discuss energy efficiency and provide practical advice on how to save energy. Air sealing measures and water-saving devices are also implemented during this first visit. A second visit involves installing programmable thermostats. Additionally, the *Econologis* website provides a link to a document which is updated regularly for participants to track their file status.

The benchmarking study shows that although the upgrades offered and the eligibility criteria vary among similar programs, the underlying considerations and principles reflected by the HWP program's design and delivery are largely consistent with those reflected by similar programs that other jurisdictions administer.

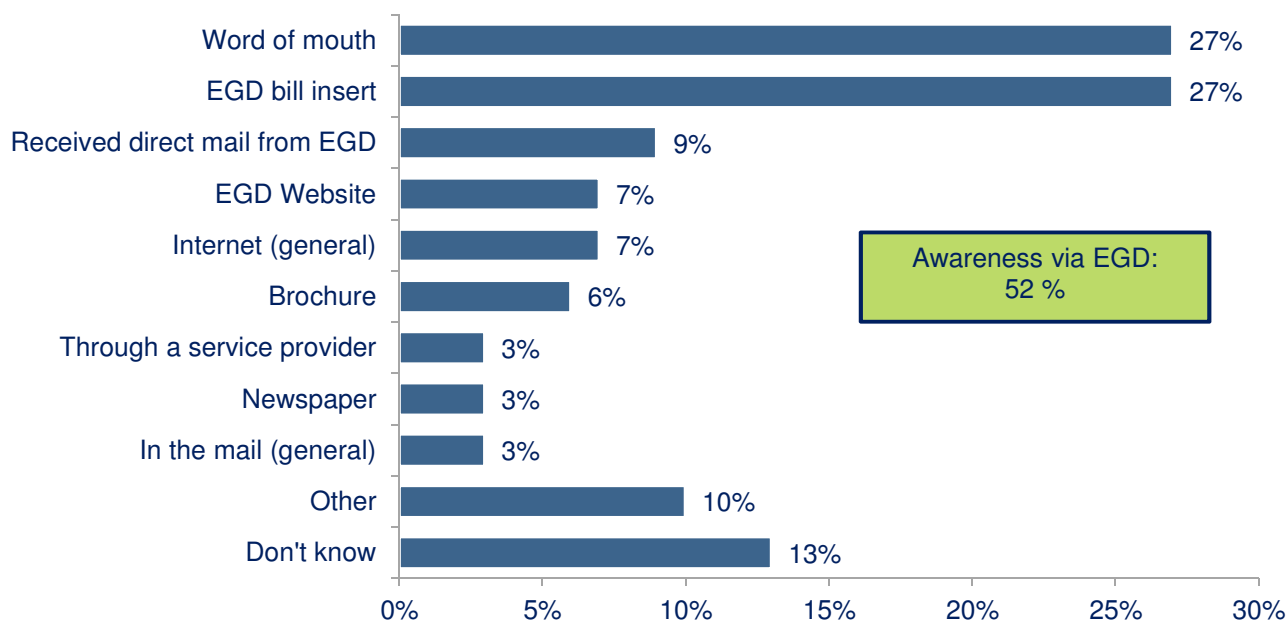
2.3.4 Participant Survey

As part of the Home Winterproofing evaluation, a survey was conducted with 70 participants. The following subsections present the main findings of this survey.



Sources of Awareness and Reasons for Participation

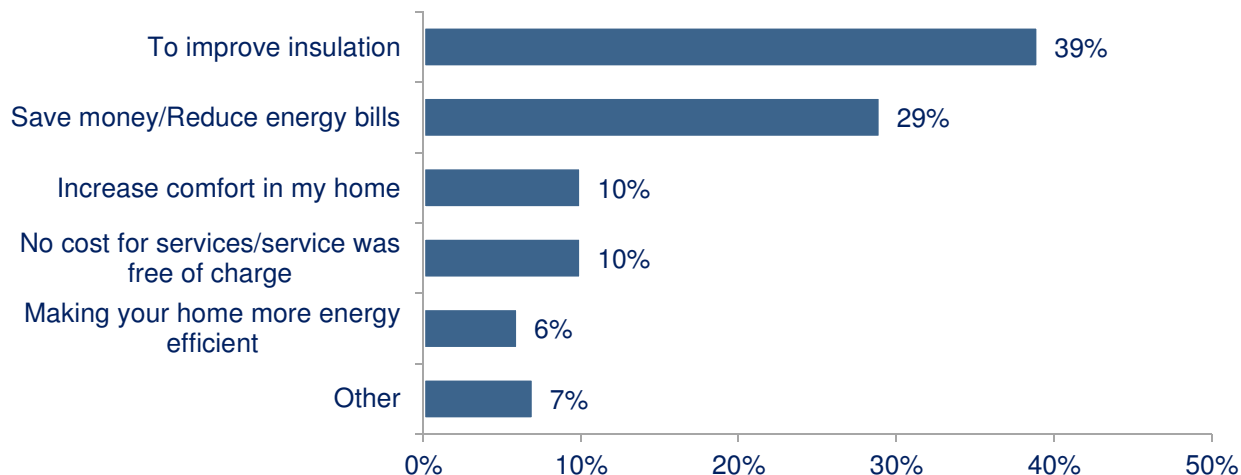
Word-of-mouth and EGD bill inserts were the most common source of the awareness (27%). In addition to the bill inserts, some participants learned about the program through other forms of EGD communication (direct mail 9%; website 7%; brochure 6%; newspaper 3%).



Source P1: How did you first learn about the Home Winterproofing program? (n=70)
Total exceed 100% due to multiple responses

Figure 14: Awareness of the Home Winterproofing Program

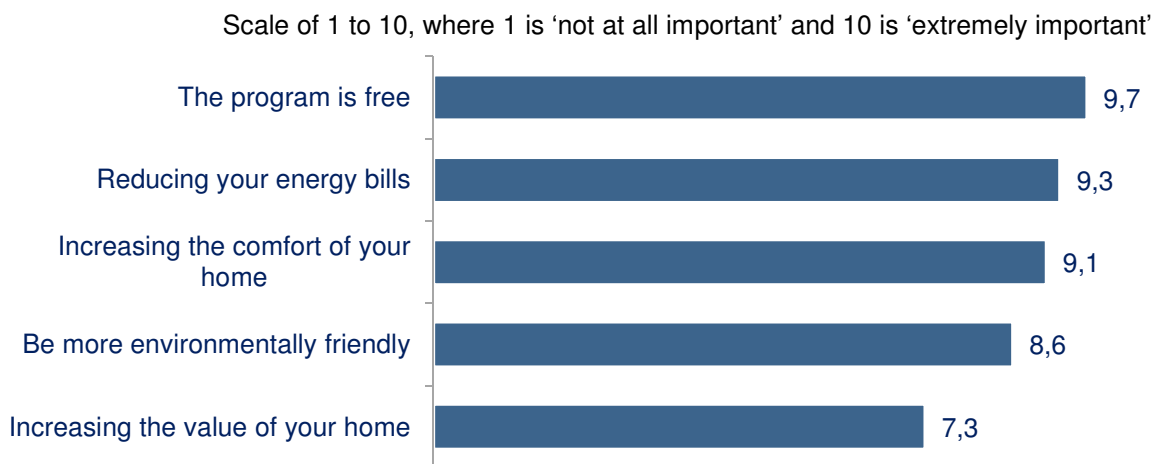
Improving insulation (39%) is the main reason cited for participating in the program. Participants were also motivated by the need to reduce their energy bills and save money (29%). Other motives or reasons cited by a smaller proportion of participants included increasing comfort at home (10%), free service (10%) and making the home more energy-efficient (6%).



Source P2: What was the SINGLE most important reason you chose to participate in the program? (n=70)

Figure 15: Reasons for Participating in the Program

Participants were asked to rate the level of influence that certain factors had on their decision to participate in the program. The participants provided a very high average rating for three of the five factors assessed, namely the program was free (9.7/10), reducing their energy bills (9.3/10) and increasing the comfort of their home (9.1/10). Being environmentally friendly also received a high average rating (8.6/10), demonstrating participants’ concerns for the environment.



Source P4a-e: On a scale of 1 to 10, where 1 is ‘not at all important’ and 10 is ‘extremely important’, how important, if at all, were the following when deciding to participate in the Home Winterproofing program? (n=70)

Figure 16: Reasons Influencing Decision-making on Program Participation



Information Received through the Program

Most of the participants (80%) received information from the DA about the upgrades implemented in their homes and about the impact it could have on their energy bills. Among these participants, 80 percent found the information very useful and 16 percent somewhat useful. All the participants found the information provided by the DA easy to understand (Actually, 84% said it was very easy to understand and 16% somewhat easy).

Barriers to Energy-efficiency Upgrades

When the time came to implement energy-efficiency upgrades in their home, 54 percent of the participants identified the financial constraint as the major barrier. A lack of information about energy efficiency products was also a barrier cited by ten percent of the participants. These barriers, which pertained to energy-efficiency upgrades in general, prove the importance of a program such as the HWP to offer free upgrades and information about energy efficiency to participants.

As part of the program, some of the participants interviewed chose not to add insulation to their home. These participants found that adding insulation would involve too much drilling and repair work.

Impact of the Program

The program had a big impact on educating the participants about energy efficiency. Around one half (53%) of the participants reported knowing much more about their homes' energy efficiency after participating in the program and a fifth (21%) reported knowing a little more. Moreover, for 56 percent of the participants surveyed, the information received through the program changed in some way their perspective on how to use energy at home.

Seven in ten (71%) participants noticed an improvement in the comfort level at home as a result of the upgrades installed. The main changes observed included a warmer or more comfortable home (50%), fewer drafts throughout the home (28%), the home being easier to heat (20%) and more even temperatures throughout the home (14%).

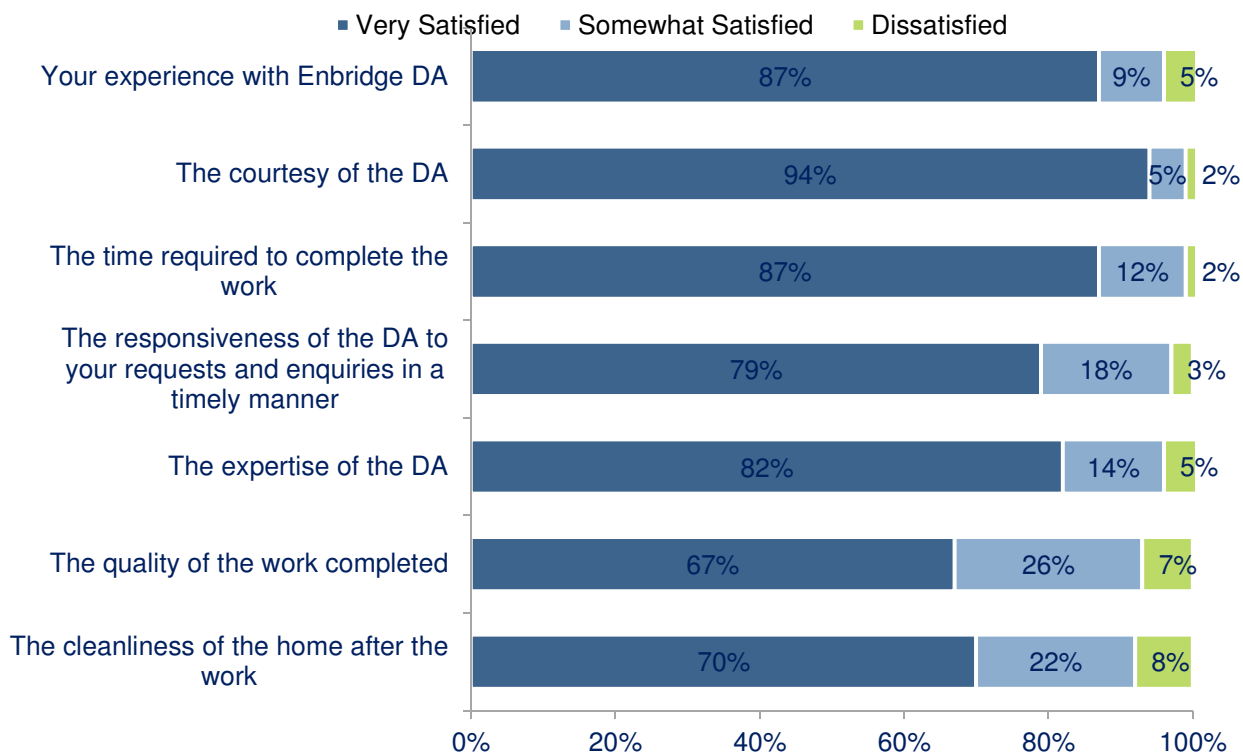
Experience with the Delivery Agent

Almost all the participants (96%) were satisfied with their overall experience with the DA, with the majority (87%) reporting being very satisfied. The small number of participants (three respondents) who were less satisfied indicated that the DA was not knowledgeable, did not finish the work and did not take care of the property.

Respondents were asked about their satisfaction with specific aspects of their contact with the DA. As shown in the chart below, all the aspects concerning the DA's service delivery received positive overall ratings. More than nine participants out of ten were satisfied with the courtesy of the DA, the time required to complete the work, the expertise of the DA, the responsiveness of the DA to their requests



and enquiries in a timely manner, the quality of the work completed and the cleanliness of the home after the work.



Source S3c -S5: Now talking about your experience with Enbridge Delivery Agent – How satisfied would you say that you are with... (n=70)
Don't know and not applicable removed from calculation

Figure 17: Satisfaction with the Delivery Agent

Satisfaction with the Program and its Aspects

The level of satisfaction with the HWP program was extremely high, with 77 percent of the participants surveyed saying they were “very satisfied” and 19 percent “somewhat satisfied”. The participants explained their satisfaction toward the overall program by citing the following reasons: an improvement in comfort at home (30%), work or upgrades of high quality (26%), money saved or lower energy bills (22%), professional and knowledgeable DA (13%), and the fact that without the program, some participants could not have afforded the upgrades (10%).

“They did a very good job. They acted on it quickly, it was very efficient. There wasn't a lengthy wait”.

“It's all free with a nice perk. Great program!”

“I see improvement on the heat in the house, the house is more warm”.



In areas where clients were satisfied others were not. The few participants who were dissatisfied explained that they had not noticed a difference in the comfort at home and the home was not much warmer (7%), they were disappointed in the quality of the work or upgrades (4%) and the work was left unfinished (4%).

The process of taking part in the program was found to be easy by 82 percent of the participants. Thanks to their participation, the participants learned about what they can do to conserve energy. Seventy-six percent were very satisfied to learn about this aspect and 20 percent were somewhat satisfied.

Nearly all the participants (97%) would recommend the EGD program to others.

Recommendations for Improvement

Half of the participants (49%) made no recommendations on how to improve the program. Meanwhile, two in ten (20%) would like to see more measures covered by the program and some participants would like to see an improvement in the quality of the work carried out (13%). A small number of participants suggested improving the communication or follow-up (9%) and advertising more about the program (7%).

2.3.5 Interviews with Delivery Agents

As part of the process evaluation, in-depth interviews were conducted with two DAs. The following subsections present the findings of these interviews. The Evaluator spoke with two of the three main program DAs as it was not possible to get in touch with the third DA during the evaluation.

Program Satisfaction

The two DAs interviewed have been involved with the program for a number of years. They both considered their involvement in the program as straightforward. One respondent mentioned the HWP was a complicated program, but this person still considered his involvement straightforward after delivering the program for a number of years.

In general, the DAs were very satisfied with the overall program and its eligibility requirement. The marketing and outreach activities conducted by EGD were also deemed satisfying, although one DA felt that EGD was spending a lot of money to market the HWP program without being sure that the marketing strategies were actually effective.

During the interviews, certain strengths of the program were highlighted. First, the DAs mentioned the HWP program favoured a positive relationship between EGD and its customers fostered by an alignment of the needs of both parties. Second, clear eligibility rules are appreciated as they facilitate the DAs' work in accepting or rejecting potential projects. Lastly, according to one DA, it is a great advantage that EGD understands the importance of keeping the program's participation process as



easy and simple as possible, and developing friendly and attractive communication when engaging with a high-barrier group, such as low-income households.

Relationship with Enbridge Gas Distribution

The DAs were very satisfied with their relationship with EGD, which includes regular meetings, good communication established over time, and a good level of understanding from EGD on the operational side. One DA said that the HWP program team is a strong one.

The DAs said they received the necessary information from EGD regarding all program aspects. The communication was described as dynamic; it was an exchange since DAs also provided information to EGD to try and make the program as effective as possible.

When discussing data-tracking, one DA mentioned EGD had a top-down approach, especially where it involved making changes to the tracking system. According to this DA, more upstream consultations would be appreciated since small changes in the forms can actually involve huge costs to implement.

Communication with Social Housing Providers

Each DA has worked with dozens of SHPs, with which the relationship and experience were usually positive, but not always. Even if an SHP often becomes great partners in the long run, both DAs agreed that there are limits to collaborating with them. One reason is that the number of SHP projects in Ontario that require these types of retrofits are decreasing. Another element is the heavy bureaucracy in such organizations, which greatly complicates and slows down the process and work to be done. This requires patience and “hand-holding” from the DAs, who think it is often worthwhile as each project includes a large number of units. In some cases, however, it takes a long time to get the approval of an SHP and this process turns out to be worthless when the first building tests prove to be negative (if, for example, the work cannot be undertaken for health and safety reasons). As a way to facilitate interaction with SHPs, one of the DAs mentioned that simplified paperwork could potentially help engaging with SHP. The Evaluator also suggests that pre-application tests be conducted before going through the complete paperwork.

Program Outreach and Marketing

The DAs are involved in program outreach in a coordinated effort with EGD to suggest and develop marketing strategies and materials. In terms of implementation, DAs target more SHPs and individual households, while EGD mostly conducts external marketing. Reaching out to individual households was described as challenging as low-income customers are difficult to identify among customers.

According to the DAs, successful outreach strategies vary over time and from one region to another, but referrals, postal drops, and bill inserts were mentioned as effective tools in consistently sparking interest. A similar finding was revealed by the participant survey, which showed that word-of-mouth and bill inserts represented the most common sources of awareness among respondents. The DAs mentioned that bill inserts make the phone ring a lot, though the actual proportion of eligible customers



making enquiries is sometimes low. One DA mentioned having successfully used EGD's website; potential participants can enter their contact information on the program website to receive more details and the DAs receive it directly. Cross-promotion was also viewed as very effective, especially when the DAs are involved in delivering more than one social program. If a person contacts a DA to participate in another program, they can promote the HWP program simultaneously. Some recommendations were shared by the DAs on program outreach and are further discussed below in the recommendation section.

Program Delivery and Barriers

The DAs play an important role in delivering the HWP program as they are responsible for the complete process from the pre-retrofit audit, the retrofit work, and the post-retrofit audit. To complete the retrofit work, the DAs work with external or internal contractors, and sometimes with both, depending on the regions where the customers are located. The DAs are responsible for managing contractors and overseeing the installation process. The experience with contractors was described as positive overall and the DAs keep a close eye on contractors to ensure that they do the work in a satisfactory manner. During the post-retrofit energy audit, all the projects are subject to quality assurance to validate whether the upgrades are properly installed. The DAs discuss about energy efficiency and ways to save energy with participants during one or both energy audits.

Customers usually have high expectations in terms of energy benefits and want to get as many upgrades as possible. In that context, some participants do not understand that some upgrades are excluded from the retrofit work because they do not meet the cost-effectiveness threshold or because of health and safety issues (moisture, asbestos, old electric wiring, etc.). In other cases, participants do not understand that certain upgrades obviously associated with household energy efficiency, such as replacing windows, are not implemented in their home because they are not part of the program offerings.

Overall, the DAs mentioned few complaints were made by participants even though there was some confusion from time to time. The complaints pertained to not getting certain measures done in houses or tidiness following the retrofit work. According to the DAs, between 2% to 10% of the participants decide to drop out from the program though they qualify and are offered a retrofit. This usually happens if a participant moves away, does not want to be disturbed or have anyone coming in the house, does not want the work to be completed because of inconvenience associated with it (for example, insulation requires drilling holes in the wall), or in some cases, because of mental health issues. In other cases, it is the DA who has to withdraw from a project without completing the work, though the participant is eligible, because there are too many health and safety-related repairs required and not enough budget available. According to the DAs, one of the challenges in delivering the HWP program is to operate with very tight budgets while trying to achieve high energy savings.



Impact of the Program

The DAs considered the program to have an influence, not on the overall residential market, but rather on each participating household by improving their comfort and financial situation. The majority of participants surveyed did actually notice an improvement in the comfort level at their homes as a result of the upgrades installed. According to the DAs, the HWP program also raises awareness about energy efficiency among program participants. This is in line with the fact that two thirds of the participants reported during the survey that they knew more about energy efficiency following their involvement in the program. However, according to the DAs, the financial constraints faced by participants greatly reduce their capacity to make any further impact, i.e., there is a slim chance they will prioritize spending money on implementing other energy efficiency measures themselves.

Recommendations for Improvements

The DAs highlighted that many efforts have been made over the years to improve the program. During the interviews, additional recommendations were made by the DAs regarding data-tracking, program design, and marketing and outreach. In terms of data-tracking, one DA suggested integrating all the fields into a single report sheet. Concerning program design, one DA mentioned that it would be great to see the two utilities, the EGD and the IESO, combining their programs which target low-income households.

A number of recommendations regarding marketing and outreach were made by the DAs. Billboards in low-income areas were mentioned by one DA as an additional outreach strategy to consider. Both DAs were aware of the high costs associated with program outreach and marketing and suggested the positive financial and marketing impacts that would arise from more collaboration with other provincial organizations. One DA suggested that co-promotion of the HWP program and the IESO's Home Assistance program would be enhanced as both programs often target the same households. Also, many opportunities can be found in the contact list of the Ontario Electricity Support Program (OESP), one of Ontario's largest social programs, which is run by the Ontario Energy Board (OEB). Even though the current policy may not facilitate this kind of information-sharing, it was recommended that EGD try to access this contact list to make the marketing efforts more effective in targeting the eligible households.

2.3.6 Interviews with Social Housing Providers

In-depth interviews were conducted with building managers of two social housing providers (SHPs). During one of these interviews, a facility maintenance supervisor was also present. The following subsections present the findings of these interviews.

Program Satisfaction

The respondents first heard of the HWP program through a DA, by email or on the DA's website. One SHP mentioned being very familiar with the program while the other was somewhat familiar.



Both SHPs claimed to be very satisfied with the overall program. The respondents decided to participate in the program since it provided an interesting opportunity to save energy and to retrofit old buildings. The SHPs were satisfied with the upgrades implemented.

Overall, the two SHPs recognized the numerous advantages of participating in the program and improving their buildings' energy efficiency. They both also found the program very informative.

Relationship with the Delivery Agents

The two SHPs were very satisfied with their overall experience with their respective DAs. One SHP was very satisfied with all the different aspects of the DA's work, namely the responsiveness of the DA to the requests and enquiries in a timely manner, the time to complete the work and the quality of the work completed. The other SHP was somewhat satisfied regarding the time to complete the work and the quality of the work which was said to be generally good except for a mistake by the contractors which increase the time and the work required to complete the retrofit.

The DAs were described as very helpful, especially in keeping the SHPs in the loop throughout the participation process. One SHP said it was a great team work. Both SHPs said they were satisfied with the information received as part of their participation, but one respondent mentioned there could have been more information on the insulation material used because of health concerns expressed by certain tenants.

Interactions with Customers and Program Outreach

The SHP mentioned they were responsible for reaching out to tenants living in their properties' units about the program. To encourage tenants to participate in HWP, a letter or verbal explanations were provided to them about the HWP program, the steps involved in the process, and the benefits associated with lower heating costs and increased home comfort. For both SHPs, all the eligible units (using natural gas as the heating source) in each organization participated in the program. Both SHPs said it was overall easy to have tenants participate in the program. One SHP mentioned the work was also done smoothly without affecting the tenants' daily life.

Barriers and Difficulties Regarding Program Delivery

In terms of the challenges concerning the program, one of the SHPs mentioned the length of time needed to conduct the energy audits which involved more than one visit in the units, and was more than what the organization was comfortable with. The other SHP referred to the challenges associated with undertaking the retrofit in old buildings; some additional electrical work was required for safety reasons when the upgrades are being installed.

Some concerns were expressed by tenants. Some tenants were uncomfortable to let people come into their homes; others were concerned about the dust that would be created by the work; others were worried about the health-related consequences of the work to be done. However, overall, all the eligible units in the two SHPs interviewed participated in the program.



Recommendations for Improvements

All the respondents made very positive comments about their experience with the program. Both SHPs would recommend the program to other organizations without hesitation. Few recommendations were made on how to improve the program. One SHP suggested that more information be provided in advance about the upgrades to be done, especially concerning the products installed. The other SHP recommended extending the program's outreach to other buildings to allow them to benefit from the program.

2.4 CONCLUSIONS AND RECOMMENDATIONS

This section presents the conclusions and recommendations concerning the key research areas covered by the HWP program process evaluation.

Program Design and Management

The HWP program was designed to achieve energy savings in low-income single-family homes. The program is delivered through experienced DAs, who have strong links to the social service providers and succeed in reaching out to the hard-to-reach low-income customer group. The interviews with the DAs showed that EGD adopted a collaborative and coordinated approach to delivering and managing the HWP program. The DAs said they were in regular contact with EGD and had plenty of opportunities to provide input on the program. An excellent communication channel has been established between EGD and the DAs over time.

Moreover, the HWP program has a logic model and a process map, two useful tools to help identify any gaps in the program design and delivery and ensure good internal communication.

Recommendation No. 1: Define and monitor program performance indicators.

As with the evaluation of the HEC program, the Evaluator recommends defining and monitoring additional performance indicators (in addition to the current CCM of natural gas saved) based on the outcomes as a way to improve the program management. These target metrics are expected to not only help quantify program objectives and outcomes, but also facilitate regular follow-up and monitoring. The performance indicators should be linked to the program activities and desired outcomes outlined in the logic model. Examples of performance indicators include the numbers of customers making applications, projects completed, and SHPs contacted, as well as the customers' levels of awareness and satisfaction related to the program.

To maintain a collaborative approach, the DAs should be involved in the process of defining program metrics. Doing so would also make it easier to align the program's delivery with the performance indicators, especially if these indicators tend to evolve and change over time. However, a multi-year planning approach should be favoured wherever possible.



Program Database and Documentation

It was found that the HWP program database contained the main information required for program management and process evaluation purposes. Overall, the database was clear and well structured. The Evaluator noticed a good level of consistency among the various data-entry fields and no irregularities were found. However, the Evaluator noted some differences between the different DAs' tabs. EGD is currently working on standardizing the DAs' templates.

Recommendation No. 2: Further complement the program database with some additional participant information.

To further improve the database contents, additional participant information could be included, such as the participants' email address, and the pre-retrofit and post-retrofit house energy consumption values. The Evaluator's previous experience suggests that adding this information could help improve data analysis quality and facilitate follow-up and evaluations. Since documenting additional information requires additional work, the Evaluator recommends involving the DAs as early as possible in the process to find the best way to collect and document these kinds of additional information.

Program Delivery and Participation Process

The HWP program is marketed and delivered through DAs, who are well established in their communities and have strong links to social service providers. By offering free upgrades, the HWP program enables installing energy-efficient upgrades and generating energy savings, which would be unlikely to happen otherwise. To this end, the HWP program offers a simple and easy participation process, as proven by the private participants' very high satisfaction level. SHP managers' and tenants' interest in the program was also found to be strong. Although the DAs faced some challenges in working with SHPs, both parties found their relationship to be generally positive.

Recommendation No. 3: Make SHP buildings pass a pre-application test for screening purposes.

Some SHP buildings are old and thus quite unlikely to meet program requirements related to health and safety concerns (moisture, asbestos, old electric wiring, etc.). The Evaluator suggests conducting a pre-application test on SHP buildings that are considered having higher health or safety-related risks before going through the complete paperwork required for their participation in HWP. Considering that the complete application process can often take a long time to finish, implementing such a pre-qualification and screening procedure would avoid wasting time completing the application process and seeking approval for those buildings that potentially do not qualify for the program for health and safety reasons.

To ease customers' health-related concerns, more information about the material to be used in the retrofit work could be shared with the SHPs once the pre-test and application process is completed.



Doing so would help tenants with health concerns make an informed decision about whether to participate in the program.

Program Marketing and Outreach

In most cases, participants found out about the program through word-of-mouth and bill inserts. A high level of program awareness achieved through word-of-mouth is usually a good indicator of the satisfaction level among participants, as demonstrated by the survey results. The main reasons cited for participating in the HWP program were similar to the benefits advocated in the program brochure and website (improve the insulation, lower the energy bills/save money, and increase the comfort at home). This finding indicates that EGD's marketing materials adequately convey the key messages. It was found that 52 percent of the survey respondents first heard about the HWP program through one of EGD's marketing tools (the three main ones being bill inserts, direct mail, and the website). According to the DAs, the website was useful in promoting the program.

General Observation

Overall, the HWP program was found to be satisfying to all the parties involved (the private participants, the DAs, and the SHPs). The program has succeeded in reaching out to the hard-to-reach low-income customer group and enabling implementing energy-efficient upgrades in those homes, which would not have been able to otherwise. The Evaluator found the HWP program's overall design, management, delivery process and marketing to be effective.



APPENDIX I HEC BENCHMARKING TABLE



Table 4: HEC Program Benchmarked against Other Utilities' Similar Programs

Program Design	Eligibility Criteria				Program Offerings				Total Incentive Amount (Including Energy Audits) ²
	Heat Sources	Customer	Specific Criteria	Eligible Upgrades	Energy Audit Incentive	Included with Energy Audit	Type of Rebate	Prescriptive Rebates ¹	
Enbridge Gas Distribution: Home Energy Conservation									
A pre-work house energy audit to receive a list of recommended upgrades and conduct a post-work audit to determine eligibility based on savings achieved	Natural gas	Homeowner or renter	<ul style="list-style-type: none"> › Reside in a designated eligible area › Have an active EGD account › Complete at least 2 upgrades › Use a certified energy auditor to complete audits 	<ul style="list-style-type: none"> › Attic insulation › Wall insulation › Basement wall insulation › Exposed floor insulation › Air sealing (at least 10% reduction) › Window replacement › High-efficiency furnace/boiler › High-efficiency water heater › Drain water recovery system 	Up to \$500 for pre and post energy audits, not including HST	Energy report	Based on gas savings	N/A	<ul style="list-style-type: none"> › Up to \$1,000 to achieve 15-24% savings › Up to \$1,600 to achieve 25%-49% savings › Up to \$2,100 to achieve 50% or more savings
Union Gas: Home Reno Rebate									
A pre-work house energy audit to receive a list of recommended upgrades and conduct a post-work audit	<ul style="list-style-type: none"> › Natural gas › Oil › Propane › Wood 	Homeowner	<ul style="list-style-type: none"> › Own a house (detached, semi-detached, row town or mobile) › Be a Union Gas customer or reside in a franchise area › Complete at least 2 upgrades › Complete the 2 audits in less than 120 days 	<ul style="list-style-type: none"> › Insulation (basement, wall and attic) › Air sealing › Furnace/boiler › Wood-burning system › Water heater › Window/Door/Skylight replacement 	Up to 500\$ for both audits	Energy report	Based on upgrades installed	<ul style="list-style-type: none"> › \$1,000 for furnace/boiler › \$375 for wood/pellet heating › \$500 for water heater › \$80 per window, door or skylight › \$250 per additional measure 	<ul style="list-style-type: none"> › Up to \$5,000 › 100\$ towards a smart thermostat after completing the post-work audit
Manitoba Hydro: Energy Evaluations									
Online energy audit to receive a custom report with recommended upgrades	<ul style="list-style-type: none"> › Natural gas › Electricity 	Homeowner	<ul style="list-style-type: none"> › Have lived in the house for at least 1 year › Have an active Manitoba Hydro account › Use the house as a principal residence (by owner or tenant) 	N/A (customer applies to receive specific rebates from other Manitoba programs after performing upgrades)	Free online audit	Energy report	N/A	Offered via other programs	N/A

^{1,2}The incentive and rebates are expressed in the currency of the country in which the program is offered.



Program Design	Eligibility Criteria				Program Offerings				
	Heat Sources	Customer	Specific Criteria	Eligible Upgrades	Energy Audit Incentive	Included with Energy Audit	Type of Rebate	Prescriptive Rebates ¹	Total Incentive Amount (Including Energy Audits) ²
Énergie et ressources naturelles Québec : Rénoclimat									
A pre-work house energy audit to receive a list of recommended upgrades and conduct a post-work audit to determine eligibility based on savings achieved	<ul style="list-style-type: none"> › Electricity › Natural gas › Propane › Oil 	Homeowner (individuals or business)	<ul style="list-style-type: none"> › Own a house, duplex, triplex or multi-unit building (4-20 units) The house must be: <ul style="list-style-type: none"> › No more than 3 stories › A maximum of 600 m² › Inhabitable all year round with a permanent foundation › Inhabited for at least 1 year › Improve the house's EnerGuide score by at least 1 point 	<ul style="list-style-type: none"> › Insulation (roof, attic, basement, exposed floor and exterior wall) › Air sealing › Heat recovery ventilator › Domestic hot water heater › Drain water heat recovery system › Central electronic thermostat › Geothermal heating system › Air-source heat pump 	Free for both audits (Costs apply to subsequent participation)	<ul style="list-style-type: none"> › Energy report › Label for electric panel 	Based on energy savings and rebates	<ul style="list-style-type: none"> › Up to \$975 for roof insulation › Up to \$1,635 for basement insulation › Up to \$1,300 for crawl space insulation › Up to \$2,440 for wall insulation › \$245 for exposed floor insulation › \$245 - \$490 for air sealing › \$490 for heat recovery ventilation › \$730 for water heater › \$165 for drain water heat recovery › \$50 for central thermostat › \$650 for air-source heat pump › \$2,115 - \$5,365 for geothermal 	<ul style="list-style-type: none"> › Incentive available only when the <u>EnerGuide</u> score is increased by at least 1 point › Multiplication factors applied to air sealing rebate in buildings with more than 2 units › Additional per unit rebate for fuel switch to electricity in multi-unit buildings
Efficiency Nova Scotia (ENS) : Home Energy Assessment									
A pre-work house energy audit to receive a list of recommended upgrades eligible for rebates and conduct a post-work audit	Electricity	Homeowner	<ul style="list-style-type: none"> › Own a house (detached, semi-detached, row town, mobile, or year-round cottage) <u>The house must be:</u> › On a permanent foundation › Inhabited for at least 6 months 	<ul style="list-style-type: none"> › Insulation (foundation, ceiling, roof, attic, exterior wall and exposed floor) › Air sealing › Air source & ductless heat pump › Wood or pellet heating system › Windows, doors and skylights › Heat recovery ventilation › Drain water heat recovery › Solar and geothermal heating › Heat pump or solar water heater 	A cost of \$99 (paid by participants) for Audit D Free Audit E	Energy report	Based on upgrades installed	<ul style="list-style-type: none"> › Up to \$900 for ceiling insulation › Up to \$1,250 for foundation insulation › Up to \$1,800 for wall insulation › Up to \$700 for a ductless heat-pump (\$150 for each additional unit) › Up to \$1,750 for each air source and air-to-water heat pump › Up to \$800 for wood/pellet stove › Up to \$1,750 for wood/pellet furnace › Up to \$2,500 for geothermal › Up to \$350 for heat pump water heater › Up to \$1,250 for solar water heater 	Up to a maximum of: <ul style="list-style-type: none"> › \$3,000 for at least 1 upgrade › \$4,000 for at least 3 upgrades › \$5,000 for at least 4 upgrades

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Program Design	Eligibility Criteria				Program Offerings				
	Heat Sources	Customer	Specific Criteria	Eligible Upgrades	Energy Audit Incentive	Included with Energy Audit	Type of Rebate	Prescriptive Rebates ¹	Total Incentive Amount (Including Energy Audits) ²
Efficiency Maine : Home Energy Savings									
Household energy audit to receive a custom list of recommended upgrades eligible for rebates	<ul style="list-style-type: none"> › Natural gas › Electricity › Oil › Propane › Wood 	Homeowner	<ul style="list-style-type: none"> › Own a 1 to 4-unit residential building <p><u>The house must be:</u></p> <ul style="list-style-type: none"> › A principal, year-round residence for occupants › Finished (not in construction) 	<ul style="list-style-type: none"> › Insulation (attic, wall and basement) › Air sealing › Wood or pellet heating system › Air source and ductless heat pump › High-efficiency furnace/boiler › Geothermal 	\$400 rebate for Audit D (no Audit E)	<ul style="list-style-type: none"> › Energy report › 6 hours of air sealing 	Based on upgrades installed	<ul style="list-style-type: none"> › Up to \$2,100 for insulation › \$250-\$750 for ductless heat pump › \$500 for central heating systems (or \$1,000 for natural gas furnace) › \$500 for pellet/wood stove › \$5,000 for wood/pellet furnace/boiler or geothermal › \$100 to combine air sealing with another upgrade 	Up to a maximum of \$5,000
Mass Save : Home Energy Assessment									
A pre-work house energy audit (including direct-install measures) to receive a custom list of recommended upgrades eligible for rebates	<ul style="list-style-type: none"> › Natural gas › Oil › Propane › Wood › Coal › Electricity 	Homeowner	Own and live in a 1 to 4-unit building or single house	<ul style="list-style-type: none"> › Insulation and air sealing › Heating and cooling equipment › Domestic hot water heater 	Free Audit D (no Audit E)	<ul style="list-style-type: none"> › Energy report › Air sealing (walls, windows and doors) › Installation of: <ul style="list-style-type: none"> - LED light bulbs - Water-saving devices › Power strips 	Based on upgrades installed	<ul style="list-style-type: none"> › \$3.50 per sq.ft. of wall insulation › \$3.00 per sq.ft. of floor over garage and cathedral ceiling insulation › Up to \$500 for ductless heat pumps › \$750 for heat pump water heater › \$500 for central AC and heat pump › Up to \$1,600 for heating and water heating equipment 	75% of costs up to \$2,000 for insulation
		Tenant/Renter	Rent a house	<ul style="list-style-type: none"> › Efficient appliances › Additional rebates for the landlord 	Free Audit D (no Audit E)	<ul style="list-style-type: none"> › Energy report › Installation of: <ul style="list-style-type: none"> - LED light bulbs - Water-saving devices › Power strips 	Based on upgrades installed	<ul style="list-style-type: none"> › Up to \$200 to replace refrigerators › Up to \$400 to replace clothes washers 	N/A

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Program Design	Eligibility Criteria				Program Offerings				
	Heat Sources	Customer	Specific Criteria	Eligible Upgrades	Energy Audit Incentive	Included with Energy Audit	Type of Rebate	Prescriptive Rebates ¹	Total Incentive Amount (Including Energy Audits) ²
Mass Save : Home Energy Assessment (suite)									
A pre-work house energy audit (including direct install measures) to receive a custom list of recommended upgrades eligible for rebates	<ul style="list-style-type: none"> › Natural gas › Oil › Propane › Wood › Coal › Electricity 	Landlord	Own and rent a 1 to 4-unit building or single house	<ul style="list-style-type: none"> › Insulation › Heating and cooling equipment › Domestic hot water heater › Efficient appliances 	Free Audit D (no Audit E)	<ul style="list-style-type: none"> › Energy report › Air sealing (walls, windows and doors) › Installation of: <ul style="list-style-type: none"> - LED light bulbs - Water-saving devices › Power strips 	Based on upgrades installed	<ul style="list-style-type: none"> › \$3.50 per sq.ft. of wall insulation › \$3.00 per sq.ft. of floor over garage and cathedral ceiling insulation › Up to \$500 for ductless heat pumps › \$750 for heat pump water heater › \$500 for central AC and heat pump › Up to \$1,600 for heating and water heating equipment 	90% of costs, up to \$3,000 for insulation per unit (If all units participate in a 2 to 4-unit building)
		Multi-family	<ul style="list-style-type: none"> › Own or manage a residential complex with more than 5 units › Obtain approval from the owner 	<ul style="list-style-type: none"> › Insulation and air sealing › Lighting, controls and sensor › Heating and cooling equipment › Domestic hot water measures › Efficient appliances › Custom site-specific upgrade 	Free Audit D (no Audit E)	<ul style="list-style-type: none"> › Energy report 	Based on upgrades installed	Site-specific custom improvements	Case by case, % of overall project costs



Program Design	Eligibility Criteria				Program Offerings				
	Heat Sources	Customer	Specific Criteria	Eligible Upgrades	Energy Audit Incentive	Included with Energy Audit	Type of Rebate	Prescriptive Rebates ¹	Total Incentive Amount (Including Energy Audits) ²
Pacific Gas & Electricity Company (PG&E) : Home Upgrade									
A pre-work house energy audit to receive a custom list of upgrades eligible for rebates	› Natural gas › Electricity	Homeowner or Tenant	› Reside in a detached home or in a building with 2 to 4 units › Obtain approval from the property owner (for tenants) › Complete at least 3 upgrades › Earn a minimum of 150 points	› Insulation (attic and wall) › Air sealing (at least 15% reduction) › Duct-sealing or replacement › High-efficiency water heater › High-efficiency air-conditioner › Windows	None	Energy report	Depends on savings	› Points assigned to each upgrade › Rebates start at \$1,500 and \$100 for each additional 10 points	› Up to \$3,000 › Up to \$6,500 for 45% or more energy savings
Pacific Gas & Electricity Company (PG&E) : Multifamily Rebates									
Based on savings determined from whole-building energy modeling	› Natural gas › Electricity	Building Owners and Managers	› Own a residential building with 5 or more units › Minimum 10% energy savings	› Insulation (attic and wall) › Air sealing (at least 15% reduction) › Duct sealing or replacement › High-efficiency water heater › High-efficiency air-conditioner › Windows	› \$100 per unit (up to 200 units) › \$25 per unit with 25% or more savings	Energy report	Based on savings	Whole building energy modeling	› \$600 per unit at 10% energy savings › Up to \$2,250 per unit with 50% or more energy savings



APPENDIX II HWP BENCHMARKING TABLE

Table 5: HWP Program Benchmarked against Other Utilities’ Similar Programs

Program Provider	Program Name	Eligibility Criteria				
		Heat Source	Customer	Specific Criteria	Free Eligible Upgrades	Additional Rebates
Enbridge Gas Distribution	Home Winterproofing	Natural gas	Homeowner Tenant Social Housing Provider	<ul style="list-style-type: none"> › Have an active EGD account › Pay the natural gas bill › Live in a house built prior to 1980 › Obtain the landlord’s consent (for the tenant) › Meet the household income eligibility criteria or participate in an eligible governmental assistance program 	<ul style="list-style-type: none"> › Insulation (attic, (basement and wall) › Air sealing › CO detectors › Water-saving products › Programmable thermostats › Drain-water heat recovery unit › Heat reflector panels 	› N/A
Union Gas	Home Weatherization Program	Natural gas	Homeowner Tenant	<ul style="list-style-type: none"> › Pay a Union Gas bill › Have a natural gas furnace › Live in a house built before 1975 › Obtain the landlord’s consent (for the tenant) › Meet the household income eligibility criteria or participate in an eligible governmental assistance program 	<ul style="list-style-type: none"> › Insulation (attic, basement and wall) › Air sealing › Water-saving products › Programmable thermostats 	› N/A



Program Provider	Program Name	Eligibility Criteria				
		Heat Source	Customer	Specific Criteria	Free Eligible Upgrades	Additional Rebates
Independent Electricity System Operator (IESO)	Home Assistance Program	Electricity	Homeowner Tenant Social Housing Provider	<ul style="list-style-type: none"> › Live in a non-profit housing property › Be the primary or secondary utility account holder listed on the bill › Obtain the landlord's consent (for the tenant) › Own or manage residential housing of a maximum of 3 storeys high and less than 6,400 sq. ft. › Meet the household income eligibility criteria or participate in an eligible governmental assistance program 	<ul style="list-style-type: none"> › Insulation (attic and basement) › Air sealing › Efficient lighting › Smart power bars › Water-saving products › Programmable thermostats › Appliance replacement 	› N/A
Manitoba Hydro	Power Smart Affordable Energy Program	Natural gas Electricity	Homeowner Tenant Landlord Building Owner	<ul style="list-style-type: none"> › Live in or rent all year-round a single detached or semi-detached home (townhouse, row house, multiple house) on permanent foundations Or › Own an apartment building And › Have a Manitoba Hydro account › Meet the household income eligibility criteria or participate in an eligible governmental assistance program 	<ul style="list-style-type: none"> › Insulation (crawl space, basement, wall and attic) › Water-saving products › Energy-efficient lighting › Window sealing (only apartment buildings) › Pipe insulation (only apartment buildings) 	<ul style="list-style-type: none"> › 3,000\$ for a high-efficiency natural gas furnace Or › \$9.50/month during 5 years for a high-efficiency natural gas boiler
Énergie et ressources naturelles Québec	Éconologis	Electricity Natural gas Propane Oil	Homeowner Tenant	<ul style="list-style-type: none"> › Own or rent a house › Pay the heating bill › Have not participated in the program in the last 5 years (for the same house) › Have not participated in the program in the last 3 years (for a different house) › Meet the household income eligibility criteria 	<ul style="list-style-type: none"> › Insulation of electric outlets on exterior walls › Air sealing › Water-saving products › Programmable thermostats 	› N/A



Program Provider	Program Name	Eligibility Criteria				
		Heat Source	Customer	Specific Criteria	Free Eligible Upgrades	Additional Rebates
Efficiency Nova Scotia (ENS)	Home Warming	Electricity	Homeowner	<ul style="list-style-type: none"> › Own a single-unit house as a primary residence and provide proof of ownership › Reside year-round in the house › Not have previously received upgrades through the current or previous program › Meet the household income eligibility criteria 	<ul style="list-style-type: none"> › Insulation (crawl space, basement, wall and attic) › Air sealing › Mechanical ventilation › Water management › Appliance replacement › CO detector › Dehumidifier 	› N/A
Efficiency Maine	Low Income Weatherization	Natural gas Electricity Oil Propane Wood	Homeowner Tenant	<ul style="list-style-type: none"> › Pay the heating bill › Participate for the first time › Reside year-round in the house › Meet the household income eligibility criteria or own or live in a single- or double-wide mobile home or a house with a value of \$80,000 or less 	<ul style="list-style-type: none"> › Air sealing › LED bulbs › Water-saving products 	<ul style="list-style-type: none"> › \$1,000 for an Audit D and basic upgrades › \$1,000 per insulation zone › Up to \$2,000 for a heating system
Mass Save	Energy Efficiency and Weatherization Assistance Programs	Natural gas Oil Propane Wood Coal Electricity	Homeowner Tenant Landlord	› Meet the household income eligibility criteria	<ul style="list-style-type: none"> › Insulation and air sealing › Heating system › Efficient lighting › Appliance replacement › Water-saving products › Dehumidifier and AC 	› N/A
			Building owner or manager	<ul style="list-style-type: none"> › Own or manage a residential complex with 5 units or more in which at least half of the units are income-eligible › Be serviced by one or more of the eligible Energy Efficiency Program Administrators 	<ul style="list-style-type: none"> › Insulation and air sealing › Heating system › Water heating system › Efficient lighting › Appliance replacement › Ventilation 	



Program Provider	Program Name	Eligibility Criteria				
		Heat Source	Customer	Specific Criteria	Free Eligible Upgrades	Additional Rebates
Pacific Gas & Electricity Company (PG&E)	Energy Savings Assistance Program	Natural gas Electricity	Homeowner Tenant	<ul style="list-style-type: none"> › Live in a house, mobile home or apartment that is at least 5 years old › Meet the household income requirement 	<ul style="list-style-type: none"> › Insulation and air sealing › Heating system › Water-heating system › Efficient lighting › Appliance replacement › Water-saving products 	› N/A



ECONOLER



Appendix D: Enbridge Gas Distribution Inc. Affordable Housing New Construction Program – Stakeholder Research and Analysis of Program Soft Launch, Phase 1 of 2, C2C Strategies



engage wisely

Enbridge Gas Distribution Inc. Affordable Housing New Construction Program

Stakeholder Research and Analysis

of Program Soft Launch

DRAFT Report

16 December 2016

Prepared by:
Emay Cowx CPF, Principal

www.c2cstrategies.ca



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INTRODUCTION

The Affordable Housing New Construction Program (Program) was rolled out in 2016 as part of Enbridge Gas Distribution's (Enbridge) 2016-2020 natural gas demand side management (DSM) Low Income Program portfolio. The Program was implemented by way of a 'soft launch' during the first half of the year. Enbridge identified participants through its regular DSM work in the social and affordable housing, and building development sectors.

C2C Strategies was asked by Enbridge to undertake an early review of the Program by conducting a series of interviews with soft launch participants. The purpose of the research was to assess the incentive approach, program delivery effectiveness and participants' general experience with the Program during the early stages. Findings from this research are expected to inform future refinements of the Program methodology and approach.

RESEARCH METHODOLOGY

Enbridge identified three different projects that are currently enrolled in the Program as the basis for the research. The projects included both Part 3 multi-residential buildings and Part 9 Single family dwellings. For this research C2C conducted one-on-one telephone interviews with eight individuals, including

- Applicants (who were the project owners or building developers);
- Selected members of the Applicant's architectural team; and
- Consultant representatives working on behalf of EGD to provide technical energy modeling support in the delivery of the Program.

The research approach consisted of a telephone interview lasting approximately 30 minutes and was conducted in a conversational style guided by questions designed to elicit interviewee perspectives on the following topics:

- Level of knowledge of the Program generally, the participation process and incentive structure.
- Experience to date in participating in the Program as either an Applicant or as a Consultant delivering key program components.
- Thoughts, ideas and suggestions for building Program awareness and marketing.

Respondents were assured of confidentiality in respect to their specific input.

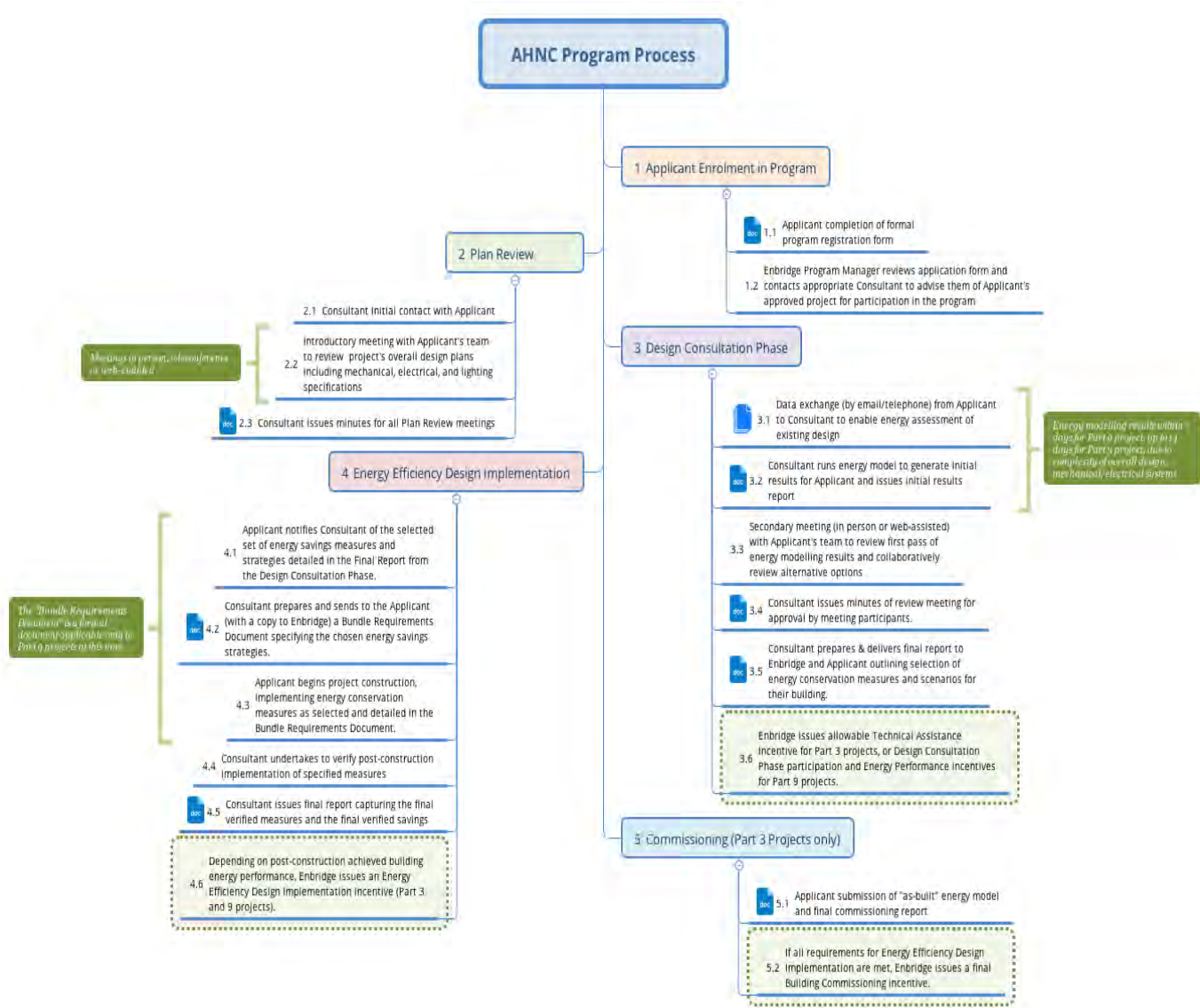


RESEARCH FINDINGS

Where it was necessary to reference a specific perspective in this research, the term “Applicant” will mean an individual who is the project owner, building developer or a member of the Applicant’s architectural team. Where the term “Consultant” was used in the body of this report, this will refer to the group of individuals who provided technical energy modeling expertise in the delivery of the Program.

1. Program Process

The illustration below provides an overview of the program process:





Where there are blue document icons noted to the left of the numbered step, there is either an exchange of information or data between the Consultant and the Applicant; or the delivery of a formal record including meeting minutes or a report. For record keeping, Enbridge receives a copy of all meeting minutes and reports developed by the Consultant on each project.

a) Step 1 – Program Enrolment

The expected process for participating in the Program would begin with an Applicant enrolling in the project by completing an application form available from Enbridge. Applicants did not experience any difficulty with the enrolment process, indicating that completing the form was “pretty simple” and “straightforward”.

One of the Consultant interviewees noted that since they have assisted builders in the past to complete application forms for other commercial building programs, it wouldn’t be a burden for them to consider completing application forms for both Part 3 and Part 9 builders who might be interested in participating in the Program. This option would make sense when the energy evaluation company introduces a potential participant to the Enbridge Program. Enbridge would still authorize approval for acceptance to the Program.

Key Finding: Enbridge to consider allowing energy efficiency evaluation companies to identify potential program participants and facilitate their application for enrolment for approval by Enbridge.

b) Step 2 – Plan Review and Step 3 – Design Consultation Phase

All Applicant interviewees had completed a full cycle of the Plan Review and Design Consultation Phases (Steps 2 and 3) and were able to share their experiences.

A common theme from the feedback was the importance of identifying and involving projects at an early stage of the building project design. It was noted that ideally, projects (regardless of building type) should be at a conceptual draft plan stage.

- *Once we’d got an architect, maybe meet before we even put pen to paper or anything. Your modelers could then say ok here’s what you need to do...because it costs us to change to the new modeling. - Applicant*
- *Now you’ve got lots of time. The architectural aren’t done, the mechanicals aren’t done, and you’ve got some ability now to really make things happen. - Consultant*
- *Generally the plans might not be finalized, but changes can still be made, at least they have a set of drawings, they have the mechanical, the electrical. - Consultant*
- *We [Consultant] can take a project as long as they have a general plan with geometry and base layouts done and a general idea of what they’re looking at in terms of mechanical systems. From there it allows us to bring the potential options*



forward for their consideration before they make those major decisions in terms of specific mechanical system with this efficiency and before those major systems are purchased. - Consultant

In some cases during the soft launch period Applicants had already entered the project construction phase, which made changes to building design or alternative equipment considerations impossible or difficult. In one case there was time to make a change order to shop drawings that had been already issued. In that situation there was, however, an additional cost that the Applicant would have preferred to avoid.

Key Finding: There is an opportunity for the Program application/enrolment form to add questions that will enable an assessment of the stage of an Applicant's project. This preliminary assessment will ensure that once a project has been accepted into the Program, it will gain maximum benefit from the Plan Review and Design Consultation Phases with the assigned Consultant. Resulting in potentially a higher chance for implementation of energy efficiency measures identified during this phase of Program work.

Although not a significant impediment to the process, it was mentioned by Consultants that initial Plan Review meetings did not always involve all necessary individuals from the Applicant's support team. These introductory and initial contact meetings were important for the Consultant to fully understand the scope of the project and key design details. Sometimes project or building owners were not as familiar with the necessary design details that would inform the set up of an energy modeling simulation. This required the Consultant to conduct follow up meetings with the Applicant's design team to obtain the necessary information. It was also suggested that if there was an identified contractor for the mechanical and electrical systems that they be available to participate in the Plan Review meeting (particularly for Part 3 projects) so that the Consultant could not only better understand the contractor's thinking, but to also help overcome potential contractor bias for traditional forms of equipment or technologies.

- *There has to be a discussion between the energy modelers and the design engineers about what was possible for the project, where would the boundary be between the code response for the highest performance response possible, and what's the reasonable place in the middle. That discussion needs to take place with the actual mechanical designer in the room. - Applicant*



c) Step 4 – Energy Efficiency Design Implementation and Step 5 - Commissioning

None of the projects reviewed for this research had yet completed requirements for either Steps 4 or 5 of the Program. Consequently feedback to provide specific insight into the Program at these steps is not available.

2. Program Knowledge and Support

Since Applicants were brought into the Program directly by Enbridge during the soft launch period, a Consultant's first contact with an Applicant took place during the Plan Review meeting. At that initial meeting Consultants noted that knowledge of the Program steps (or phases) and details regarding the incentive structure was relatively weak among Applicants. One Consultant surmised the reason as possibly being a lack of shared knowledge among the builder's staff assigned to the project. Specifically the person on the builder's side to whom Enbridge had introduced and described the Program, might not have been the same person representing the project at the Plan Review meeting. This resulted in the Consultant having to explain in detail the Program features and guidelines.

In reflecting on Applicants' level of knowledge about the Program, Consultants offered the following feedback:

- *Something up front that is more clear. Better laid out, maybe it's just the way the program is presented. - Consultant*
- *The first couple of projects there was a representative from Enbridge, but the last one there wasn't. So now the builders call me and ask me what are the next steps. I'm more than happy to give this information to them, but when it comes to the incremental cost of building energy star it should come from Enbridge. - Consultant*

Deeper knowledge of the Program elements appeared to become evident to Applicants during the Plan Review phase and the following Design Consultation phase, where the role of the incentives were demonstrated in the outcomes of the design modeling simulation:

- *We had one of the representatives at one of the construction meetings. So they were also able to share light on the program with ourselves, the contractor and the owner's representative. I think it was very self explanatory. When you get a grasp and navigate through the description you start to understand its context. - Applicant*
- *I don't think I went through the process, how many steps. We did the modeling, everything being put into effect now. - Applicant*

In summary, it appears that during the soft launch period it was common to have an Enbridge representative participating in those early meetings with Applicants and therefore available to directly answer any Program-related questions. In the future as the volume of Applicants increases, familiarity with the program steps and incentive structure could be better supported by providing Consultants with marketing resources and website links to



reference during those early meetings. These materials and references would be particularly useful where the Applicant is a large organization with different staff assigned to work on different projects, not all of which might be in the affordable housing sector.

Additionally, the deeper complexity involved in engineering the mechanical and electrical components of a Part 3 project suggests that an Applicant's team will be comprised of specialized individuals brought in to support those building design elements, and who will have had no prior exposure to the Program. Feedback also indicated that participants working on behalf of an Applicant who went through the process of a technical energy modeling consultation led to experiential learning, which reinforced Program understanding and the phased incentive approach.

Key Finding: Consultants would benefit from having additional Program marketing materials and online resources that provide an overview of the steps and phased incentive structure. These materials would be particularly effective during Consultants' early meetings with Applicants and their team. Enbridge would also benefit from requiring that Consultants brought on to deliver the Program have a deep understanding of the phases and incentive structure so that when required, Consultants are confident and capable of describing the Program in detail directly to Applicants.

3. Information Trail

Participating in an energy design modeling simulation required the Applicant to provide to the Consultant a variety of documents and data, including architectural and technical drawings and layouts, mechanical and electrical specification data, and other building design and construction information. Consultants were uniformly in agreement that they kept a detailed record of what information was provided. The data was generally obtained by email, although sometimes through telephone conversations.

Formal written records developed by the Consultant would take the form of minutes to capture discussions that occurred during the Plan Review phase, and Design Consultation phase results meetings. A copy of these minutes was provided to all meeting participants for review and approval, and a final copy provided to Enbridge for its reference and retention.

Other types of formal documentation generated again by the Consultants during the soft launch period included two formal reports per Applicant project: an Initial Results report from the energy modeling simulation, and a Final Report capturing the final measures and energy savings strategies that an Applicant may select from to incorporate as the project



advances to construction. An outcome of the final results meeting is the selection by the Applicant of a 'bundle' of energy saving strategies based on what they learned from the modeling simulation and outcomes of alternative design scenarios. Both of these reports are also provided to meeting participants for review, with copies again provided to Enbridge for its reference and retention.

Following the Final Results meeting and report, the Applicant is then sent by the Consultant a "Bundles Requirement Document" based on the final selected strategies. This document would then form the basis of verification during the Energy Efficiency Design Implementation phase to determine if the selected strategies and measures have been implemented following construction and determine the final level of incentive to be paid. The Bundle Requirements Document is noted as a specific report generated by Consultants supporting Part 3 projects.

A similar reporting process was not referenced by Consultants supporting Part 9 projects. Given that energy evaluators working on behalf of the Consultant assigned to support Part 9 projects are Natural Resources Canada certified, it is presumed that similar reporting protocols and documentation are in place. The Consultant supporting Part 9 projects did indicate that since the Program had set Energy Star standards as the target, the project *"has been given a file number by the government."* Inferring that an official record resided in a federal government database.

Key Finding: If not already in place, to facilitate alignment in formal reporting processes and documentation between the two streams of projects (Part 9 and Part 3), it is suggested that Consultants for either type of project provide to Enbridge a formal document detailing the energy savings strategy and collection of measures agreed on by the Applicant following delivery of the final results report from the Design Consultation phase. This document would provide a clear record of intent to build selected measures and/or adopt specific energy savings strategies into the Applicant's project, for future reference and verification purposes.

4. Program Design and Incentive Structure

All interviewees spoke very highly of the Program and its staged incentive structure. In comparison to other energy conservation programs targeted at buildings, such as Sustainable Buildings Canada (referenced by one interviewee), the Program was viewed as simple to navigate and it entrenched real learning among participating Applicants. Having the energy modeling based on an Applicant's project made the learning both immediately



practical and relatable, rather than a training exercise using a generic scenario whose learning was often forgotten over time.

- *It made their company think about things in a whole new way with an industry that's willing to help them. - Consultant*

So far the Program has achieved its desired objective for one particular project by demonstrating to the building owner through the modeling results, how an early design by the architect was in fact superior in energy performance than the design ultimately selected to accommodate project budget constraints. The Design Consultation phase provided savings and monetary data that ended up convincing the Applicant to invest in slightly more costly (but energy effective) technology earlier, rather than later.

- *So knowing that there are systems that are cost effective and energy savings systems that are going to save them money over the long term life cycle of the equipment and project is a big plus. And then on top of that be able to get some incentives to encourage them to spend a little more money up front for the greater benefit down the road, I think that was huge. - Consultant*
- *The best thing that's going to come out of this is that we're going to have over \$15,000 that's going to go to commissioning and the costs of the better energy decisions that we've made so I would call that a very big success. ... There are things like the occupancy sensors, or the vacancy sensors that may have not gotten done without being a requirement in here. So there definitely have been a few things that have been added in that may have been forgotten had we not participated. - Applicant*

It was encouraging to note that Consultants supporting the program have had a very positive experience with the Program during this soft launch period of learning how the program will work for Applicants, and how they as Consultants are expected to support them. The administrative burden was seemingly acceptable, and the Program's design apparently a pleasant surprise. One Applicant who has had previous experiences with many other federally funded and utility-based energy efficiency programs indicated surprise that a "roadblock" or "bureaucracy" never occurred. In their words, "We were always waiting for a negative, but it never happened like that. It was just so positive!"

a) Templated Modeling Approach

The Program design is supported primarily on two features:

1. Technical support provided during the design phase by an energy modeling consultant; and
2. Incentives that are determined based on level of building performance that exceeds the Ontario Building Code (OBC).



Consultants supporting the program for both Part 9 and Part 3 buildings were all highly experienced energy evaluators. In conducting this work they utilized computer-based energy modeling software in order to assess various design scenarios and deliver results for discussion with Applicants.

Feedback from Applicants highlighted a few shortcomings with using a templated modeling approach. First, prices and data reported by one Consultant were provided in U.S., rather than Canadian currency and metric units. The Applicant did provide feedback directly to the Consultant who subsequently translated the data to be consistent with Canadian references.

Second, the level of energy modeling knowledge and sophistication varied among Applicants. Where an Applicant was least knowledgeable and sophisticated in the area of building design efficiencies (in other words generally built only to OBC), working with an energy modeler utilizing a templated approach delivered a high learning factor and introduced primary level strategies that made it simple to exceed OBC. Where an Applicant was highly sophisticated, to the degree that the project had its own energy modeler on staff, the templated approach was challenged in making the Program fit the already high standards imposed on the defined project. In this specific case the project was designed to achieve what is known as “passive house” certification, which relied heavily on extraordinary levels of insulation and designed to have less reliance on mechanical systems. In this situation and elsewhere, various Applicants described the shortcomings of the approach in the following ways:

- *One of the problems we had with the program is that it's not able to model how good of a building we've produced. - Applicant*
- *Every model makes a certain set of assumptions so it's always good to have someone else looking at it to work out if something critical has been missed, or you're getting carried away on something you wouldn't have to. I didn't get a strong feeling that they've done a very detailed model. - Applicant*
- *It's more a question of what the scope of work of the models will be. - Applicant*
- *It's a question of having the flexibility in the development team on the owner's side and the development team on the [modeling] side to get the best out what the opportunities are. A templated approach may actually not allow you to get the best opportunities in play. - Applicant*
- *Maybe Enbridge already knows the answer and they're not necessarily looking for what the building can be, perhaps they just already know the answers that they want and they're just trying to find it inside of the design. Once again that's not necessarily a bad thing, because I have no doubt that not everybody is building the way that we are, and there's guarantee you could be making a lot of buildings*



better by making sure that people go through this checklist because a lot of people don't. - Applicant

- *My biggest feeling is they [Enbridge] could be looking even bigger. I feel they put themselves in a box and gave themselves a limit as how efficient a building could be. They could be incenting and looking at making even bigger and better buildings and more efficient buildings than what they've limited themselves to. - Applicant*

Key Finding: By involving Applicants who represent a continuum of energy modeling knowledge and sophistication during the soft launch period, the templated modeling approach has shown some gaps in terms of delivered value to Applicants who are at the high end of the range. One suggestion was for Enbridge to consider offering both modeling and constructability analysis as part of the Design Consultation phase. This would be achieved by having Consultants with demonstrated competencies in both modeling and implementation to help an Applicant identify the opportunities best suited and tailored for their specific projects.

b) Incentive Structure

All interviewees acknowledged that the phased incentive approach was the right one. They believed that it was an important contributing factor to ensuring continued Program participation; except in the case where one project was already preparing for construction and too far along to alter the design in a manner that would work within defined Program rules.¹ Applicants were quite candid about the draw that financial incentives had for encouraging Program participation. As not-for-profit developers, not one interviewee mentioned that proffered amounts were inadequate or lacking.

A few interviewees indicated that the program's models and therefore incentives were focused primarily on the mechanical/electrical aspects of a project.

- *It's easier to incent things at the manufacturing level than it is at the design and construction level. - Applicant*
- *They put a lot of effort into their mechanical strategy. If I look at the requirements document that we've been given, half of it is related to the mechanical system. I can understand makes sense from perhaps the old that we're building and from Enbridge's point of view because that's where gas is consumed; it's going to be in*

¹ Despite not continuing in the Program with that specific project, both the Consultant and the Applicant noted in their respective interviews that the learning, combined with the benefits offered through the Program, has led the Applicant to notify the Consultant of an eligible, upcoming project that will be applying to the Program in the near future.



the boilers, or in the air makeup units. I feel they focused heavily on that. Whereas in our building we're doing such high insulation with a simple mechanical system and focusing on a huge heat recovery ventilation on that mechanical system. I think that this entire program, these requirements listed here might almost be obsolete when the new building code comes out. The new building code will make the extras listed in here the baseline. So this program has an expiry date of three years. – Applicant

In contrast, others felt that basing efficiency improvements against OBC was a flexible approach.

- *The new building code will require more insulation, and more efficiency on the mechanicals...when the code goes up it now just raises the benchmark for the Enbridge program. The new energy star will jump up by 20% over code when the code goes up. A lot of it is dependent on the architecture. We're seeing a lot more glass and it has a certain R-value. So to get more efficient you might have to look at the mechanicals more. - Consultant*

In summary, financial incentives geared towards the affordable housing sector are always welcomed as one Applicant noted, "The commonality for this is there isn't enough money to do the job."

Key Finding: At this time, satisfaction with the incentive approach and levels notionally appears high. Another review of these Program elements should be considered in the future, with projects that have completed construction and gone through a full Program cycle.

5. Program Support

As a market transformation program, there were a variety of areas where interviewees felt that Enbridge might provide additional support to Applicants as they participate in various phases or steps of the Program. As noted earlier, interacting with energy evaluators/Consultants through a modeling process is both a learning exercise and an opportunity to help building contractors and tradespeople overcome bias for traditional building practices and technologies. To entrench the learning and support the market transformation brought about by the Program, it was suggested that Enbridge consider delivering focused training in the following ways:

- *Enbridge could, as the project moves through one of the phases where the builder could be, provide a half day of in-class training for the developer or builder's team. They can choose how many people they want in it, just a half day with ourselves*



[Consultant]... here are the future opportunities around the world, cool building science, lessons learned. We always find that the builders and developers are keen to get that kind of information. Union Gas has done a little more by virtue of some of their programs, Optimum Homes and others where they've targeted pure consulting, pure instruction with the builders. - Consultant

- *Some builders work with the same trades and some trades are not willing to change. I sometimes think if we could get some of these head trades people trained, and then they can pass that information on. So it's building practices. Little changes, nothing big, but it makes a difference. – Consultant*
- *If a builder commits to it, I think there should be some trades training. If they've never built or have any experience building a more energy efficient home. – Consultant*

One interviewee mentioned that the real benefit of training at the trades level was the development of shared understanding of how trades people all have a role in delivering an energy efficient building by adjusting the manner in which they complete their tasks. A situation was described where a design may call for the application of high insulation into a building's walls. The framers and insulator trades people do their jobs, but when it comes to installing the electrical boxes, etc. the question was asked whether the electrician followed up by sealing the plastic when completing their task in order to maintain the integrity of the building envelope.

Another interviewee (who was an energy modeler brought on to a Part 3 Applicant's team) suggested a more aggressive support framework similar to one adopted at Hydro Quebec. In this structure Enbridge would internalize the energy modeling expertise by having technical staff available to directly support large projects. Further to that, it was also suggested that Enbridge might consider undertaking a robust economic study that would help to demonstrate to affordable housing project developers how upfront investments in a better performing building would result in an immediate stream of lower operating costs, thereby overcoming the general anxiety of taking on the perceived financial risk of doing something new.

- *The providers, even the necessarily sophisticated ones don't have the building expertise to tune their instincts and they always are short of cash so the risk of trying something new and having to fix it could be fatal. The investment is always questioned and the tendency is to push towards cheaper buildings that actually need more maintenance, but deferring the maintenance. It's the social side, not necessarily the bricks and mortar side that are the trickier parts of the equation. – Applicant*



At the project level, particularly for the more complex Part 3 buildings it was noted that ongoing modeling support beyond the Design Consultation phase would be valuable.

- *To be really, really effective in taking advantage of the opportunity, the applicant would actually have to have a fairly sophisticated understanding of what was possible from the mechanical, electrical and control side of the project. That's probably beyond what most of the providers have in-house. - Applicant*

During this soft launch period assessing the adequacy of ongoing Consultant technical support to Applicants would not be possible until projects have completed one full cycle of the Program (i.e., final verification has been completed). Enbridge may want to consider the degree to which modeling Consultants might be required to provide ongoing technical support to Applicants as project move through to completion under the Program.

Key Finding: Interviewees provided a number of suggestions where Enbridge might consider providing additional support to the Program. These ideas ranged from targeted training sessions for builders, contractors and tradespeople, developing its own technical energy modeling competencies (rather than contract out), and undertaking a robust economic study that would assist affordable housing developers overcome anxiety over the perceived financial risks of building to high energy efficient standards. After Consultants complete a project's final energy savings verification, and Applicants apply for the final incentive, it would be beneficial to review an Applicant's experience with ongoing technical support from a Consultant during the project's Energy Efficiency Design Implementation phase. This feedback will provide insight into the level of desired and/or necessary support from Consultants through the entire Program process.

6. Developing Program Awareness

To create a sustained Affordable Housing New Construction Program, it will be necessary to build program awareness in order to create a pipeline of potential Applicants. A common remark among interviewees was that regular liaison with the builder industry and with the energy evaluator community would be the first approach to finding out about projects ahead of time when they're at the conceptual draft plan stage. One Consultant mentioned that they learned about the Program through the Ontario Not for Profit Housing Association (ONPHA), further sharing that the Canadian Mortgage and Housing Corporation (CMHC) had been discussing the funding of new affordable housing developments. This



would suggest that there's an opportunity for Enbridge to get information about their Program to CMHC, for when their outreach occurs. Other suggestions include

- *Getting out to agencies, like local construction associations, getting out to consultants so they can inform their clients of some of the incentive programs. – Applicant*
- *Architects, I'm sure they have a website they go on to or they're part of an architect. – Consultant*
- *Through our evaluators. They're closest to them. Were putting something on our website. They're the closest to the builder. They're on the ground floor. Builders will pick demographically someone who's closest to where they're building. – Consultant*
- *More visibility is going to get interest because the basic condition of a housing provider is not having any money. Anyone who offers to help out with that load is going to get attention, but they have to be visible. It might be just as easy having a representative go direct to the providers: OCH [Ottawa Community Housing], TCHC [Toronto Community Housing Corp.] and all the municipal housing agencies. Just go direct. It's going to be more effective than manning a booth at a trade show. Talk to specific people. Talk to the people doing the stuff. - Applicant*

Key Finding: Due to pent up demand for a unique program such as the one created by Enbridge for new construction in the affordable housing sector, creating Program visibility appears key. Interviewees provided a number of suggestions including leveraging from the networks already held by the modeling Consultants currently supporting its delivery.

CONCLUSION

The Enbridge Affordable Housing New Construction Program clearly fills a need in the energy efficiency construction marketplace. Soft launch interviewees generally felt that the Program was much easier to navigate and understand in comparison to other programs that Enbridge offers in the building construction sector. Given that Applicants' experience with the Program during this soft launch stage has been only in the early Plan Review and Design Consultation phases, a full assessment of the Program will be achieved by revisiting their experience once they've completed the latter phases of the Program. Research conducted at this future time will also provide an opportunity to examine the desire, or need by Applicants for ongoing technical support from Consultants contracted by Enbridge to deliver the Program.



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Our operating principles are built on:

- Relationships – We firmly believe that long term relationships are developed from thoughtful and considerate actions.
- Collaboration – Keeps the lines of communication open, allowing us to work in a focused and productive way with clients and their stakeholders.
- Co-creation – Is the space in which we build new paths forward together.
- Innovation – Transcends current thinking to establish “next” practices that will carry into the future.

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ENBRIDGE SUMMARY RESPONSES TO 2016 NATURAL GAS
DEMAND SIDE MANAGEMENT ANNUAL VERIFICATION RECOMMENDATIONS

In its final 2016 Natural Gas Demand Side Management Annual Verification report, dated October 30, 2018, the Evaluation Contractor outlined findings and recommendations for review by the utilities for the purposes of informing future evaluation work.

Findings and recommendations were summarized in the following categories:

1. 2016 annual verification recommendations
 - Overall annual verification
 - Whole home simulation modeling
 - Cost-effectiveness recommendations
2. CPSV recommendations
 - Energy savings and program performance
 - Verification process recommendations
 - Documentation and support recommendations
 - Data management recommendations
3. Measure Life Study Recommendations
 - Updates to Measure Lives
 - Future Research
 - Recommended measure lives

Enbridge has reproduced below the various tables provided in Section 5 of the EC's 2016 Annual Verification Report as well as the details provided regarding the EC's "Findings", "Recommendations", and "Outcomes", from the EC's report. The following is a listing of these items along with Enbridge's responses where such findings were applicable to Enbridge.

1. 2016 Annual Verification Recommendations

Overall Annual Verification – Summary of Recommendations¹

#	Finding	Recommendation	Recommended in 2015	Applies to 2016			Primary Outcome		
				Union	Enbridge	Evaluation	Reduce Costs	Improve Accuracy	Decrease Risk
O1	The Enbridge tracking file does not currently include information that allows the evaluator to identify all the projects installed by a single customer.	A: Consider investing in a relational program tracking database.	✓	✓	✓		✓	✓	✓
		B: Enbridge should include site-level information for all measures installed through the program.	✓		✓			✓	✓
O2	The format of Enbridge's tracking data is not well suited to a combined evaluation with the Union data.	A: Enbridge should deliver tracking data in a single flat file.	✓		✓		✓	✓	✓
		B: Consider investing in a relational program tracking database.	✓	✓	✓		✓	✓	✓
O3	Neither Union nor Enbridge tracking databases currently use prescriptive measure descriptions that map directly to the approved energy savings spreadsheet (TRM).	A: Develop, maintain, and use an electronic summary spreadsheet of the TRM.	✓	✓	✓	✓	✓	✓	✓
		B: Once the electronic TRM spreadsheet is developed, track prescriptive savings using unique measure descriptions that map to electronic TRM.	✓	✓	✓	✓	✓	✓	✓
		C: Once the electronic TRM spreadsheet is developed, utilize the same electronic TRM for both utilities		✓	✓	✓	✓	✓	✓
		D: OEB: develop means for consistent system				✓	✓	✓	✓
O4	Different TRMs were used by utilities for savings calculations.	A: Explicitly agree to the TRM version to utilize for measure-inputs		✓	✓	✓	✓	✓	✓
		B: Use the same TRM version for both utilities for each program year		✓	✓	✓	✓	✓	✓
O5	DNV GL and other EAC members were sometimes confused about appropriate sources and the definition of terms.	A: Evaluation Contractor: distribute to the EAC a list of the anticipated sources at the start of the verification process, possibly within the scope of work, for review and verification.				✓	✓		✓
		B: Evaluation Contractor: distribute to the EAC a glossary of terms at the start of the verification process, possibly within the scope of work, for review and verification.				✓	✓		✓

¹ 2016 Natural Gas DSM Annual Verification Report, October 30, 2018, Table 56, page 32

O6	Explicit documentation was not available for all program stages, specifically for non-savings metrics	A: Document each required element and stage for non-savings metrics.		✓	✓	✓	✓		✓
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O1. Finding: The Enbridge tracking file does not currently include information that allows the evaluator to identify all the projects installed by a single customer.

Recommendation A: Both utilities should strongly consider investing in relational program tracking databases. Relational program tracking databases and customer relationship management (“CRM”) systems allow for multiple measures and projects to be associated with a single customer and/or customer site. The incremental cost of implementation is low if it is part of the initial database design, populated as projects are started, and updated once they are complete.

Outcome: Reduced burden on utility staff and reduced evaluation costs. A relational database would streamline aggregation of program data for scorecards and make providing data simpler for annual savings evaluation and verification.

ENBRIDGE RESPONSE: As detailed in its 2015-2020 Multi-Year Plan, Enbridge outlined the need for a DSM IT system replacement. The Board approved this request in its January 20th, 2016 Decision. As a result, Enbridge DSM is currently undergoing a system upgrade that will include improved tracking & reporting and CRM components. This system upgrade is expected to be rolled out in late 2018.

Recommendation B: Enbridge should include a unique site-level or customer-level identifier for every measure installed in the program to allow the evaluator to identify all projects installed at a single customer, regardless of program.

Outcome: Confirmation that each installation is unique and assessment of interactive effects.

ENBRIDGE RESPONSE: Enbridge's projects are designated with a unique project ID. Although a customer identifier to identify related sites is not utilized for projects, they can be linked on the basis of account billing information, site address, or at the customer name assignment for multiple addresses. There are some exceptions however such as School Boards and property managers with many sites.

O2. Finding: The format of Enbridge's tracking data is not well suited to a combined evaluation with the Union data, meaning that the format requires a significant investment of time to extract the necessary data for verifying each program's savings. In addition to increased time and thus verification cost, the need for manual extraction of data introduces many opportunities for error, which potentially decreases savings accuracy and increases risk.

Recommendation A: Deliver to evaluators a single, flat file of tracking data.² Each record should have measure-level information which includes the information listed below:

- Program identification information, such as scorecard, and program name
- Customer identification information, such as a unique customer ID, rate class, and location
- Measure identification information, such as measure description, unique measure identification, measure group, measure life, free rider rate, and savings per unit for prescriptive measures
- Savings information, such as annual gross and net savings, cumulative gross and net savings, and non-gas savings
- Additional information as needed to allow the evaluator to verify lost revenue and cost-effectiveness
- A "verification ready" flat file would not require summary rows, hidden rows or

² In this context, a flat file is a table with one record per line and no summary information.

columns, links or formulas but would include all necessary variables in a single tab or table for all projects and measures, regardless of type.

Outcome: Reduced burden on program staff, more flexibility for evaluators.

ENBRIDGE RESPONSE: Enbridge's tracking summary has evolved and improved through the review of previous audits to a comprehensive and transparent tool. Prior auditors and Audit Committees expected Enbridge's tracking database to have this level of transparency to fully illustrate the determination of scorecard achievements. Enbridge's tracking reports have historically been found to be comprehensive and accurate. Though Enbridge's tracking information for 2016 was not laid out in a single flat file, as was desired by the current EC, with the exception of this item, the tracking spreadsheet Enbridge provided the EC included the project information details requested in Recommendation A. Based on the EC's recommendations from the 2015 verification, Enbridge made every effort to ensure the 2016 tracking summary clearly provided the information requested.

Recommendation B: See recommendation O1A. The utilities should consider investing in a new database.

Outcome: Reduced burden on utility staff and reduced evaluation costs.

ENBRIDGE RESPONSE: See response to O1A.

O3. Finding: Neither Union nor Enbridge tracking databases currently use prescriptive measure descriptions that map directly to the approved energy savings spreadsheet ("TRM"). The EC does note that Enbridge did provide a tab within the excel Tracking File that provided a summary of their prescriptive offers and the savings values associated with these and that Union provided a mapping of Union names to TRM terms. However, these offer names do not consistently match the values described within the TRMs. The EC often struggled to align tracking measures to the

correct TRM measure, resulting in increased effort and time in identifying intended TRM measures and repeated back-and-forth between evaluation and the utilities for clarification.

Recommendation A: Develop, maintain, and use an electronic summary of the TRM, such as an Excel file. Each measure (identified as a unique savings value) should have an assigned measure ID number, and new ID numbers should be assigned when a measure is updated with a new savings value. This allows for a historical record of the changes in the TRM and allows the evaluation to identify outdated values. Once developed or agreed to, both utilities should utilize this system for simplification and transparency.

Recommendation B: Once the electronic TRM is developed, track prescriptive savings using unique measure descriptions that clearly map to the electronic TRM.

Recommendation C: Once the electronic TRM is developed, utilize the same electronic summary file for both utilities.

Recommendation D: As the entity with primary ownership of the TRM, the OEB should develop the references for parties to directly refer to specific measures in a consistent way which accounts for variations in energy savings due to capacity or other characteristics.

Outcome: Reduced burden on utility staff and reduced evaluation costs. Fewer errors in the tracking data.

ENBRIDGE RESPONSE to Recommendations O3A, O3B, O3C, O3D: As acknowledged by the EC in Recommendation O3D, the OEB now has ownership of the TRM. As such these recommendations should be directed to OEB Staff. In the meantime, as noted in the finding above, Enbridge provided, in its 2016 tracking worksheet, details that provided a summary of prescriptive offers and their

associated savings values per the TRM sub-docs. It should be noted that a direct one-to-one naming of measures based on the current TRM to Enbridge's tracking database is not always possible. For example, a measure offered across two different sectors that have unique incentive structures (e.g., CI Prescriptive and Low-Income Prescriptive) might refer back to the same sub-doc but would require two different "names" within Enbridge's tracking database. Also of note, the EC did not find any errors in Enbridge's tracking database related to incorrect mapping of prescriptive measures to the appropriate sub-doc.

O4. Finding: Mid-way through the evaluation and verification process, it was noted that utilities were using different TRMs for reference for savings values. The general rule for use of the best available information, while generally good, does allow for ambiguity. In this instance, the ambiguity created a need for additional verification processes, with new savings values for Union Gas.

Recommendation A: Explicitly state which TRM version applies to the annual savings calculations for savings calculations for both Scorecard / DSM shareholder incentive calculations as well as lost revenue calculations. This explicit agreement on the appropriate TRM should be made prior to the start of the verification cycle, at the very latest.

Recommendation B: Use the same TRM version for both utilities for each program year.

Outcome: Reduced evaluation costs. Decreased risk to utilities that savings estimates are incorrect due to use of "incorrect" TRM, improved savings accuracy.

ENBRIDGE RESPONSE to O4A and O4B: It is Enbridge's understanding that the expectation was that for the 2016 program year, the Company should use the TRM that had been most recently filed as at December 31, 2015 (the end of the previous

program year). As such Enbridge utilized the TRM that was reflected in EB-2015-0344 New and Updated DSM Measures – Joint Submission from Union Gas Limited and Enbridge Gas Distribution, December 16, 2015. The EC accepted these TRM values as appropriate in the 2016 verification. Enbridge’s understanding of the Board’s direction for the balance of the 2015 to 2020 Framework is that input assumptions and net-to-gross factors that are the result of the annual evaluation process will be used to determine subsequent targets. Results for gas savings calculations will use the same input assumptions and net-to-gross adjustment factors that were used to determine that year’s targets. Results for lost revenue calculations will use the best available information at the time of the audit.

O5. Finding: Throughout the verification process, DNV GL and other EAC members had questions about the appropriate source to use for items such as TRM savings (March or December), program eligibility requirements, and other information necessary to complete the evaluation. The EAC and EC also had a number of discussions about terminology and the meaning of different terms. These conversations often resulted in small delays in the evaluation work.

Recommendation A: The evaluation team should distribute to the EAC a list of the anticipated sources at the start of the verification process, possibly within the scope of work, for review and verification.

Recommendation B: The evaluation team should distribute a glossary of terms to the EAC at the start of the verification process, possibly within the scope of work, for review and verification.

Outcome: Clearly defined and agreed upon sources, definitions and documentation should reduce the risk for confusion and re-analysis of scorecard metrics and reduce costs.

ENBRIDGE RESPONSE to O5A and O5B: These recommendations were not specifically directed to Enbridge but rather for future evaluation consideration however, Enbridge concurs that clear and documented consensus amongst the EAC and EC regarding the sources to be utilized is appropriate.

Enbridge adheres to the glossary of terms developed as part of the Board approved TRM filed in EB-2016-0245 in December 2016 and supports its use in the evaluation effort. Scorecard metrics and their calculation are as defined in the Board's Decision on Enbridge's 2015-2020 DSM Plan in EB-2015-0049.

O6. Finding: Explicit documentation was not available for all program stages for programs such as Enbridge's Market Transformation Run It Right program. In that program, there was no documentation for participants moving to step 4 of the program (see Appendix H), only documentation that the participants had completed step 3 and utility confirmation that this is equivalent to engagement in step 4. Similar recommendations are included in section 5.1.2 for whole home simulation modeling programs.

Recommendation A: Documentation for each required element and stage for non-savings metrics should be recorded. The majority of these elements for future years have been identified in this evaluation, in the scorecard and program-relevant appendix sections.

Outcome: Reduced burden on utility staff and reduced evaluation costs.

ENBRIDGE RESPONSE: Enbridge believes it collects documentation sufficient to support results for non-savings metrics. Ultimately, upon review and with clarification from Enbridge regarding eligibility, the EC concluded no changes to Enbridge's non-savings metrics were warranted.

Whole Home Simulation Modelling - Summary of Recommendations³

#	Finding	Recommendation	Recommended in 2015	Applies to			Primary Outcome		
				Union	Enbridge	Evaluation	Reduce Costs	Improve Accuracy	Decrease Risk
SM1	Both utilities use building simulation modeling to estimate energy savings	A: Provide both simulation file (HSE) and output file (TSV) to the evaluation team for every project.	✓		✓		✓		✓
SM2	Both utilities collect and deliver <i>some</i> photographs to support retrofit site improvements.	A: Provide more explicit support for major measure installations.	✓	✓	✓				✓
SM3	There were some inaccurate savings entries.	A: Consider reviewing and modifying program processes to avoid data entry or outdated simulation result errors.		✓			✓		✓
		B: Provide more explicit support for major measure installations.	✓	✓	✓		✓		✓
SM4	Air sealing as a savings measure is present in a high percentage of single-family home retro-fit projects.	A: Evaluation: distribute before and after equivalent leakage area and energy savings attributable to reduced air leakage (if possible).				✓		✓	✓
SM5	The energy savings from the home retrofit programs rely exclusively on the simulations provided by the delivery agents.	A: Consider funding a study to verify the models produced by the utility agents.	✓			✓		✓	

SM1. Finding: Both utilities use building simulation modeling to estimate energy savings for their home retrofit programs, including Home Energy Conservation, Home Reno Rebate, Winterproofing, and the Home Weatherization Program. HOT2000 is the most common program used for those simulations, which is a program developed and released by NRCAN for certified energy advisors. Because of the restrictions on the program, the evaluator could not consistently run the simulation files and produce the same result reported by the program. While Union provided TSV files for all sampled locations, Enbridge did not.

³ 2016 Natural Gas DSM Annual Verification Report, October 30, 2018, Table 57, page 34

Recommendation A: Provide the building simulation file (HSE), the program output file (“TSV”), and full supporting documentation for all claimed project measures for every sampled project.

Outcome: Reduced burden on utility staff and reduced evaluation costs.

ENBRIDGE RESPONSE: Enbridge believes that the EC has made this finding in error. In the case of the Residential Home Energy Conservation offer, all program output files were provided to the EC along with the HSE building simulation file and full supporting documentation for all requested projects included in the EC’s verification sample. A TSV can only be generated where the EnerGuide mode of NRCAN’s HOT2000 software is used.

As permitted in the Home Weatherization offer, not all projects include building simulation models completed in the EnerGuide Rating application mode of HOT2000. In scenarios where the building simulation model (“HSE”) for the project was completed in “general” mode, the software does not provide for the generation of a TSV program output file. In these cases, to be of assistance, Enbridge proactively provided the EC with a PDF document clearly illustrating the values in the HSE file referenced to support the calculation of the project energy savings. This PDF document provided an explanation on how the building simulation was utilized to confirm the gas savings claimed and included a breakout of the gas savings calculations accompanied with screenshots from the building simulation file to verify the data used in the calculations.

SM2. Finding: Both utilities collect and deliver some photographs to support many of the changes made at a home retrofit site as well as additional documentation for installed equipment and performed measures. However, the evaluator could not consistently confirm the number or type of major measures installed based on the photographs or other documentation provided.

Recommendation A: Consider providing more explicit support for each measure to eliminate uncertainty around project savings and participation. Full project documentation (pre/post photos, documentation of all installations or actions such as invoices and/or photos of each measure, data collection reports, pre-and post blower door tests for all sites) to the evaluation team. By delivering all documentation, the evaluation team would not have to follow up with the utility to obtain output for models that could not be run but could still verify the output for models that can be run.

Outcome: Greater certainty around scorecard achievements.

ENBRIDGE RESPONSE: Enbridge consistently works to provide all available supporting information (e.g., documents/photos/invoices) collected by agents in delivering the offering to the EC upon request. The supporting information gathered for the Whole Home offers is consistent with what Natural Resources Canada (“NRCan”) requires be collected for use of HOT2000 software. Building simulation (“HSE”) files as well as project data output files (“TSV”) are also provided, where available.

Of note, in some projects, confirming measures after they have been installed can be challenging. By way of example, wall insulation once completed is covered up by drywall, making a post-installation photo difficult however, an invoice confirms that work was complete.

Enbridge will continue to strive to provide all available information to facilitate the confirmation of measures installed in a project subject to review.

SM3. Finding: The evaluator identified a number of inaccurate savings entries due to data entry errors or outdated Union home retrofit simulation results. Many of these errors could be avoided through changes in program processes.

Recommendation A: Consider reviewing and modifying program processes to avoid similar errors in the future.

ENBRIDGE RESPONSE: This finding/recommendation was not directed to Enbridge.

Recommendation B: Consider providing more explicit support for each measure to eliminate uncertainty around project savings and participation. Full project documentation (pre/post photos, documentation of all installations or actions such as invoices and/or photos of each measure, data collection reports, pre-and post blower door tests for all sites) to the evaluation team. By delivering all documentation, the evaluation team would not have to follow up with the utility to obtain output for models that could not be run but could still verify the output for models that can be run.

Outcome: Reduced burden on utility staff and reduced evaluation costs.

ENBRIDGE RESPONSE: See response to SM2.

SM4. Finding: Air sealing as a savings measure is present in a high percentage of single-family home retro-fit projects, over 90% of projects in some programs. With such a high percentage of projects relying on a single measure, it is more important to ensure the savings validity of that measure.

Recommendation A: If possible, the evaluation team should evaluate the before and after leakage area and attributable energy savings.

Outcome: Greater certainty around savings estimates.

ENBRIDGE RESPONSE: This recommendation was not directed to Enbridge.

SM5. Finding: The energy savings from the home retrofit programs rely exclusively on the simulations provided by the delivery agents. Those simulations likely rely on a number of assumptions or standard modeling practices which may or may not follow

industry standards. A detailed review of the models was outside the scope of the annual audit.

Recommendation A: Consider funding a study to verify the models produced by the utility agents to ensure they conform to standard industry practice.

Outcome: Greater certainty around savings estimates.

ENBRIDGE RESPONSE: While this recommendation was not directed to Enbridge, it should be clarified that the agents supporting the home retrofit offer are expected to follow NRCan protocols. These agents complete training to achieve their certification from NRCan, and are trained to simulate home energy usage using NRCan's HOT2000 modeling software. This certification requires advisors to use NRCan industry standard inputs and modeling practices. In practice, home energy modelling simulation files are submitted to NRCan and are subject to NRCan's QA procedures.

SM6. Finding: Site-level documentation confirmed that an auditor was involved, it does not signal that the auditor was an approved Certified Energy Evaluator.

Recommendation A: Tracking certifications for all energy evaluators and/or auditors submitting records.

Outcome: Ensuring proper credentials for all auditors decreases risk to program.

ENBRIDGE RESPONSE: This recommendation was not directed to Enbridge.

SM7. Finding: Number of projects for residential retrofit programs was very large.

Recommendation A: Increase sample to include more project files in following verification cycles.

Outcome: Increased sample, along with improved documentation recommended earlier, increases the accuracy of savings estimates for the applicable programs.

ENBRIDGE RESPONSE: This recommendation was not directed to Enbridge.

Cost-Effectiveness - Summary of Recommendations ⁴

#	Finding	Recommendation	Recommended in 2015	Applies to			Primary Outcome		
				Union	Enbridge	Evaluation	Reduce Costs	Improve Accuracy	Decrease Risk
CE1	All overhead is still applied at the sector level rather than the program level.	A: Allocate "sector"-level administrative cost and overhead to each individual program	✓	✓	✓		✓	✓	
CE2	Water avoided costs are still based on water rates.	A: Explore the possibility of better defining water costs	✓		✓		✓	✓	
CE3	The utilities used different discount rates.	A: Use a consistent real discount rate of 4% when using real streams of benefits and costs.	✓	✓	✓	✓		✓	
CE4	EUL is inconsistently applied for accelerated projects.	A: Include separate fields in the tracking data to explicitly communicate accelerated, annual and cumulative savings.			✓		✓		
CE5	A reduction factor accounting for removals and non-installs was applied to savings and resource costs.	A: Do not adjust resource costs if the costs are still incurred by the program, even if the equipment is removed.			✓		✓		

CE1. Finding: In 2015, the EC recommended that "sector"-level administrative costs and overhead be allocated to each individual program and the utilities report program-

⁴ 2016 Natural Gas DSM Annual Verification Report, October 30, 2018, Table 58, page 35

level cost-effectiveness results. In 2016, there are still inconsistencies in how administrative and overhead costs are allocated. For example, Union identifies administration and evaluation costs at the scorecard level whereas Enbridge details spending as direct and indirect at the OEB-defined program level and then has an explicit 'overhead' spend at the scorecard level. To facilitate the analysis, the EC recommends that the utilities report spending in a consistent format and apportion the overhead costs to individual programs.

Recommendation A: Allocate "sector"-level administrative cost and overhead to each individual program and report program-level cost-effectiveness results. Explicit allocation of general administration and evaluation costs will allow for easier cost-effectiveness calculations at the program level.

ENBRIDGE RESPONSE: As outlined in Enbridge's 2015-2020 DSM Plan (EB-2015-0049), where possible, Enbridge allocates these costs at the program level – i.e. Resource Acquisition, Low Income and Market Transformation. In some instances, as acknowledged in the Board's framework where this is not possible, administration and overhead costs may be reflected at the portfolio level.

CE2. Finding: Water avoided costs are still based on water rates. The utilities followed the EC's 2015 approach and reduced the water avoided costs by 75% to simulate the removal of the fixed-cost portion of the rate. As is the case for gas and electricity, water avoided costs should only include the marginal impact from reduced consumption. Fixed costs (which, in our experience, can represent about 75% to 80% of water costs) must be excluded. On the other hand, water rates are often predominantly or exclusively variable, notably to promote conservation, and are thus a bad proxy of avoided costs.

Recommendation A: Explore the possibility of better defining water avoided costs.

Outcome: Better defined water avoided costs will result in more accurate cost effectiveness values, reducing the risk of less accurate values.

ENBRIDGE RESPONSE: This recommendation was not directed to Enbridge however, Enbridge concurs with the EC that water avoided costs should only include the marginal variable impact from reduced consumption. In the 2015 verification, the EC recommended a 75% reduction to avoided water costs (which are based on average retail water costs across Enbridge's service territory) as a means to better estimate avoided water costs. Enbridge repeated this approach in 2016.

CE3. Finding: While the discount rate appears to be aligned there was a methodological inconsistency between utilities. Union calculated their discount rate using 4% as their real discount rate and an inflation rate of 1.68% to get a combined discount rate of 5.7472%. Enbridge did not show how their discount rate was calculated and simply applied a discount rate of 5.75%.

Recommendation A: Both utilities should use identical discount rates.

ENBRIDGE RESPONSE: Enbridge followed the EC's recommendation from the 2015 verification and calculated the discount rate using 4% as the real discount rate with an inflation rate of 1.68%. In the same way the EC applied the calculation in 2015, Enbridge simply rounded the combined discount rate to 2 significant digits consistent with most other values utilized by the EC.

CE4. Finding: EUL and cumulative gross savings were not provided in a consistent manner in the Enbridge program tracking database extract. The EUL inconsistency is

the result of a work-around for advanced (Accelerated) projects used by Enbridge to report accurate dual baseline savings estimates and first year savings. Communicating the work-around consistently with the evaluation team led to some rework.

Recommendation A: Include separate fields in the program tracking database for EUL, RUL, gross first year annual savings, gross post-RUL annual savings, NTG, gross cumulative savings, net cumulative savings, and net first year savings.

Outcome: Improved data integrity results in less evaluation risk and more accurate savings totals. Proving each of the key savings types and their components allows evaluation to confirm that the savings provided are internally consistent.

ENBRIDGE RESPONSE: Enbridge will explore how to more clearly and consistently capture and provide details for accelerated projects in the future.

CE5. Finding: Enbridge applied a reduction factor to both the resource savings and costs for some measures to account for the percent of non-installs and removals. The adjustment factor is correctly applied to the savings; however, it should not be applied to the costs as costs are still incurred.

Recommendation A: Do not adjust resource costs to account for non-installations or removals.

Outcome: A more accurate representation of the costs incurred by the program.

ENBRIDGE RESPONSE: Enbridge concurs with the EC's recommendation. Enbridge acknowledges there were very few instances, with very minor impacts, where a reduction factor applied to savings was also incorrectly applied to costs for showerhead

and faucet prescriptive measures. Enbridge will work to correct this moving forward.

2. CPSV recommendations

Energy Savings and Program Performance Recommendations⁵

#	Energy Savings and Program Performance		Applies to			Primary Beneficial Outcome			
	Finding	Recommendation	Union	Enbridge	Evaluation	Reduce Costs	Increase Savings	Increase Customer Satisfaction	Decrease Risk
1	Both utilities exhibit a strong commitment to accurate energy savings estimate	The utilities should continue in their commitment to accuracy.	✓	✓				✓	✓
2	The CPSV effort found realization rates near 100% and identified adjustments for most projects.	Continue performing custom savings verification on a regular basis.			✓				✓
3	Relative precision targets were met or surpassed for all programs	Use error ratio assumptions from the results provided in this report in future evaluation years, but with more conservative bounding than performed this year.			✓	✓			✓
4	Some measures have difficult-to-define baseline technologies.	Establish a policy to define rules around energy savings calculation for fuel switching and district heating/cooling measures.	✓	✓	✓				✓
5	Review of documentation for gross evaluation showed that several projects were high free rider risks.	Review projects with large incentives for free ridership risk. Develop clear program rules that allow the utility to reject free rider projects.	✓	✓			✓		✓
6	Influence adjustments were made to projects that adjusted the gross savings for "net" or program influence reasons.	Increase transparency of "influence adjustments" and do not include in gross savings	✓				✓	✓	✓
7	There is not a clear policy to determine "standard" baselines.	Establish a clear policy to determine and define "standard" baselines	✓	✓	✓	✓			✓

⁵ 2016 Natural Gas DSM Annual Verification Report, October 30, 2018, Table 59, page 41

#	Energy Savings and Program Performance		Applies to			Primary Beneficial Outcome			
	Finding	Recommendation	Union	Enbridge	Evaluation	Reduce Costs	Increase Savings	Increase Customer Satisfaction	Decrease Risk
8	Some measures in each utility program are routine maintenance or periodic repairs that are considered standard care in other jurisdictions.	Establish a clear policy regarding eligibility of maintenance and repair measures for the programs.	✓	✓	✓	✓			✓
9	The programs did not consistently account for interactivity among measures.	Add an interactivity check to the programs' internal QC process for savings estimates.	✓	✓	✓	✓			✓

ES1. Finding: Both utilities exhibit a strong commitment to accurate energy savings estimates. Both utilities have made significant investments in developing calculation tools which model savings accurately. For example, Union's dock door seal calculator is well considered and designed, and Enbridge's Etools calculator is very thorough in attempting to model savings for key measures.

Both utilities chose to retain engineers with strong understanding of their customers' building and process systems and showed a commitment to finding accurate savings estimates. On several occasions, both on the phone and in writing, the evaluation team suggested a value that would have increased savings in a way that the utility program engineer did not think was valid. When this happened, neither utility was shy in suggesting that we may want to make a more conservative choice.

Recommendation: The utilities should continue in their commitment to accuracy.

Outcome: Accurate energy savings.

ENBRIDGE RESPONSE: Enbridge intends to continue to strive for accurate savings calculation estimates in line with the Company's dedication to continuous

improvement in its DSM program efforts. Enbridge has been a leader in refining savings calculations for many technologies and are recognized as subject matter experts in many areas throughout the industry. Enbridge will continue to look for opportunities to improve approaches and calculation tools with consideration for new information and learnings.

ES2. Finding: The CPSV effort this year found realization rates near 100% and identified adjustments for most projects. Across the programs a near equal number of adjustments increased and decreased savings and one third of projects had a large adjustment (verified savings more than 20% different from tracked).

Recommendation: Continue performing custom savings verification on a regular basis. Even a study that results in an adjustment of near 100% is still valuable because the programs know that their savings estimates will be reviewed. Knowing a review will be conducted improves the quality of ex ante estimates. The review itself also results in information that improves future program savings estimates.

Outcome: Accurate energy savings.

ENBRIDGE RESPONSE: This recommendation was not directed to Enbridge however, Enbridge generally concurs that completing custom savings project verification on a regular basis is useful. As discussed at the EAC recently, the committee has considered the frequency of undertaking CPSV. For example, a review which spans multiple years may be more efficient while still maintaining an appropriate scope in terms of the breadth of project results reviewed. Further, in accordance with the EC's recommendation for Low Income in 2016, multiple years of consistent and solid verification results merit consideration for the application of a weighted realization rate based on prior years' findings.

It should be noted that the EC reported that the utilities generally produced solid ex ante engineering estimates of savings that were not systematically biased. The EC further noted that much of the CPSV adjustment variation in gross realization rates was due to changes in operating conditions observed at the time of verification. It is broadly acknowledged that such conditions are often difficult to anticipate in ex ante savings estimation. This reality was exacerbated in the 2016 effort given that these verifications were being completed often 2 years or more after the project was completed. In these cases, changes in operating conditions can lead to larger adjustments.

ES3. Finding: Relative precision targets were met or surpassed for all programs. The sample design incorporated the previous year's error ratios ("ERs") and averaged them with the assumption used in 2015. ERs were further bounded (minimum ER was 0.25, maximum 0.60) to limit the risk of over- or under- collecting data. There was one segment (Union Commercial) where precision was not as good as expected.

Recommendation: The process used to develop error ratios assumptions from the results provided in this report should be continued in future evaluation years, possibly with more conservative bounding (potentially increasing the maximum ER) to avoid under-collection of data for any segments.

Outcome: Realistic estimates of error ratios result in an appropriate amount of data collected to meet targets.

ENBRIDGE RESPONSE: This recommendation was not directed to Enbridge however, it is important to highlight the prudence of maintaining balance between ensuring results meet a suitable threshold of statistical significance while also ensuring customers are not overly burdened by excessive and repeated sampling. Enbridge is of the view that the sampling in 2016 more reasonably met this balance

than in the 2015 effort.

ES4. Finding: Some measures (e.g., geothermal heat pumps, combined heat and power, and those that save district heating energy) have difficult-to-define baseline technologies. Multiple different baselines are possible for these projects depending on how one looks at the scope of the project: how non-gas energy changes and offsite gas use are considered in savings estimates are two of the challenging aspects.

Recommendation: Consider establishing a policy to define rules around energy savings calculations and baselines for fuel switching and district heating/cooling measures.

Outcome: Less risk of adjustment and a better alignment between province energy efficiency goals and program implementation.

ENBRIDGE RESPONSE: Enbridge is expected to adhere to DSM policies and guiding principles as defined by the Board in the 2015-2020 DSM Framework and Guidelines.

ES5. Finding: Through the gross verification process, we reviewed project documentation and had conversations with customers about their installed measures. While the focus of this report is not on net savings, we did observe a handful of projects (out of the 122 evaluated) that appeared to be clearly at high risk for free ridership. These projects included maintenance type measures, projects that were far along in planning prior to utility involvement, projects with very short paybacks, and projects that included significant non-energy benefits.

Recommendation: Review projects with large incentives for free ridership risk. Develop clear program rules that allow the utility to reject free rider projects.

Outcome: Increased savings, reduced risk of free ridership, more efficient use of program funds.

ENBRIDGE RESPONSE: To the extent possible, Enbridge is committed to reducing free ridership in its Commercial/Industrial Custom offers and has taken a number of steps, as outlined in its DSM Mid-Term Submission (EB-2017-0127) with this objective in mind. Receiving feedback from the EC is an important component of the continuous improvement cycle. The delay in the current EM&V process has hindered the utility's' ability to respond to learnings year to year. It would be helpful if the EC provided specific project examples rather than general comments.

ES6. Finding: Union made influence adjustments to projects that adjusted the gross savings for "net" or program influence reasons. Accounting of which projects had these adjustments was not maintained by Union and the adjustments were included in different places in project calculation workbooks, making their identification and validation challenging. In addition, the program NTG was also applied to these projects, effectively double discounting savings in scorecards.

Recommendation: If Union chooses to continue making influence adjustments to the savings upon which it calculates savings, it should make these adjustments more transparent and exclude them from the reported gross savings for the program in scorecards. Instead the specific project influence adjustment should be included in the scorecard in place of the general program or domain level NTG factor.

Outcome: Reduced risk of double adjustments.

ENBRIDGE RESPONSE: This recommendation is not directed to Enbridge.

ES7. Finding: There is not a clear policy to determine what standard to use for replace on burnout or new construction baselines. The 2016 verification used a

code or minimum available baseline where required, in alignment with the 2015 net-to-gross study. Without a clear policy there is uncertainty for all stakeholders as to what the appropriate baseline should be. This uncertainty affects all aspects of the programs, including what measures are offered, what incentives are paid and how measures are evaluated.

Recommendation: Establish a clear policy to determine and define baseline standards where an “industry standard” baseline would be applicable.

Outcome: Consistency of approach across utilities, evaluators and studies will reduce risk of adjustment and evaluation cost.

ENBRIDGE RESPONSE: Enbridge adheres to DSM policies and guiding principles as defined by the Board in the 2015-2020 DSM Framework and Guidelines. In the case of new construction, in line with standard practice in other jurisdictions, code requirements are generally used for baseline consideration. In replace on burnout scenarios, for a given technology, where there exists a supported, evidenced based report to inform an industry standard practice, the utility would apply this standard as the appropriate baseline. In the absence of a supported industry standard, Enbridge attempts to seek an external data source to inform a reasonable approach or consider site-specific information to inform the baseline.

ES8. Finding: Some measures in each utility program are routine maintenance or periodic repairs that are considered standard care in other jurisdictions.

Recommendation: Establish a clear policy regarding eligibility of maintenance and repair measures for the programs.

Outcome: Reduced free ridership risk.

ENBRIDGE RESPONSE: Enbridge is expected to adhere to DSM policies and guiding principles as defined in the 2015-2020 DSM Framework and Guidelines. It should be noted however, that as an internal policy Enbridge does not support routine maintenance projects in the Commercial/Industrial custom offer.

ES9. Finding: The programs did not consistently account for interactivity among measures. In several cases, we saw an overestimation of the combined boiler efficiency improvement yielded by the addition of linkageless controls and condensate heat recovery measures and an overestimation of savings for subsequent measures that interact with earlier measures within the same program year.

Recommendation: Add an interactivity check to the programs' internal QC process for savings estimates.

Outcome: More accurate savings estimates and a reduced evaluation risk.

ENBRIDGE RESPONSE: Enbridge agrees that interactivity should be accounted for when estimating savings for custom projects and makes an effort to account for interactivity across multiple projects. Enbridge intends to review its process further to examine how it might improve reviews with consideration for interactivity.

Verification Process Recommendations ⁶

#	Verification Process		Applies to			Primary Outcome			
	Finding	Recommendation	Union	Enbridge	Evaluation	Reduce Costs	Increase Savings	Increase Customer Satisfaction	Decrease Risk
10	DNV GL was unable to obtain access to all the equipment at all the sites selected for verification.	Modify contracts to require participants to agree to comply with EM&V as part of the requirements for participation in the program.	✓	✓		✓			✓
11	Future evaluations should consider large HVAC to be high rigour rather than standard rigour.	Consider large HVAC measures for higher rigour verification.			✓				✓

VF 10.Finding: DNV GL was unable to obtain access to all the equipment at all the sites selected for verification. Both Enbridge and Union have several large projects with industrial companies, including food processing, refineries, and other industries. In many cases, the customer refused to provide SCADA (Supervisory Control and Data Acquisition) system data or similar trend data to allow a reasonable verification of the project. This means we were unable to do more than a reasonableness check on the savings.

A review of the Enbridge contract shows that the customer is not required to provide the information that is necessary for EM&V. The most relevant sections are:

- Item 6: Payment of the Incentive Payment is subject to the completion of a satisfactory site inspection of the improvements, including the installed equipment by an authorized representative of Enbridge.

⁶ 2016 Natural Gas DSM Annual Verification Report, October 30, 2018, Table 60, page 43

- Item 9: Upon request within eighteen months of the commissioning date of the Project, and with reasonable notice, the Customer agrees to provide authorized representatives of Enbridge with access to the Project, and with required information or data relating to the project for the purposes of the Application and these General Terms and Conditions.

Neither of these are sufficient for EM&V.

Recommendation: Modify contracts to require participants to agree to comply with EM&V as well as utility representatives as part of the requirements for participation in the program.

Outcome: Reduced evaluation costs and risks. Participant non-compliance requires evaluators to request documentation for a large backup sample, and to survey and/or visit additional sites to obtain sufficient data for the evaluation. The process of contacting a site and getting a refusal costs time and money, as does the substitution of an additional site to make up for the unobtained data. In some cases, there might not be additional sites to sample, in which case the evaluation estimates will have lower precision than they would with full compliance.

ENBRIDGE RESPONSE: Enbridge encourages its customers to comply, cooperate and participate with all EM&V activities. At the same Enbridge recognizes it is important to be respectful that customers are busy running businesses and requests for customers' time should not be overly burdensome. Up until the 2015 verification, virtually 100% of sampled participants selected for verification have complied with verification related requests. In recent verification efforts, in some cases, Enbridge received feedback from customers that onerous time requirements and/or specific data requests made of customers may not have been considered reasonable and/or compromised customer privacy or safety policies. In addition, the delay between project completion and third party evaluation may have discouraged customers from

participating fully in the verification because the appropriate person that should respond was now not available. Notwithstanding the foregoing, Enbridge has strengthened language in the custom offer application to include specific wording as follows: “The Customer agrees to participate in any follow-ups surveys, studies, audits, evaluations or verifications conducted by Enbridge or its agents in connection with the Program. Enbridge reserves the right to independently verify the information in this Application.”

VF11. Finding: Large HVAC and HVAC controls projects proved more complex to evaluate than planned.

Recommendation: Future evaluations should consider large HVAC to be high rigour rather than standard rigour.

Outcome: Better alignment of rigour with uncertainty will improve accuracy of savings estimates and provide more cost-effective evaluation.

ENBRIDGE RESPONSE: This recommendation is not directed to Enbridge.

Documentation and Support Recommendations⁷

#	Documentation and Support		Applies to			Primary Outcome			
	Finding	Recommendation	Union	Enbridge	Evaluation	Reduce Costs	Increase Savings	Increase Customer Satisfaction	Decrease Risk
12	Incremental improvement in project documentation by both utilities was observed in the 2016 CPSV. Project documentation for some projects lacked sufficient details to allow evaluators to reproduce the calculations made by program staff or third-party vendors.	Take steps to improve documentation: <ul style="list-style-type: none"> • Implement an electronic tracking system that archives all materials • Include explicit sources for all inputs and assumptions in the project documentation. • Store background studies and information sources with the project files and make them available to evaluators. • Provide evaluators full access to customer data. • Provide pre- and post-installation photos, where available. • Document and provide internal M&V documents where available. • Institute a checklist as part of project closeout to ensure all relevant project documentation is assembled as ready for verification 	✓	✓			✓		✓
13	Explanations of complex projects were not consistently clear making it hard to understand what process is producing energy savings.	Improve clarity and details of documentation explaining the source of energy savings for complex projects.	✓	✓					✓

⁷ 2016 Natural Gas DSM Annual Verification Report, October 30, 2018, Table 61, page 43

#	Documentation and Support		Applies to			Primary Outcome			
	Finding	Recommendation	Union	Enbridge	Evaluation	Reduce Costs	Increase Savings	Increase Customer Satisfaction	Decrease Risk
14	Ex ante savings estimates based on annual energy consumption for industrial sites did not always include sufficient information documenting production.	Include site production totals in relevant years in the savings estimates based on annual energy consumption for industrial sites	✓	✓					✓
15	Enbridge Boilers use a 73% assumed thermal efficiency for in situ boilers that have been in place for more than 10 years.	Estimate boiler degradation from name plate efficiency to determine the baseline boiler efficiency rather than a flat number	✓	✓					✓
16	Pipe insulation is a significant source of savings for the Union Gas programs. Documentation for the source of factors used in calculations and of in situ conditions was not consistently provided.	Document baseline conditions of pipe insulation (and other measures) using photos and text descriptions to provide context. Explicitly tie the documentation of baseline condition to the heat loss rate used for the savings calculation.	✓	✓					✓
17	Enbridge documentation did not always include a prose explanation and supporting documentation for baseline types (ROB, ER) and remaining useful life (RUL).	Always complete the "Base Case Overview" in the form with a prose description of the base case. The description should reference included emails and photos to document in situ conditions and features that are carried over into the baseline system.		✓					✓
18	The utilities should use longer duration data in ex ante savings estimates when possible.	Use longer duration data in ex ante savings estimates. When time periods less than a year are used, documentation should be provided to indicate why the period used is applicable to a full year and why a full year was not able to be used.	✓	✓		✓			✓

#	Documentation and Support		Applies to			Primary Outcome			
	Finding	Recommendation	Union	Enbridge	Evaluation	Reduce Costs	Increase Savings	Increase Customer Satisfaction	Decrease Risk
19	In situ boiler name plate information, age and operating condition are all helpful for determinizing the designed performance and reasonable range of actual efficiency for the system as well as providing context to better determine remaining useful life (RUL)	Document in situ boiler name plate information, age and operating condition for all projects where boiler efficiency affects savings	✓	✓					✓
20	Items that may be obvious to the ex ante team can be non-obvious to an outside party.	Review ex ante documentation from an outside perspective to help identify gaps	✓	✓					✓
21	At large sites with multiple spaces containing similar equipment, ex ante documentation did not always identify which space or piece of equipment was affected by the project.	Include additional descriptions of spaces and equipment affected to differentiate among similar spaces and equipment at the site.	✓	✓					✓
22	Invoices were not always included with documentation, and sources for incremental costs were not always clear.	Ensure that incremental costs are supported by invoices or other documentation, especially for add-on and optimization measures where the total cost and incremental cost are likely to be the same.	✓	✓				✓	✓
23	Larger projects appeared to fall under the same documentation standards as smaller projects.	Increase the amount of documentation and source material for projects that have greater energy savings.	✓	✓					✓

#	Documentation and Support		Applies to			Primary Outcome			
	Finding	Recommendation	Union	Enbridge	Evaluation	Reduce Costs	Increase Savings	Increase Customer Satisfaction	Decrease Risk
24	Union's custom project summary workbook is a good approach to documentation. The workbook is not used in a consistent manner across all projects.	Consider providing more training or adding quality control steps to ensure the summary workbook front page is completed and stored in a consistent manner. Identify a common approach for common measures and, if necessary, document deviations and the reasons for the deviations in a clearly labelled field on the summary sheet.	✓			✓			✓
25	Enbridge Etools does not sufficiently document sources of inputs and assumptions.	Use a consistent summary workbook.		✓		✓			✓

DS12. Finding: Incremental improvement in project documentation by both utilities was observed in the 2016 CPSV. Project documentation for some projects lacked sufficient details to allow evaluators to reproduce the calculations made by program staff or third-party vendors. Specific issues included:

- Project data or details missing
- Insufficient measure-level details to fully describe what was installed
- Descriptions that were difficult to understand
- Use of black box tools
- Hardcoded information in calculation spreadsheets
- Undocumented assumptions

- Sources referenced but not included or available, such as feasibility studies and historical analysis of energy use that was left out of the project documentation.
- Input adjustments that approximate other effects, but are not explained.
- Insufficient access to customer data (by customers).
- Modelling files that could not be opened.
- Adjustments to savings estimates for safety or influence that were not clearly marked, sourced, or carried out in a consistent fashion.

Recommendation: Improve data quality. Possible steps include:

- Implement an electronic tracking system that archives all materials.
- Include explicit sources for all inputs and assumptions in the project documentation.
- Store background studies and information sources with the project files and make them available to evaluators.
- Provide evaluators full access to customer data.
- Provide pre- and post-installation photos, where available.
- Document and provide internal M&V documents where available.
- Institute a checklist as part of project closeout to ensure all relevant project documentation is assembled as ready for verification.

Outcome: Properly explaining and sourcing the savings calculation method and assumptions allows the evaluating engineer to more easily identify what needs to be verified. It also makes it easier to determine whether the methods and assumptions are reasonable and use ex ante assumptions rather than seek documented values elsewhere.

ENBRIDGE RESPONSE: Enbridge is gratified to hear that incremental improvements in project documentation were observed in the 2016 CPSV. Enbridge is committed to improving custom project documentation as appropriate in an effort to ensure that

detailed inputs and supporting evidence are clearly outlined for each project. Nonetheless, Enbridge will review these specific recommendations to investigate opportunities to improve project documentation quality and data quality moving forward.

DS13. Finding: Explanations of complex projects were not consistently clear making it hard to understand what process is producing energy savings. This was seen with large HVAC control projects with MUAs, AHUs, heat recovery projects, and custom process projects, and others.

Recommendation: Improve the documentation/explanation of the source of energy savings for complex projects that are related to complex systems. Use figures, diagrams, and equations as needed, especially for cascading or multi-staged measures. Parameters such as the heating source, and the efficient case peak and off-peak period flowrates and schedules should be recorded and sourced. If there are additional units not included in the measure, these should be documented and considered in savings estimates (even if the effect is zero).

Outcome: Increased accuracy of savings estimates. Reduced evaluation risk.

ENBRIDGE RESPONSE: Irrespective of the complexity of projects, Enbridge engineers strive to ensure project documentation reflects the relevant information to clearly describe each project. In some cases this may include supporting schematics, charts, calculations and equations to provide an explanation regarding the process producing energy savings. Enbridge will explore the recommendation for greater clarity on complex projects as part of its commitment to continuous improvement.

DS14. Finding: Ex ante savings estimates based on annual energy consumption for industrial sites did not always include sufficient information documenting production. The change in energy use pre- and post- measure is sensitive to changes in production.

Recommendation: Savings estimates based on annual energy consumption for industrial sites should include information from the site on amount of production in the years used. It's not enough to say "not much is changed, they run 24/7". If detailed production data are not available, the utilities should get percentage differences year to year (e.g., if year 1=100%; is year 2 exactly the same, or is it 95% or 110% of production the previous year).

Outcome: Documenting production changes and using them in savings estimates will improve accuracy and reduce evaluation risk.

ENBRIDGE RESPONSE: For projects moving forward, Enbridge will explore clarifying how it documents changes in production for industrial project savings based on annual energy consumption.

DS15. Finding: Enbridge Boilers use a 73% assumed thermal efficiency for in situ boilers that have been in place for more than 10 years. This is based on a 2% de-rate of a 2007 combustion efficiency study that found an average combustion efficiency of 74.6% for 39 boilers aged 12-38 years (average 24.5). The study, which Enbridge provided to the evaluation team, did not attempt to tie the degraded combustion efficiency to the original rated efficiency of the boilers. The study is also now more than 10 years old, so its findings are likely out of date and should only at most apply to 20-year-old or more boilers. For 2016, the evaluation used the 73% value since a better option was unavailable at the time.

Recommendation: Use a degradation from name plate efficiency to determine the baseline boiler efficiency rather than a flat number. The 2017 CPSV effort should include in the scope secondary research to determine a degradation factor or curve to be used for the 2017 and 2018 CPSV and could be incorporated by the utilities for the 2019 program year until primary research is completed or a better approach is developed.

Outcome: Improving this key assumption will improve savings estimates for a significant portion of savings in the Enbridge portfolio and the process would also be applicable to Union sites where baseline boiler efficiencies are required and not based on site tests of boiler performance.

ENBRIDGE RESPONSE: Enbridge acknowledges that a research effort to seek updated information is merited given the age of the study currently utilized to support the 73% assumed combustion efficiency. It should be noted however, Enbridge utilizes this assumption for application in atmospheric boiler projects only.

DS16. Finding: Pipe insulation is a significant source of savings for the Union Gas programs. Union estimates heat loss rate for damaged baseline insulation less than that from a simple bare pipe assumption, which is reasonable and appropriate. Documentation for the source of the factors used in the calculation and documentation (via photos and/or a description of the pipe insulation condition) was not consistently provided.

Recommendation: Document baseline conditions using photos and text descriptions to provide context. Tie the documentation of baseline condition to the heat loss rate used in a clear way.

Outcome: Improving documentation of baseline conditions and clarity in calculations will reduce evaluation risk improve consistency of approach among the Union engineering team.

ENBRIDGE RESPONSE: Though Enbridge strives to ensure its project documentation captures relevant information to support calculations, Enbridge recognizes there may be areas for improvement including documented substantiation regarding baseline conditions. Enbridge will review the recommendation for greater clarity on pipe insulation projects as part of its commitment to continuous improvement.

DS17. Finding: Enbridge documentation did not always include a prose explanation and supporting documentation for baseline types (ROB, ER) and remaining useful life (RUL). “See Etools for base case” is not sufficient: Etools is not designed to provide context and sources to support the values included.

Recommendation: Always complete the “Base Case Overview” with a prose description of the base case. The description should reference included emails and photos to document in situ conditions and features that are carried over into the baseline system.

Outcome: Improved descriptions and documentation will reduce evaluation risk and help Enbridge ensure that accurate information has been entered into Etools.

ENBRIDGE RESPONSE: Enbridge is committed to continue in its efforts to improve upon the comprehensiveness and clarity of all relevant project information, data and underlying input assumptions. Enbridge will review this recommendation with ESCs to ensure the “Base Case Overview” provides a prose description of the base case with supporting documentation where possible.

DS18. Finding: Duration of pre- post- data (energy consumption, production output, raw material consumption, etc.) used for savings estimates were too brief in several instances.

Recommendation: The utilities should use longer duration data in ex ante savings estimates when possible. When time periods less than a year are used, the utilities should document why the period used is applicable to a full year and why a full year was not able to be used.

Outcome: Increased accuracy of savings estimates.

ENBRIDGE RESPONSE: Enbridge will review the recommendation for greater clarification of pre- and post-data as part of its commitment to continuous improvement. It should be noted in the case of process load assessments, for example, where it can be established that energy consumption is consistent, data across shorter time periods may be sufficient.

DS19. Finding: The utilities did not always gather boiler nameplate data for in situ systems. The age and operating condition was also not always recorded or described. This was a concern on boiler projects, but also for projects where boiler efficiency has an effect on savings, such as greenhouses, pipe insulation and heat recovery.

Recommendation: In situ boiler name plate information, age and operating condition are all helpful for determining the designed performance and reasonable range of actual efficiency for the system as well as providing context to better determine remaining useful life (“RUL”)

Outcome: Improving documentation of the in situ boiler will reduce uncertainty in savings estimates and reduce evaluation risk.

ENBRIDGE RESPONSE: Enbridge makes an effort to include boiler nameplate data for in situ systems where available and applicable unless testing data can support a different efficiency. Enbridge will review the recommendation for greater documentation of the in situ boiler as part of its commitment to continuous improvement.

DS20. Finding: Items that may be obvious to the ex ante team can be non-obvious to an outside party. Examples from sites this year included in situ burners that could not be turned off and whether heating needs were equal to or greater than the amount of heat recovered.

Recommendation: Review ex ante documentation from an outside perspective to identify where documentation or explanation could be added.

Outcome: Reduced evaluation risk.

ENBRIDGE RESPONSE: It is challenging to anticipate which information may be non-obvious to the verifier however, Enbridge will consider the recommendation for greater documentation review as part of its commitment to continuous improvement.

DS21. Finding: At large sites with multiple spaces containing similar equipment, ex ante documentation did not always identify which space or piece of equipment was affected by the project.

Recommendation: Include additional descriptions of spaces and equipment affected to differentiate among similar spaces and equipment at the site.

Outcome: Reduced evaluation risk.

ENBRIDGE RESPONSE: Enbridge will review the recommendation to provide clarity differentiating among similar spaces and equipment at a site and to include additional descriptions of spaces and equipment affected, as part of its commitment to continuous improvement.

DS22. Finding: Invoices were not always included with documentation, and sources for incremental costs were not always clear.

Recommendation: Ensure that incremental costs are supported by invoices or other documentation, especially for add-on and optimization measures where the total cost and incremental cost are likely to be the same. Equipment replacement measures may require an additional standard efficiency quote to produce incremental cost.

Outcome: Incremental cost is an important component of simple payback, which is often used to judge the economic benefit of energy efficiency projects. It is also an input to some benefit-cost tests.

ENBRIDGE RESPONSE: Enbridge generally attempts to ensure that incremental costs are supported by including invoices or other documentation in the project file. In some instances, project costs may be included as part of an invoice(s) relating to broader work being completed at a customer site. In such cases, Enbridge estimates incremental costs using engineering judgment. For some projects, implementation may be supported with internal customer resources, in which case no invoice is generated to support costs. In these cases, Enbridge will ask the customer to estimate incremental costs based on their internal records.

DS23. Finding: Larger projects appeared to fall under the same documentation standards as smaller projects.

Recommendation: Increase the amount of documentation and source material for projects that have greater energy savings.

Outcome: Projects that are better documented tend to have more accurate savings estimates and receive fewer evaluation adjustments than those that are less documented. Large projects have a greater effect on overall savings adjustment factors. Therefore, large projects with better documentation are more likely to result in adjustment factors closer to 100%.

ENBRIDGE RESPONSE: Enbridge strives to ensure project documentation captures all relevant information to support and explain the project regardless of project size however, Enbridge will review the recommendation to increase the amount of documentation provided for projects with greater energy savings as part of its commitment to continuous improvement.

DS24. Finding: Union custom projects utilized a project application summary workbook that summarizes the key project inputs, calculations, and most details. In general, this is a good approach that facilitates internal review and evaluation. We also found that the

workbooks had improved source documentation relative to the 2015 projects. One challenge was that different projects used the workbook in different ways:

- The notes section was sometimes used to identify and highlight specific unique approaches and features in projects, but not always.
- Calculations internal to the summary page were consistent for most projects, but not all (additional factors were sometimes added).
- Sub-methods critical to the calculation were contained in hidden sheets.
- Safety and influence adjustments were inserted in different locations and not always explained.

Recommendation: Consider providing more training or adding quality control steps to ensure the summary workbook front page is completed and stored in a consistent manner. Identify a common approach for common measures and, if necessary, document deviations and the reasons for the deviations in a clearly labelled field on the summary sheet.

Outcome: A consistent summary workbook aids both internal and external quality assurance, quality control, and measurement and verification.

ENBRIDGE RESPONSE: This recommendation was not directed to Enbridge.

DS25. Finding: Enbridge Etools is used as both a calculation tool and as a communication tool with customers. While it appears to serve the needs of the program, this form of communication is difficult for the evaluation efforts.

- Etools does not easily allow for assumptions to be sourced within the record.
- Some Etools selections may be site-specific and some may be defaults; the calculator does not distinguish.
- Energy savings that are calculated outside of Etools are hard-entered in Etools but not always sourced.

Recommendation: Use a consistent summary workbook.

Outcome: A consistent summary workbook aids both internal and external quality assurance, quality control, and measurement and verification.

ENBRIDGE RESPONSE: Enbridge will review the recommendation for a consistent summary workbook as part of its commitment to continuous improvement.

Data Management Recommendations ⁸

#	Data Management		Applies to			Primary Outcome			
	Finding	Recommendation	Union	Enbridge	Evaluation	Reduce Costs	Increase Savings	Increase Customer Satisfaction	Decrease Risk
26 A	Neither Union nor Enbridge currently track participating customer or participating vendor contact information in their program tracking database. Providing the information to the evaluation puts significant burden on utility staff. In 2016, the data provided by utility staff was much more consistent and clear relative to 2015.	Track contacts associated with projects in the program tracking database.	✓	✓		✓		✓	✓
26 B		Strongly consider investing in relational program tracking databases.	✓	✓		✓	✓	✓	✓
26 C		Continue to use improved structure for data integrity in the evaluator request for contact information for the 2017 savings verification and evaluation.			✓	✓		✓	
27	The extracts from the utility program tracking database do not include dates for key project milestones.	Track and provide to evaluators dates for key milestones in the project.	✓	✓		✓			✓
29	EUL and cumulative gross savings were not provided in a consistent manner in the Enbridge program tracking database extract	Include separate fields in the program tracking database for all components of gross and net cumulative and first year savings.	✓	✓			✓		✓

⁸ 2016 Natural Gas DSM Annual Verification Report, October 30, 2018, Table 62, page 48

DM26. Finding: Neither Union nor Enbridge currently track participating customer or participating vendor contact information in their program tracking database. Providing the information to the evaluation puts significant burden on utility staff. In 2016, the data provided by utility staff was much more consistent and clear relative to 2015.

Recommendation A: Track contacts associated with projects in the program tracking database. At a minimum, the program tracking database should include:

- Project site address
- Customer mailing address
- Primary customer contact name
- Primary customer contact phone
- Primary customer contact email
- Primary customer contact mailing address
- Addresses are best tracked as multiple fields including:
 - Street address line 1
 - Street address line 2
 - City
 - Province
 - Postal code

Phone number fields should include data validation to enforce a consistent format and avoid missing or extra digit errors. Phone extensions should be tracked in a field separate from the ten-digit phone number and be restricted to numeric data only.

The best practice is to maintain contacts in a table separate from specific project or customer data. This allows for a single contact to be connected to multiple accounts and/or projects as necessary without creating duplication. This structure also makes it easier to associate multiple contacts with a single project, and decreases quality control costs.

Vendor contact information should also be tracked in the database, in the same table as the participating customer contact information. With a relational database, the contact ID from the table can be added to a project record in the role consistent with the contact's participation (such as vendor, decision maker, or technical expert) with a separate table that allows a single vendor contact to be associated with multiple projects.

Outcome A: Reduced burden on utility staff to seek contact information for projects, whether for internal or evaluation use. Reduced evaluation costs and improved sample design expectations.

ENBRIDGE RESPONSE: As detailed in its 2015-2020 Multi-Year Plan, Enbridge outlined the need for a DSM IT system replacement. The Board approved this request in its January 20th, 2016 Decision. As a result, Enbridge DSM is currently undergoing a system upgrade that will include improved tracking & reporting and CRM components. This system upgrade is expected to be rolled out in late 2018.

Recommendation B: The utilities should strongly consider investing in relational program tracking databases. Relational program tracking databases and customer relationship management ("CRM") systems allow for multiple contacts to be associated with a single account and/or project. The incremental cost of implementation is low if it is part of the initial database design, populated as projects are started, and updated once they are complete.

For the implementation team, a query-able one-stop shop for information provides a wealth of information that can improve delivery. For example, these databases can help programs understand how contractors work across projects, identify when projects have hit snags and need attention, and give the program team access to key customer context such as historical participation, and different contacts that have worked with the program.

For evaluation, this allows programs to easily clarify aspects of projects during implementation and to provide accurate, timely, and usable contact information to evaluators and verifiers.

Outcome B: Improved customer satisfaction from better delivery, and a reduced burden on utility staff for tracking information. A relational database would also streamline aggregation of program data for scorecards and make providing data simpler for annual savings evaluation and verification.

ENBRIDGE RESPONSE: As detailed in its 2015-2020 Multi-Year Plan, Enbridge outlined the need for a DSM IT system replacement. The Board approved this request in its January 20th, 2016 Decision. As a result, Enbridge DSM is currently undergoing a system upgrade that will include improved tracking & reporting and CRM components. This system upgrade is expected to be rolled out in late 2018.

Recommendation C: When the evaluation requests contact information for savings verification and evaluation, the contact request spreadsheet will continue to provide additional fields to enforce data integrity (e.g., specific fields for a parsed address and company name for the technical and decision-making contacts). If the program tracking databases are able to report contact information, this spreadsheet should be modified to reduce burden on utility staff while maintaining high levels of data integrity.

Outcome C: Reduced evaluation costs due to less data cleaning and research to fill missing information. Improved data collection with less returned advance letters and more accurate connection between projects and contacts.

ENBRIDGE RESPONSE: This recommendation was not directed to Enbridge.

DM27.Finding: The extracts from the utility program tracking database do not include dates for key project milestones. Enbridge's data did not include any dates and Union's included only the "install date."

Recommendation: Track and provide to evaluators dates for key milestones in the project. Dates for project start, installation, and those that define the program year provide useful context for interviewers that is not always easy to find in project documentation

Outcome: Improved data collection through more informed interviewers and reduced evaluation costs through less need to search for dates in documentation.

ENBRIDGE RESPONSE: Contrary to the EC's finding, Enbridge does track an installation date. This date was included in the tracking workbook for all offers with the exception of prescriptive which, though the installation date was recorded in the project file, for the purposes of the tracking workbook, the installation month was recorded. Also, it should be noted that not all projects will have a definitive start date. The program year is defined by the calendar year.

DM 29. Finding: EUL and cumulative gross savings were not provided in a consistent manner in the Enbridge program tracking database extract. The EUL inconsistency is the result of a work around for advanced (accelerated) projects used by Enbridge to report accurate dual baseline saving estimates and first year savings. Communicating the workaround consistently within the evaluation team led to some re-work.

Recommendation: Include separate fields in the program tracking database for:

- EUL
- RUL
- gross first year annual savings
- gross post-RUL annual savings
- NTG
- gross cumulative gross
- net cumulative savings
- net first year savings

Outcome: Improved data integrity results in less evaluation risk and more accurate savings totals. Providing each of the key savings types and their components allows evaluation to confirm that the savings provided are internally consistent.

ENBRIDGE RESPONSE: Enbridge will review the recommendation to include separate fields in the program tracking database as described above as part of its commitment to continuous improvement.

3. Measure Life Study Recommendations

Updates to Measure Lives:

ML1. Finding: Use a 15-year measure life for boiler controls. This does not include burner modifications, which are currently assigned a separate measure life by Union. Enbridge could consider adding a separate category for burner modifications, which would use a 20-year life similar to Union.

ML2. Finding: Increase the measure life for variable frequency drives for make-up air units to 15 years.

ML3. Finding: Reduce the measure life for loading dock door and ramp seals to 10 years to be consistent with what is used in other cold-weather jurisdictions.

ML4. Finding: Reduce the measure life for pipe insulation to 14 years, which is consistent with the industry average, and accounts for a portion of the insulation being installed outdoors or in hazardous environments where it is unlikely to last 20 years.

ML5. Finding: Use a measure life of 15 years for building automation systems, also known as energy management systems.

ENBRIDGE RESPONSE to ML1 – ML5: As directed by Board Staff through the EAC, Enbridge will move forward with the measure life changes to custom offers proposed in

the Measure Life Study for the purpose of reaching consensus (with application to 2017 targets as well as for application to 2017 shareholder incentive and LRAM calculations) but the utilities have concerns regarding the basis for which some conclusions were reached. These include:

- **Insulation:** The Measure Life Study recommends reducing the commercial/ industrial pipe insulation measure life from 20 to 14 years. However, the Study's 14 year measure life accounts for "hazardous and outdoor installs." The utilities are of the view that a pipe insulation installation classified as "hazardous" is specialized and should be treated separately. Such projects should not be averaged with a generalized/typical pipe insulation install. Outdoor insulation piping if installed properly should last at least 20 years. In addition, some sources provided for outdoor pipe insulation refer to residential hot water insulation installs. This type of install is not similar to industrial/commercial pipe insulation installs and should not be included in the average.
- **Energy Curtains.** The Study cites three sources for measure lives with an average of 13 years however the final value proposed was a measure life of 10 years.

Future Research:

ML6. Finding: As the top priority, conduct primary research on the type of pipe insulation projects installed in Ontario to determine the appropriate measure life.

ML7. Finding: As the second priority, conduct primary research on recently installed building automation systems to determine how current system measure lives deviate from the primary research conducted approximately 20 years ago.

ML8. Finding: Consider also studying dock door seals, either through vendor interviews or program participant interviews, to determine the appropriate measure life.

ML9. Finding: Collect on-going data, similar to the ASHRAE database referenced in the study, to confirm or deny the assumed measure lives for energy curtains, exhaust fan controls, boiler controls, heat exchangers, and “other” industrial equipment.

ENBRIDGE RESPONSE to ML6 – ML9: Enbridge agrees that further research should be considered to explore the areas recommended in the Measure Life Study. These studies should be prioritized in consultation with the EAC.

Updates to Custom Measure Life Table:

The Commercial/Industrial custom offer Measure Life Study recommends the measure lives outlined in the table below be adopted as the “default” values for custom programs.

Default measure lives recommended by the Measure Life Study⁹

Measure	Recommended Measure Life
All other industrial equipment	20
Boiler – Industrial Process	20
Boiler – Space heating	25
Pipe Insulation	14
Boiler – Domestic Hot Water	25
Boiler Controls	15
Energy Curtains	10
Heat Recovery – Commercial	15
Heat Recovery – Industrial	20
Exhaust Fan Controls	15
Heat Reflector Panels	15
Economizers – Conventional and condensing	20
Steam Trap	6
Infiltration Controls – Air Doors	15
Infiltration Controls – Dock Seals	10
IR Poly	5
VFD retrofit on MUA	15

⁹ 2016 Natural Gas DSM Annual Verification Report, October 30, 2018, Table 63, page 59

Heat Exchanger	17
Building Automation System	15
Ovens and Thermal Oxidizers	20
Reverse Osmosis Water Conditioner	20
Building Envelope	25

ENBRIDGE RESPONSE: Following discussion at the EAC – although not all EAC members agreed – it was concluded that results of Measure Life Study should apply starting with 2017 shareholder incentive and LRAM calculations. 2017 targets were also to reflect updates to the Measure Life Study because the Board’s Decision on the Multi-Year DSM 2015-2020 Plans notes "to calculate next year’s targets, the OEB directs the utilities to use the new, updated input assumptions and net-to-gross factors that are the result of the annual evaluation process." Since the Measure Life study was part of the 2016 evaluation effort, Enbridge’s 2017 targets will reflect the changes in measure life.