NOVA SCOTIA UTILITY AND REVIEW BOARD

IN THE MATTER OF: *The Public Utilities Act, R.S.N.S. 1989, c. 30* as amended

- and -

IN THE MATTER OF: An Application by EfficiencyOne for Approval of an electricity efficiency and conservation and Supply Agreement between EfficiencyOne and NSPI for the term 2016 to 2018, pursuant to *The Public Utilities Act, s. 79J.*

NOTICE OF APPLICATION

TO: The Nova Scotia Utility and Review Board ("UARB" or "the Board")

1. The *Electricity Efficiency and Conservation Restructuring (2014) Act, S.N.S. 2014, c. 5* effected a new regime for the delivery of electricity conservation in the Province of Nova Scotia, and in particular created a franchise system whereby an electricity conservation franchisee is appointed by the Province of Nova Scotia to provide electricity efficiency and conservation activities to Nova Scotia Power Inc. ("NSPI").

2. EfficiencyOne was granted a Franchise by the Minister of Energy on November 28, 2014 effective January 1, 2015. EfficiencyOne's predecessor was Efficiency Nova Scotia Corporation, which delivered electricity efficiency and conservation services, also referred to as "demand side management", to NSPI from October 2010 through 2014 By Board Order M06247 dated September 28, 2014, EfficiencyOne provides demand side management services to NSPI for the period January 1 to December 31, 2015.

3. Pursuant to section 79J of the *Public Utilities Act*, EfficiencyOne, as the franchise holder, is required to enter in an agreement for a term of three (3) years with NSPI for the supply of electricity efficiency and conservation services ("Supply Agreement"), which agreement is subject to approval of the Board pursuant to section 79L of the *Public Utilities Act.*

4. EfficiencyOne and NSPI have been unable to reach agreement on all required terms of the Supply Agreement. Pursuant to section 79J(3) of the *Public Utilities Act*, where the franchise holder and NSPI are unable to finalize the agreement, either may apply to the Board for a decision with respect to a Supply Agreement.

5. EfficiencyOne makes this Application to the Board, pursuant to subsection 79J(3) of the *Public Utilities Act* for a decision with respect to a Supply Agreement and the establishment of a final

Supply Agreement between EfficiencyOne and NSPI on such terms as the Board considers appropriate.

6. In support of this Application is filed the evidence of EfficiencyOne, which includes Appendices A through J containing additional materials supporting the Application.

7. On the Evidence filed in support of this Application, EfficiencyOne asserts that the Order sought by the Application is in the Public Interest.

8. EfficiencyOne therefore seeks an Order finalizing and approving a Supply Agreement between EfficiencyOne and NSPI

Dated at Halifax, in the Halifax Regional Municipality, in the Province of Nova Scotia, this 27th day of February, 2015.

EFFICIENCYONE

Per: James R. Gogan, EfficiencyOne Counsel

Name and Address for Service:

James R. Gogan
EfficiencyOne Counsel
The Breton Law Group
Suite 300, 292 Charlotte St.
Sydney, NS B1P 1C7
Tel: 902-563-5920 (direct)
Fax:902-563-1113
Email: jim@bretonlawgroup.com

Allan Crandlemire
Chief Executive Officer
EfficiencyOne
230 Brownlow Ave.
Suite 300
Dartmouth, NS B3B 0G5
Tel: 902-470-3501 (direct)
Fax: 902-470-3599
acrandlemire@efficiencyns.ca

EfficiencyOne

IN THE MATTER OF *The Public Utilities Act*, R.S.N.S. 1989, c.380, as amended.

- and -

IN THE MATTER OF An Application pursuant to Subsection 79J(3) of the *Public Utilities Act* for Approval of the 2016-2018 Supply Agreement for Electricity Efficiency and Conservation Activities.

Evidence of EfficiencyOne as Holder of the Efficiency Nova Scotia Franchise

FILED
February 27, 2015

This page was intentionally left blank

TABLE OF CONTENTS

1. INTRODUCTION 1
1.1 Background 2
2. 2014 DSM RESULTS 6
2.1 2014 DSM Expenditures and Energy Savings Results 6
2.2 2014 DSM Programs 7
2.2.1 Residential Sector Results 8
2.2.2 Business, Non-Profit and Institutional Sector Results 12
2.2.3 Enabling Strategies 14
3. 2016-2018 DSM RESOURCE PLAN 19
3.1 Summary 19
3.2 Energy Savings and Investment 21
4. DEVELOPMENT OF THE 2016-2018 DSM RESOURCE PLAN 25
4.1 Development of 2016-2018 DSM Program Targets and Investment 25
4.1.1 Results of NS Power's 2014 Integrated Resource Plan (IRP) Process 27
4.1.2 Balance of Long-Term and Short-Term Considerations 31
4.1.3 Affordability 37
4.1.4 Cost Efficiency Opportunities 39
4.1.5 Balanced Portfolio 42
4.2 Evaluation 42
4.3 Reporting 43
4.3.1 Annual Progress Reports 44
4.3.2 Quarterly Meetings and Reports 45
4.4 Performance Requirements 45
4.5 Considerations and Items Related to Legislation 49
4.5.1 Transition Update 49
4.5.2 HST 51
4.5.3 Establishment of an ENS Reserve Fund for DSM Expenses 51
5. ADDITIONAL ITEMS 56

5.1 Cost-Effectiveness Testing 56
5.2 Rate and Bill 58
5.3 Cost Allocation Method 59
6. CONCLUSION 64

TABLE OF FIGURES

Figure 2.1 - 2014 DSM Plan Actual Expenditures and Evaluated Energy Savings 6
Figure 3.1 - 2016-2018 DSM Resource Plan Investment and Savings..... 21
Figure 3.2 - 2016 DSM Resource Plan Investment and Savings..... 22
Figure 3.3- 2017 DSM Resource Plan Investment and Savings..... 23
Figure 3.4 - 2018 DSM Resource Plan Investment and Savings..... 24
Figure 4.1- Capacity Additions Avoided by Modelled DSM Scenarios 29
Figure 4.2 - Proposed Performance Indicators and Targets..... 48
Figure 4.3 - Minimum Performance Thresholds..... 49
Figure 4.4 – Reserve fund balance calculation 55
Figure 5.1 - 2014 Rate Class Expenditures (unaudited) 60
Figure 5.2 - Issues with Constraining Rate-Class Participation 61

APPENDICES

Appendix A 2016-2018 DSM Resource Plan
Appendix B Supply Agreement Outstanding Items
Appendix C 2013 Evaluation and Verification Recommendations
Appendix D 2016-2018 Rate and Bill Impact Analysis
Appendix E *Investing in Demand-Side Resources: Considering Affordability*, Navigant Consulting
Appendix F *Balanced Plan Principles*, Dunsky Energy Consulting
Appendix G *DSM Performance Indicators*, Dunsky Energy Consulting
Appendix H *Establishment of a Reserve Account*, Collins Barrow
Appendix I *DSM Screening in Nova Scotia: Towards a Balanced Cost-Effectiveness Framework*, Dunsky Energy Consulting
Appendix J Agreed Form of Supply Agreement for Electricity Efficiency and Conservation Activities

1. INTRODUCTION

This Evidence is in support of approval of a Supply Agreement for Electricity Efficiency and Conservation Activities (the "Supply Agreement") between EfficiencyOne and NS Power. To the extent possible, EfficiencyOne and NS Power have reached agreement on certain elements of the Supply Agreement. This agreed form of Supply Agreement is attached hereto as Appendix J.

EfficiencyOne and NS Power have not been able to reach agreement on the electricity efficiency and conservation activities that EfficiencyOne proposes to undertake for NS Power. This Evidence is in support of the approval of an electricity Demand Side Management Resource Plan (2016-2018 DSM Resource Plan) to supply Nova Scotia Power Inc. (NS Power) with electricity efficiency and conservation activities from 2016-2018. The Plan is being filed with the Nova Scotia Utility and Review Board (UARB) by EfficiencyOne as the holder of the Efficiency Nova Scotia (ENS) franchise, which enables the organization to supply NS Power with electricity efficiency and conservation activities.

Under section 79I of *The Public Utilities Act,* NS Power is required to purchase reasonably available, cost-effective energy efficiency and conservation activities from the franchise holder. As the franchise holder, EfficiencyOne is considered to be a public utility in relation to these activities.

In this Evidence, electricity efficiency and conservation activities supplied to NS Power by ENS will be referred to as demand-side management (DSM). Activities conducted in 2014 or earlier will reference Efficiency Nova Scotia Corporation or ENSC, the past administrator of DSM activities in Nova Scotia. Activities conducted in 2015 or later will reference Efficiency Nova Scotia or ENS.

The following inclusions are provided in support of this Evidence:

- Appendix A: 2016-2018 DSM Resource Plan

- Appendix B: Supply Agreement Outstanding Items
- Appendix C: 2013 Evaluation and Verification Recommendations
- Appendix D: 2016-2018 Rate and Bill Impact Analysis
- Appendix E: *Investing in Demand-Side Resources: Considering Affordability*, Navigant Consulting
- Appendix F: *Balanced Plan Principles*, Dunsky Energy Consulting
- Appendix G: *DSM Performance Indicators*, Dunsky Energy Consulting
- Appendix H: *Establishment of a Reserve Account*, Collins Barrow
- Appendix I: *DSM Screening in Nova Scotia: Towards a Balanced Cost-Effectiveness Framework*, Dunsky Energy Consulting
- Appendix J: Agreed Form of Supply Agreement for Electricity Efficiency and Conservation Activities

1.1 Background

The responsibility and accountability for DSM administration transferred from NS Power to ENSC effective October 1, 2010. ENSC submitted its first DSM Plan filing, the 2012 DSM Plan, on February 28, 2011, which was approved by the UARB on June 30, 2011.

ENSC submitted its 2013-2015 DSM Plan on February 27, 2012, along with subsequent revisions filed on March 30, 2012 and April 18, 2012. A DSM Settlement Agreement for 2013-2014 was approved by the UARB on June 4, 2012.

ENSC filed its 2014 DSM Cost Recovery Rider (DCRR) application on November 14, 2013, after working with stakeholders to develop a solution to mitigate what would otherwise be significant rate increases for two rate classes in 2014. The increases were due to a combination of greater-than-forecast participation in 2012 programs and an increased participation forecast for 2014 programs. The solution supported by stakeholders was the inclusion of a Rate Smoothing Adjustment (RSA) mechanism to mitigate the large rate increases faced by the two rate classes. On January 22, 2014, the

UARB approved ENSC's amended 2014 DCRR application, including the approval of the RSA for the 2014 year only, subject to a compliance filing. ENSC filed its compliance filing on January 27, 2014, with a final UARB Order released on January 29, 2014.

Revisions to *The Public Utilities Act*, proposed through the *Electricity Efficiency and Conservation Restructuring (2014) Act*, were proclaimed on May 1, 2014. Highlights of the legislation affecting this DSM Resource Plan include the following:

- As of January 1, 2015, NS Power is required to undertake cost-effective electricity efficiency and conservation activities that are reasonably available in an effort to reduce costs for its customers (subsection 79I(1)).
- ENSC ceased to exist as the provider of DSM as of January 1, 2015. In its place, an Efficiency Nova Scotia (ENS) franchise was created and awarded by the Minister of Energy. The franchise, which "gives the franchise holder the exclusive right to supply Nova Scotia Power Incorporated with reasonably available, cost-effective electricity efficiency and conservation activities" (subsection 79C(2)(a)), was awarded for a 9-year term from January 1, 2016 to December 31, 2024 (subsection 79Q(1)), with an initial one-year transition added to the term for 2015 (subsection 79Q(2)).
- The supply of electricity efficiency and conservation activities will be administered by the ENS franchise on a contractual basis with NS Power, with the contract being approved by the UARB. For the 2015 transition year, NS Power and ENS were deemed to have entered into an initial agreement (subsection 79Q(2)).
- The legislation states that the UARB "shall establish such performance requirements for the franchise holder as it considers appropriate" (subsection 79R(4)).
- In 2015 only, the legislation limited the dollar amount approved by the UARB to be spent on electricity efficiency and conservation activities to not more than $35 million, plus any over-recovery of funds by ENSC from 2013 (subsection 79R(1)). The costs NS Power can recover from ratepayers for the 2015 year,

beginning in 2016 and over an 8-year period, must not exceed the lesser of $35 million or the amount approved by the UARB, less the amount of any over-recovery from 2013 (subsections 79R(2) & (3)).

- The legislation outlined the UARB may "determine the manner in which any costs recoverable by Nova Scotia Power Incorporated from its customers must be allocated amongst Nova Scotia Power Incorporated's customers, and in doing so may, in addition to any other factors considered appropriate by the Board, take into account the Rate Smoothing Adjustment" (section 79S).

ENSC filed its 2015 DSM Resource Plan on May 14, 2014. The one-year Plan was designed as a continuation plan, based on historical experience, market research and evaluated savings results rather than the modelling approach used in past DSM Plans. On July 22, 2014, ENSC filed a Settlement Agreement with respect to the 2015 DSM Resource Plan. The Agreement was signed by representatives of ENSC, the Consumer Advocate, the Small Business Advocate, the Industrial Group, the Affordable Energy Coalition, and the Clean Foundation. The Settlement Agreement was approved by the UARB on September 8, 2014. In accordance with the September 8, 2014 Order, ENSC (or ENS, as relevant), has completed the following:

- Provided an implementation report on the changes to the future delivery of DSM in Nova Scotia to the DSM Advisory Group on October 31, 2014 and subsequently filed with the UARB on November 14, 2014.
- Provided updates, in November 2014, to the DSM Advisory Group on the implementation of recommendations of the Econoler and Peach reports with the Board (updates, as of February 2015, are included as Appendix C within this Application).
- Ensured that the internal audit undertaken by KPMG regarding procurement practices examined whether such practices are, in fact, appropriate.

Also in accordance with the September 8, 2014 Order, ENS will complete the following:

- Continue quarterly reporting to the UARB during 2015.

- Provide the remaining internal audit reports to the DSM Advisory Group by the end of April 2015 and file reports with the UARB thereafter.

On October 1, 2014, ENSC filed its 2014 Rate and Bill Impact Analysis, with subsequent corrections filed on October 6, 2014.

2. 2014 DSM RESULTS

2.1 2014 DSM Expenditures and Energy Savings Results

On June 4, 2012, the UARB approved years 2013 and 2014 of ENSC's 2013-2015 DSM Plan application. The approved DSM Plan identified an overall 2014 energy-savings target of 137.8 GWh from DSM programs. Actual, unaudited expenditures and evaluated energy and demand savings results by program are provided in Figure 2.1.

Figure 2.1 - 2014 DSM Plan Actual Expenditures and Evaluated Energy Savings

	2014 Plan Targets as Filed		Mid-Course Adjustment		Actual		
	Expenditures[1] $M	Energy Savings GWh	Expenditures[1] $M	Energy Savings GWh	Expenditures[1] $M	Energy Savings GWh	Demand Savings MW
RESIDENTIAL DSM PROGRAMS							
Efficient Product Rebates [2]	4.3	19.3	6.5	17.5	4.5	13.5	2.5
Existing Residential	10.6	16.9	13.0	34.2	11.0	37.0	8.9
New Residential	6.7	6.8	2.0	5.9	1.2	4.6	1.2
Energy Savings Actions	1.0	15.0	1.3	15.4	1.0	25.4	2.9
BUSINESS, NON-PROFIT AND INSTITUTIONAL DSM PROGRAMS							
Efficient Products Rebates	8.1	31.2	6.4	27.0	4.9	24.6	4.9
Custom Incentives	9.3	40.3	7.3	23.9	6.5	33.6	4.1
Direct Installation	3.6	8.4	6.8	14.0	6.0	13.2	2.6
ENABLING STRATEGIES							
Education and Outreach	2.7	-		-	1.7	-	-
Development and Research	1.4	-		-	1.6	-	-
Other Enabling Strategies	1.0	-		-	0.3	-	-
Total	**48.7**	**137.8**	**47.5**	**137.8**	**38.7**	**151.9**	**27.1**

*Numbers may not sum due to rounding

[1] Unaudited, Includes HST

[2] Includes LED Holiday Light Exchange Savings

In addition to the evaluated energy savings for the 2014 DSM Plan, evaluated energy savings for Codes and Standards in 2014 were 31.4 GWh. Savings from Codes and Standards are outside of DSM programs and therefore not included as a contribution to ENSC's overall UARB-approved target.

The DSM Settlement Agreement dated May 28, 2012 stated ENSC would move toward a

rolling schedule of evaluation.[1] As a result, mature programs that had both a process and impact evaluation in 2013 did not have a process and impact evaluation in 2014. For these programs, the 2014 evaluation validated tracked savings with the parameters established in the 2013 evaluation. All DSM programs will have a process and impact evaluation in 2015.

2.2 2014 DSM Programs

ENSC exceeded target in 2014, achieving 151.9 GWh of energy savings compared to the UARB-approved target of 137.8 GWh. These savings include results from both the Residential and Business, Non-profit, and Institutional (BNI) sectors. Individual program results are presented below and are compared to mid-course-adjusted program-level targets within the overall UARB-approved 2014 DSM Resource Plan target of 137.8 GWh.

Energy savings for 2014 exceeded target by 14.1 GWh (10.2 percent). The Home Energy Report was the primary reason for this result, contributing 25.4 GWh to energy savings in 2014, compared to a target of 15.4 GWh. The program was a new service offering, so ENS did not have Nova Scotia-specific historical results on which to base its target and determined it was more appropriate to assume a conservative result. Evaluated energy savings for ENSC's remaining portfolio were more aligned, 3.3 percent higher than target, with results (excluding Home Energy Report) of 126.4 GWh compared to a target (excluding Home Energy Report) of 122.4 GWh.

Customer service continued as a priority of ENSC and was reflected in the 2014 Corporate Customer Satisfaction Index of 91.2. The 2014 Corporate Customer Satisfaction results are consistent with the 2013 and 2012 results, which were 90.5 and 89.0, respectively.

[1] NSUARB (2012) DSM Settlement Agreement E-ENSC-R-12

2.2.1 Residential Sector Results

The Residential sector obtained energy savings of 80.5 GWh, compared to the target of 72.9 GWh. The majority of savings were achieved in Existing Residential, as indicated in ENS's mid-course adjustment and approved 2014 Plan.

Efficient Product Rebates

Residential Efficient Product Rebates consists of both point-of-purchase discounts and incentives for the retirement of old, inefficient appliances. The overall savings for this program was 13.5 GWh compared to a 2014 target of 17.5 GWh. The Appliance Retirement component of Efficient Products retired a total of 7,408 refrigerators, freezers and air conditioners in 2014, which resulted in energy savings of 3.9 GWh.

The Instant Savings component of Residential Efficient Products sold over 275,000 products and achieved a total energy savings of 9.4 GWh. During the fall 2014 campaign, the transition to light emitting diode (LED) technology as the sole standard lighting product eligible for point-of-purchase discounts was completed. This transition was a result of ENSC adapting its service due to increased market penetration of compact fluorescent lamp (CFL) technology. As a result, over 182,000 LEDs were sold in the program.

Existing Residential

The Existing Residential program, comprised of the Residential Direct Install, Rental Properties and Condos, Home Energy Assessment, Green Heat, Residential Solar components, and Low Income Homeowner services, achieved savings of 37.0 GWh in 2014 compared to its target of 34.2 GWh. In 2014, ENSC agreed to report on low income programs separately from residential program information. This agreement was part of the 2015 DSM Resource Plan Settlement Agreement, approved September 8, 2014 by the UARB. A description of the Low Income Homeowner Service has been included in a

separate section below. Its results, however, contribute to the overall Existing Residential program.

The Residential Direct Install (RDI) program component obtained energy savings of 24.6 GWh. Previous program evaluations identified that free ridership (participants who would have adopted the energy-efficient product or behaviour without receiving an incentive) increased as adoption of CFLs continued to increase. In July 2014, the RDI program transitioned from installation of CFLs to LEDs for the replacement of incandescent bulbs. This allowed for dimmable fixtures to be replaced and eased some homeowners' concerns about CFLs, resulting in an increase of installations from an average of 17 bulb replacements per house to 27 bulb replacements per house. The transition to LEDs as the replacement for incandescent bulbs also reduced free ridership and allowed for increased program demand in areas with high levels of participation.

The Rental Properties and Condos (RP&C) program component achieved 2.7 GWh of energy savings within tenant units. Formerly known as Multi-Unit Residential Buildings (MURB), RP&C offers landlords, tenants, and condominium owners direct, no-cost installation of energy-efficient products in both common-space areas and rental units. This program component was the first ENSC service to transition from promoting CFLs to promoting LEDs. Products installed in common-space areas through RP&C are tracked as part of the Business Energy Solutions (BES) service, as they are generally owned or managed by commercial landlords or property managers.

A Home Energy Monitoring pilot was initiated in 2014 through the RDI program component, with 200 participants receiving monitors displaying real time energy use and cost. The pilot will continue throughout, and be evaluated in, 2015.

ENSC's Home Energy Assessment service achieved energy savings of 5.8 GWh in 2014. In 2014, there were 839 completed Home Energy Assessment projects for the year, which is an increase compared to the 519 completed projects in 2013. Of the 5.8 GWh energy savings generated, 2.1 GWh were derived from an internal study that was evaluated by

Econoler and approved to be used in subsequent years. This study asked a sample of participants who did not complete their final assessment the level of influence the initial assessment, homeowner upgrade report, and energy advisor had on their decision to perform work, despite not receiving incentives. In-home assessments were performed on this sample of participants to quantify the energy savings achieved given the information, advice, and expertise provided by the service. The 2.1 GWh of energy savings reflect all participants who had their initial assessment with ENSC, and whose timeline for a final assessment expired in 2011, 2012, or 2013. This is a batch savings recognition covering three years. Therefore, future savings, evaluated on an annual basis using the same methodology, are not expected to be as high.

In 2014, the Green Heat program component achieved 1.5 GWh of energy savings. In 2014, 235 participants completed heating system upgrades in their homes, 42 of which went through ENSC's zero-interest financing program. Residential Solar had a total of 33 homes participate in the service in 2014 for total energy savings of 0.1 GWh. Of the 33 homes to participate in the Residential Solar program, three participants selected the financing option.

Low Income Homeowner Service

The Low Income Homeowner Service obtained energy savings of 2.3 GWh in 2014, an increase compared to the 1.7 GWh achieved in 2013. ENSC completed upgrades in 961 homes compared to the 739 homes in 2013. ENSC staff and program delivery agents achieved these results while preparing for the transition of the service to the Clean Foundation for electrically heated low-income households. This transition, effective January 1, 2015 required extensive planning by both ENSC and the Clean Foundation.

New Residential

The New Residential program achieved energy savings of 4.6 GWh compared to its target of 5.9 GWh. The new housing sector experienced low levels of activity in 2014,

with housing starts down 21 percent and completions down 29 percent over 2013 levels. The number of unabsorbed (completed, unsold) homes was also high. This impacted the program, since savings are typically recorded after the home is sold. Compared to the previous year, the average EnerGuide rating in 2014 has risen above 2013 levels, with 14 homes obtaining EnerGuide ratings of 90 or higher, up from 6 in 2013.

Energy Savings Actions

The 2014 Home Energy Report (HER) program achieved 25.4 GWh of energy savings compared to its target of 15.4 GWh. HER is the first behaviour-based program ENSC delivered; therefore, energy savings tracking and targets were conservative estimates, as Nova-Scotia-specific historical results did not exist on which to develop them. This contributed to the difference in tracked versus evaluated energy savings. The purpose of HER is to enable participating households to compare their energy usage with similar neighbouring homes by receiving periodic reports illustrating their energy usage patterns and providing personalized energy efficiency tips to help them reduce their energy consumption. In April 2013, the delivery agent selected a total of 98,000 households to receive mail-out energy reports. A web portal was made available to these participants, and then to all NS Power residential customers by October 2013.

The 2014 evaluation cycle was the first time the HER program was evaluated. It was launched mid-2013, and ENSC wanted the program to be in market for a full year before evaluation occurred. Since HER's inception, 93,119 participants have taken part in the paper-based component of the program. In 2014, ENSC worked to increase participation in Web-For-All, the web-based accounts version of the program that is open to all NS Power residential customers. To increase Web-For-All registration, ENSC partnered with Air Miles on several advertising campaigns. Over 3,500 new accounts were created in 2014.

ENSC's deployment of the Home Energy Report had multiple successful outcomes:

- 84 percent of report recipients read the reports, compared to the delivery agent's

benchmark of 74 percent.

- 49 percent of recipients read the report thoroughly, compared to the delivery agent's benchmark of 33 percent.
- Nova Scotians have the highest "save rate" (save one or more reports for reference) of any jurisdiction receiving the Home Energy Report.
- From an education perspective, 87 percent of recipients believe it is important for Nova Scotians to reduce their use of electricity, while only 81 percent of a control group believe the same.
- There were 15,880 unique web visits in 2014, within which there were 125,663 page views, and participants added 44,067 energy savings tips to their accounts.

2.2.2 Business, Non-Profit and Institutional Sector Results

The Business, Non-Profit, and Institutional (BNI) sector generated 71.4 GWh in energy savings in 2014, exceeding its target of 64.9 GWh. Custom Incentives contributed to the majority of the 2014 BNI savings.

Efficient Product Rebates

The Efficient Product Rebates (BNI) program, marketed as the Business Energy Rebates (BER) service, includes both mail-in and point-of-purchase incentives. The service achieved total energy savings of 24.6 GWh in 2014, below its 27.0 GWh target. In 2014, the mail-in rebate component generated energy savings of 11.1 GWh and the Instant Rebates component generated energy savings of 13.5 GWh. Total units rebated in 2014 were 310,667. In 2014, Custom Incentive lighting projects began to be transferred to the BER service to improve service delivery and overall cost-effectiveness due to the standardization possible when more complex retrofits are not required.

Custom Incentives

The Custom Incentives program consists of the Custom Retrofit, Custom New

Construction, Custom Existing Building Commissioning, and Energy Management Information Systems (EMIS) program components. Overall, Custom achieved a total of 33.6 GWh in 2014, compared to its target of 23.9 GWh, with Custom Retrofit being the largest contributor to energy savings.

In 2014, Custom Retrofit achieved energy savings of 20.3 GWh. With the removal of basic lighting upgrade projects from Custom Retrofit to BER, more projects had to be identified in order to achieve its target. Unique program offerings, such as compressed air retrofits and leak surveys, were therefore introduced into the program. New and emerging technology markets, such as co-generation, were examined to direct future marketing efforts and to expand technical knowledge. In 2014, ENSC had six On-site Energy Managers (OEMs), who worked with large clients across the province to guide their respective participants through a wide range of projects.

The Custom Existing Building Commissioning program component was a new offering in 2014 and achieved energy savings of 1.7 GWh. The service targets existing medium-to-large facilities with large amounts of conditioned space that could benefit from an examination of the HVAC control systems. Energy savings are achieved through the implementation of no-cost and low-cost measures, achieving immediate savings for the end-use customer with little investment required. The projects completed provided energy savings at low-cost for both the client and ENSC.

The Energy Management Information Systems (EMIS) program component generated energy savings of 5.0 GWh through work with two organizations. The service offered incentives to help medium and large industrial customers reduce their electricity consumption through the implementation of an energy management information system, which is a performance management tool that allows organizations to monitor and analyze their energy usage.

The Strategic Energy Management (SEM) pilot is now two-thirds complete. SEM provides organizations with a comprehensive approach to energy management that will

achieve sustainable energy and cost savings over the long-term. This is completed through continuous business process and energy performance improvements, along with organizational culture change. Six industrial companies have completed program modules and milestones to date. It is anticipated this pilot will be evaluated in 2015.

The Custom New Construction program component generated energy savings of 6.7 GWh. Participants interested in installing common measures, such as air-source heat pumps, were directed towards the BER program; these referrals were observed largely in the Multi-Unit Residential sector. In 2014, further attempts were made to minimize free ridership by working more closely with participants and screening out measures (or projects) that were already designed and/or planned to be included.

Direct Installation

The Direct Installation program, consisting of the Business Energy Solutions (BES) and the Rental Properties and Condos (RP&C) Common Areas services, accounted for 13.2 GWh in energy savings compared to the 2014 target of 14.0 GWh. In total, 854 participants went through Direct Installation program with 803 participants from BES and 51 participants in 105 separate buildings from RP&C.

BES started offering linear LED technology in 2014; among the LED products installed in this program, linear LED T8 lamps – a product used to replace existing T8 fluorescent lamps – accounted for 28 percent of the total lighting energy savings.

2.2.3 Enabling Strategies

Enabling strategies include Education and Outreach, Development and Research, and Other Strategies such as Innovative Financing, Capacity Building, Working with Governments, and Codes and Standards. These activities are essential in order for efficiency services and programs to continue achieving energy savings. In addition to driving increased participation in ENSC's programs and services through awareness and

education, enabling strategies drive market transformation to energy-efficient products and advance energy efficiency standards and industry practices.

Education and Outreach

In 2014, ENSC connected with Nova Scotians in a number of ways to continue its work in energy efficiency education and outreach. Such activities are critical in raising awareness of energy and the measures Nova Scotians can take to conserve and use energy more efficiently.

In 2014, activities included the LED Holiday Light Exchange, which was in its 10th year. The exchange allows participants to exchange two sets of working incandescent lights for one set of LED holiday lights. In 2014, 117 communities across the province hosted a light exchange event during their community tree-lighting ceremonies. At these events, approximately 12,600 sets of incandescent lights were collected and recycled, and 6,343 LED light sets were distributed. The events, which are intended to raise awareness of energy efficiency and ENS's services, also resulted in energy savings of 0.2 GWh, which have been included in the Efficient Product Rebates (Residential) program total. Although energy savings are achieved, the primary purpose of the activity is to generate awareness of energy efficiency, which is why it is categorized as an Enabling Strategy.

ENSC also continued with its Green Schools Nova Scotia program in 2014. This program helps students in grades Primary through 12 to form 'Green Teams' that develop and lead initiatives to make their schools and communities more energy efficient and environmentally sustainable. Due to ENSC's efforts to expand its reach, 2014 saw a significant increase in the number of participating schools. At the end of the 2013, there were 87 schools participating; by the end of 2014, the number of schools participating in the Green Schools program grew to 132. Participation in Green Schools extends to all nine school boards, in all 18 Nova Scotia counties, and includes the Conseil scolaire acadien provincial and the First Nations School Board. ENSC also participated in "Take Our Kids to Work Day," with eight students joining ENSC staff for one day to learn

about energy efficiency. As well, ENSC attended career fairs and connected with guidance counsellors in the Halifax Regional School Board to raise awareness of the growing opportunities in the energy efficiency sector.

ENSC reached out to Nova Scotians throughout the year in other ways, including attendance at home shows, trade shows and speaking engagements, as well as through its Summer Tour. In 2014, the Summer Tour visited 26 community festivals and events across the province with its "Be the Change" booth. The 2014 Tour focused on visiting smaller, rural communities. An online questionnaire was administered to 130 Nova Scotians who visited the ENSC booth and who agreed to be contacted for research. Six in 10 visitors reported learning useful tips on how to use energy better as a result of visiting ENSC's booth. This represents an 11 percent increase from 2012, the last time quantitative data was gathered. Among these visitors, many stated they subsequently participated in energy conservation activities. In addition, eight in 10 visitors to the booth provided a rating of eight or higher on a 10-point scale – where 10 means 'completely support' – regarding their support for the work of ENSC.

Bright Business, an energy efficiency conference, built on the success of ENSC's 2013 conference. The 2014 conference theme was "Energy Efficiency: A Strategy for Growth." The objectives of the conference were to demonstrate how energy efficiency contributes to Nova Scotia's economic growth and prosperity, profile and highlight success and leadership of Nova Scotia's energy efficiency industry and communicate the business case for energy efficiency. Approximately 250 participants attended including senior management of participating organizations, operations and facility managers, policy experts, senior advisors from the energy efficiency industry, and students interested in careers in energy efficiency.

The ENSC website is an important channel for keeping Nova Scotians informed about efficiency programs and to provide educational content. In 2014, approximately 25 percent of all Nova Scotia households indicated they visited the ENSC website, which was comparable to 23 percent in 2013. Given the consistent wide reach of the website,

ENSC continued to make improvements to the site including changes to navigation as well as the addition of several tools and calculators to help Nova Scotians understand the value of energy efficiency and make choices that are more informed. Social media was utilized in 2014 as an education and outreach tool, resulting in a 7 percent increase in Facebook 'likes' and a 40 percent increase in Twitter followers compared to 2013. As of December 2014, ENSC had over 40,000 Facebook likes and over 3,400 Twitter followers.

One of the measures used to gauge the effectiveness of ENSC's education and outreach activities was awareness of ENSC. In 2014, unaided awareness increased from 22 percent to 35 percent (average quarterly results). While other factors contribute to awareness, these results provide evidence that ENSC's education and outreach activities have been effective in reaching Nova Scotians.

Development and Research

ENSC's 2014 development and research activities focused on primary market research designed to guide strategic decision-making in a number of program areas including:

- Impacts of product rebate levels on point-of-sale purchases;
- Preference between types of incentives (rebates or financing), professional project support, and financing mechanisms such as property-assessed clean energy (PACE), pay-as-you-save (PAYS), direct lending, and other;
- Potential for energy savings within specific industries in Nova Scotia;
- Evaluation of ENSC's Residential Financing pilot; and
- Usability of the ENS website.

ENSC continued to make progress on its programs tracking application and database, with a goal of having a common database for all programs, which provides the means to develop more effective reporting across all programs.

Other Enabling Strategies

In 2014, ENSC continued to offer training on ENSC's mandate and program-specific information to trade partners and contractors. ENSC worked with the Nova Scotia Community College to develop online versions of this training, which will be available in 2015. ENSC also continued to promote local contractors for its Home Energy Assessment program through a 'Find a Contractor' tool on the ENSC website.

In 2014, ENSC continued its work on Codes and Standards through its support and involvement with the Canadian Advisory Council on Energy Efficiency (CACEE). It further contributed through membership on the Steering Committee on Performance Energy Efficiency and Renewables (SCOPEER). Significant work and progress was made in the work required for amendments to the Nova Scotia *Energy-efficient Appliances Act* to harmonize standards with the federal government.

3. 2016-2018 DSM RESOURCE PLAN

3.1 Summary

The 2016-2018 DSM Resource Plan, as presented in Appendix A, is a three-year plan in accordance with the requirements of the *Public Utilities Act.* The Plan proposes a three-year energy savings target and a three-year system peak demand savings target as well as the programs, services, and strategies designed to achieve those targets. Annual milestones are presented, which will be reported on throughout the Plan period. Total Resource Cost Test and Program Administrator Cost Test results by program are provided, as well as lifetime benefits.

The Plan was developed to meet a range of potential outcomes as analyzed by NS Power and is based on the principles of balance and continuous improvement within affordability considerations. In 2016-2018, ENS will continue to adapt program and service offerings based on research performed internally and by other DSM administrators and experts. ENS will continue to develop, and provide benefit from, its internal expertise and experience in delivering effective DSM programs for Nova Scotians.

In accordance with a philosophy of continuous improvement, programs and services at ENS will be delivered and marketed differently to Nova Scotians during the implementation of the Plan. Since 2013, ENS has been exploring ways of delivering services in a more customer-centric fashion that encourages deeper energy savings, simplifies customer participation, and improves customers' experiences. Initial development work on this initiative has been completed, and full implementation is expected in 2016. It is expected that pilots and research projects will result in a refined customer delivery model in 2016, both consistent with and advancing best practices among DSM Administrators. While changes to program delivery are expected, the core offerings and measures supported by ENS continue to be guided by market trends, advancements in technology, and cost-effectiveness testing, as in past DSM Resource

Plan Applications. These changes will not affect ENS's ability to report on its programs as proposed in this Application.

Enabling Strategies will continue to play a role in ENS's 2016-2018 activities. These activities are focused on increasing Nova Scotia's culture of energy efficiency, which requires clear communication about the benefits and availability of energy efficiency opportunities. ENS's continuous development of services and service delivery, which is supported by Enabling Strategies activities, ensures DSM services are relevant, technically sound, and provide opportunities for individual customer engagement resulting in a positive customer experience.

Enabling Strategies aimed at market transformation objectives are also included in the 2016-2018 Plan. These activities ensure Nova Scotians have broad access to the most advanced efficient products and energy efficiency services. They serve to improve the long-term uptake of DSM activities in Nova Scotia.

ENS's specific objectives for Enabling Strategies are currently defined as:

- Increasing awareness and education of electricity efficiency and conservation programs and services, which is key to driving participation in energy efficiency activities;
- Evolving energy efficiency services through innovation and improving delivery of these services to Nova Scotians; and
- Driving market transformation.

To achieve these objectives, ENS is proposing the following categories of Enabling Strategies activities for the 2016-2018 period:

- Education and Outreach;
- Development and Research; and
- Other Enabling Strategies:
    - Property-Assessed Clean Energy (PACE) Financing Support;

- Working with Governments;
- Capacity Building; and
- Regulatory Affairs.

For a full discussion of planned 2016-2018 programs, services and activities please refer to the 2016-2018 DSM Resource Plan, attached as Appendix A.

3.2 Energy Savings and Investment

Figure 3.1 provides a summary of the energy and demand savings and investment for the 2016-2018 DSM Plan.

Figure 3.1 - 2016-2018 DSM Resource Plan Investment and Savings

Year	Investment ($ million)	Lifetime Benefits ($ million)[a]	Incremental Annual Net Energy Savings at Generator (GWh)	Incremental Annual Net Demand Savings at Generator (MW)	Total Resource Cost Test (TRC)[b]	Program Administrator Cost Test (PAC)[c]
2016	38.5	127.3	133.1	20.4	1.9	3.6
2017	40.3	139.8	136.5	21.0	2.0	3.8
2018	42.6	150.5	136.3	21.0	2.1	3.9
Total	**121.5**	**417.5**	**405.9**	**62.5**	**2.0**	**3.8**

Currency is expressed in 2016 dollars. Columns may not add correctly, due to rounding.
Annual avoided costs, calculated using ENSC's DSM Potential Study at the Base Level, were provided by NS Power. They include the cost of energy and capacity.
[a] Lifetime benefits are expressed as the net present value of the avoided costs, including energy and capacity, over the life of the program measures.
[b] TRC is a benefit/cost ratio comparing lifetime benefits to the sum of ENS's and participants' costs.
[c] PAC is a benefit/cost ratio comparing lifetime benefits to ENS's costs.

Figures 3.2, 3.3, and 3.4 provide the program-level savings and investment for 2016, 2017, and 2018 respectively.

Figure 3.2 - 2016 DSM Resource Plan Investment and Savings

2016	Investment ($ million)	Lifetime Benefits ($ million)[a]	Incremental Annual Net Energy Savings at Generator (GWh)	Incremental Annual Net Demand Savings at Generator (MW)	Total Resource Cost Test (TRC)[b]	Program Administrator Cost Test (PAC)[c]
Residential DSM Programs						
Efficient Product Rebates	2.5	6.6	11.0	1.1	1.6	2.7
Existing Residential	12.0	50.9	41.0	7.5	1.8	4.3
Low Income Participation[d]	*2.0*		*7.8*	*1.0*		
New Residential	1.7	6.7	3.5	1.0	2.5	3.9
Business, Nonprofit and Institutional Programs						
Efficient Product Rebates	6.7	23.8	34.1	5.3	2.0	3.5
Custom Incentives	8.2	32.0	34.0	4.2	2.5	3.9
Direct Installation	4.2	7.3	9.5	1.3	1.0	1.8
Enabling Strategies						
Education and Outreach	1.6					
Development and Research	1.1					
Other Enabling Strategies	0.6					
Total	**38.5**	**127.3**	**133.1**	**20.4**	**1.9**	**3.6**

Currency is expressed in 2016 dollars. Columns may not add correctly, due to rounding.
Annual avoided costs, calculated using ENSC's DSM Potential Study at the Base Level, were provided by NS Power. They include the cost of energy and capacity.

[a] Lifetime benefits are expressed as the net present value of the avoided costs, including energy and capacity, over the life of the program measures.

[b] TRC is a benefit/cost ratio comparing lifetime benefits to the sum of ENS's and participants' costs.

[c] PAC is a benefit/cost ratio comparing lifetime benefits to ENS's costs.

[d] Reflects ENS's planned participation by low income customers, per the 2015 DSM Resource Plan Settlement Agreement. Numbers are a subset of Existing Residential.

Figure 3.3- 2017 DSM Resource Plan Investment and Savings

2017	Investment ($ million)	Lifetime Benefits ($ million)[a]	Incremental Annual Net Energy Savings at Generator (GWh)	Incremental Annual Net Demand Savings at Generator (MW)	Total Resource Cost Test (TRC)[b]	Program Administrator Cost Test (PAC)[c]
Residential DSM Programs						
Efficient Product Rebates	2.7	7.3	12.0	1.1	1.7	2.8
Existing Residential	13.6	58.3	44.2	8.0	1.9	4.3
Low Income Participation[d]	*2.3*		*8.2*	*1.1*		
New Residential	1.8	7.2	3.6	1.0	2.6	4.1
Business, Nonprofit and Institutional Programs						
Efficient Product Rebates	6.5	25.4	33.6	5.4	2.2	3.9
Custom Incentives	8.2	33.9	34.1	4.3	2.7	4.1
Direct Installation	4.0	7.5	9.0	1.2	1.1	1.9
Enabling Strategies						
Education and Outreach	1.7					
Development and Research	1.2					
Other Enabling Strategies	0.7					
Total	**40.3**	**139.8**	**136.5**	**21.0**	**2.0**	**3.8**

Currency is expressed in 2016 dollars. Columns may not add correctly, due to rounding.
Annual avoided costs, calculated using ENSC's DSM Potential Study at the Base Level, were provided by NS Power. They include the cost of energy and capacity.

[a] Lifetime benefits are expressed as the net present value of the avoided costs, including energy and capacity, over the life of the program measures.

[b] TRC is a benefit/cost ratio comparing lifetime benefits to the sum of ENS's and participants' costs.

[c] PAC is a benefit/cost ratio comparing lifetime benefits to ENS's costs.

[d] Reflects ENS's planned participation by low income customers, per the 2015 DSM Resource Plan Settlement Agreement. Numbers are a subset of Existing Residential.

Figure 3.4 - 2018 DSM Resource Plan Investment and Savings

2018	Investment ($ million)	Lifetime Benefits ($ million)[a]	Incremental Annual Net Energy Savings at Generator (GWh)	Incremental Annual Net Demand Savings at Generator (MW)	Total Resource Cost Test (TRC)[b]	Program Administrator Cost Test (PAC)[c]
Residential DSM Programs						
Efficient Product Rebates	2.7	7.9	12.2	1.1	1.8	2.9
Existing Residential	14.8	61.8	43.6	8.0	1.9	4.2
Low Income Participation[d]	*2.6*		*7.7*	*1.0*		
New Residential	1.8	7.8	3.7	1.1	2.8	4.3
Business, Nonprofit and Institutional Programs						
Efficient Product Rebates	7.0	28.9	33.6	5.3	2.2	4.1
Custom Incentives	8.3	36.4	34.4	4.3	2.9	4.4
Direct Installation	3.9	7.7	8.6	1.2	1.1	2.0
Enabling Strategies						
Education and Outreach	1.8					
Development and Research	1.3					
Other Enabling Strategies	0.9					
Total	**42.6**	**150.5**	**136.3**	**21.0**	**2.1**	**3.9**

Currency is expressed in 2016 dollars. Columns may not add correctly, due to rounding.
Annual avoided costs, calculated using ENSC's DSM Potential Study at the Base Level, were provided by NS Power. They include the cost of energy and capacity.

[a] Lifetime benefits are expressed as the net present value of the avoided costs, including energy and capacity, over the life of the program measures.

[b] TRC is a benefit/cost ratio comparing lifetime benefits to the sum of ENS's and participants' costs.

[c] PAC is a benefit/cost ratio comparing lifetime benefits to ENS's costs.

[d] Reflects ENS's planned participation by low income customers, per the 2015 DSM Resource Plan Settlement Agreement. Numbers are a subset of Existing Residential.

4. DEVELOPMENT OF THE 2016-2018 DSM RESOURCE PLAN

To aid in the preparation of the 2016-2018 DSM Resource Plan, ENS engaged Navigant and Dunsky Energy Consulting (Dunsky). ENS and NS Power also held ongoing discussions from fall 2014 until the Plan filing. As a result of these discussions, ENS has modified its Plan to reduce planned costs, while attempting to minimize negative impacts to its programs and portfolio. To do so, multiple considerations were taken into account during Plan development and are outlined in the following sections. ENS presented a high-level overview of its preliminary proposed Plan to the DSM Advisory Group on February 4, 2015.

4.1 Development of 2016-2018 DSM Program Targets and Investment

The 2016-2018 DSM Resource Plan has been developed based on ENS's growing experience and history in delivering successful DSM programs and services to Nova Scotians. As part of the process of developing its 2016-2018 DSM Resource Plan targets and investment, ENS engaged Navigant Consulting, which used its Electricity Resource Assessment Model (EL-RAM) to assess the cost-effectiveness and potential achievability of the Plan. The model has been used in numerous North American DSM jurisdictions.

Per requirements of *The Public Utilities Act,* ENS is proposing a DSM Resource Plan that is cost-effective and affordable, as analyzed in NS Power's 2014 IRP or subsequent analyses. Specifically, the 2016-2018 Plan includes the following benefits:

- The Plan includes a three-year target of 405.9 GWh compared to three-year energy-savings of 417.8 GWh in ENS's Base-DSM Scenario in the DSM Potential Study, which was analyzed in the IRP. Prior to the development of a Candidate Resource Plan (CRP) containing the Mid-DSM Scenario, which was analyzed by Synapse and selected by NS Power as its Preferred Resource Plan, the CRP containing the Base-DSM Scenario had the lowest revenue requirement of any other CRP over the IRP's planning period.

- The 2016-2018 three-year target will be achieved within an investment level comparable to the Low-DSM Scenario from ENSC's DSM Potential Study ($121.5 million over the three years compared to $126.9 million in the Potential Study). The development of this lowered investment level was a result of discussions with NS Power, experience and historical results achieved since the completion of the Potential Study in 2012, and a revision of assumptions based on the current context in Nova Scotia.
- The 2016-2018 DSM Resource Plan demand savings align with the Low-DSM Scenario from ENSC's DSM Potential Study (62.5 MW over the three years compared to 72.2 MW in the Potential Study). This level of demand savings (62.5 MW) was not analyzed in the IRP. However, the IRP indicated that the Base-DSM Scenario (92.4 MW) avoided the same capacity additions as the Mid-DSM Scenario until 2035, and, on request from ENS, NS Power conducted a Strategist run that indicated the Low-DSM Scenario avoided the same capacity additions as the Mid-DSM Scenario until 2032. With ENS's research into demand-response options, additional demand savings not included in the existing modelling are expected to increase potential demand savings if required in future Plans.

The 2016-2018 DSM Resource Plan has been developed with an emphasis on producing affordable and achievable results that balance short-term DSM expenditures and long-term requirements for energy savings within a balanced approach to portfolio design. The considerations and inclusions used in the development process include the following:

- Results of NS Power's 2014 Integrated Resource Planning Process;
- Additional analysis completed by NS Power;
- Balance of long-term and short-term considerations;
- Affordability considerations;
- Cost efficiency opportunities; and
- Balanced portfolio considerations.

With the analyses conducted as indicated above, ENS believes the Plan will meet IRP targets in the longer-term without negative impacts, while reducing DSM-related rate pressures in the near term. Further, it maintains the existing benefits and capacity of DSM in Nova Scotia, as detailed in the following sections.

4.1.1 Results of NS Power's 2014 Integrated Resource Plan (IRP) Process

The Preferred Resource Plan from NS Power's 2014 IRP specified that the Candidate Resource Plan modelled by Synapse Engineering Economics included a level of DSM consistent with the Mid-DSM Scenario from ENSC's 2014 DSM Potential Study.[2] This CRP, using the assumptions modelled in the other IRP Candidate Resource Plans, resulted in NS Power's lowest revenue requirement over the planning period, resulting in many of the benefits of the High-DSM Scenario while maintaining revenue requirements closer to the Base-DSM Scenario.[3]

When end-effects were included in the analysis (the "study period"), the CRP with the lowest revenue requirement included a level of DSM consistent with the High-DSM Scenario. This is an important consideration in the analysis of DSM, as, unlike supply-side options, an initial investment, if expensed as a one-time cost as modelled in the IRP, does not require ongoing investment while continuing to provide benefits. The average life of DSM measures across ENS's entire portfolio of programs, as modelled in the Base-DSM Scenario, is 12.96 years. This results in more than 12 years of benefits after an initially expensed investment. If the initial expense is determined to be of concern, it can be adjusted through the application of deferral and amortization options, as indicated in the *Public Utilities Act*.

Given the restructuring of DSM in Nova Scotia, additional requirements set forth through legislation, and existing industry capacity, ENS determined it was not appropriate to put

[2] NS Power, *NSPI to UARB IRP Preferred Resource Plan Letter*, filed December 10, 2014, p. 6
[3] Synapse Energy Economics, *Key Planning Observations and Action Plan Elements,* filed October 20, 2014, p. 4

forth a DSM Resource Plan at the Mid-DSM Scenario level, even prior to discussions with NS Power, despite the long-term benefits associated with such a Plan. However, following the guidance of "Using Less Energy: Nova Scotia's Electricity Efficiency and Conservation Plan," the results of the IRP were still a key consideration in ENS's Plan development. In addition to alignment with Government policy, the long-term implications of the decisions made regarding the 2016-2018 period were an important starting point for the development of the proposed DSM Resource Plan.

Additional Analysis by NS Power

Throughout the fall of 2014 and into 2015, ENS worked with NS Power to incorporate additional NS Power-provided data into Navigant's model. Specifically, NS Power requested that ENS incorporate system load-shape data, provided by NS Power, into Navigant's modelling of potential demand savings. ENS has done so. This incorporation has led to a change in the demand-to-energy ratio from prior DSM Plans. As a result of this new information provided by NS Power, the Plan includes lower demand savings than the Base-DSM Scenario from ENS's DSM Potential Study.

To help with considerations in its preliminary development of the Plan, ENS asked NS Power to perform a Strategist modelling run using the Low-DSM Scenario of the DSM Potential Study. NS Power's analysis indicated that the same capacity additions are avoided in the Low-DSM Scenario as in the Mid-DSM Scenario until 2032. The results of this analysis, provided to stakeholders by NS Power on February 20, 2015, are shown in Figure 4.1.

Figure 4.1- Capacity Additions Avoided by Modelled DSM Scenarios[4]

2014 IRP	No DSM Plan	CRP01-01-FGD-R01 Half-Low DSM	Low DSM	CRP2-17 FGD Base DSM	CRP Mid DSM/FGD (Synapse Model)
2015					
2016					
2017	ML Oct 2017 Lin 2 retire	ML Oct 2017 Lin 2 retire	ML Oct 2017 Lin 2 retire	ML Oct 2017 Lin 2 retire	ML Oct 2017 Lin 2 retire
2018					
2019	Mersey Redevelopment Mersey Expansion Phase 1	Mersey Redevelopment Mersey Expansion Phase 1	Mersey Redevelopment	Mersey Redevelopment	Mersey Redevelopment
2020	CT 50 MW				
2021					
2022	PPA				
2023	Mersey Expansion Phase 2	Mersey Expansion Phase 2 PPA			
2024					
2025	TUC 1 Retire CT 100 MW FGD Lin 3/4 (300 MW)	TUC 1 Retire FGD (Lin 3/4 300 MW)	TUC 1 Retire FGD (Lin 3/4 300 MW)	TUC 1 Retire FGD (Lin 3/4 300 MW)	TUC 1 Retire FGD Lin 3/4 (300 MW)
2026		2 x CT 34MW			
2027	CT 50 MW				
2028					
2029					
2030	CT 50 MW				
2031		CT 50MW			
2032	TUC 2 Retire Wind Block 150 MW 2 x CT 50 MW (wind integration)	TUC 2 Retire CT 50MW	TUC 2 Retire CT 50MW	TUC 2 Retire	TUC 2 Retire
2033	CT 100 MW				
2034					
2035	Tre 5 Retire CC 145 MW	Tre 5 Retire CC 145MW	Tre 5 Retire 2 x CT 50MW CT 34MW	Tre 5 Retire CT 50MW	Tre 5 Retire
2036		CT 50MW			
2037	CT 34 MW				
2038	CC 145 MW	CT 50 MW			
2039	PHBM 51.7MW firm * Lin 1 Retire	CT 50 MW PHBM 51.7MW firm * Lin 1 Retire	2 x CT 50 MW PHBM 51.7MW firm * Lin 1 Retire	CT 100MW PHBM 51.7MW firm * Lin 1 Retire	PHBM 51.7MW firm * Lin 1 Retire
NPV 2020	3,679	3,784	3,789	3,815	3,851
NPV 2025	6,341	6,340	6,267	6,275	6,331
NPV 2030	8,674	8,762	8,275	8,230	8,277
Planning PV $M	12,302	11,762	10,981	10,731	10,623
Study PV $M	20,833	18,946	16,952	16,244	15,626

These results provided a basis for ENS to build a Plan that balanced the possibility of higher requirements of DSM in the long-term while ensuring capacity additions would not be required in the short to mid-term. The timeframe until 2032 is long enough for ENS to increase DSM activities to higher levels at a smooth, consistent ramp-up level, to avoid subsequent capacity additions as indicated in the 2014 IRP analysis, or as required by future analyses.

While Figure 4.1 illustrates the avoidance of capacity additions, it does not show the additional energy benefits provided by DSM. As part of the requested analysis, NS Power calculated the avoided costs of the Base-DSM and Low-DSM Scenarios, which includes energy benefits. The Base-DSM Scenario saves ratepayers $1.7 billion (NPV) in energy costs and $0.6 billion (NPV) in capacity costs: DSM provides more benefits to customers

[4] DSM Scenarios are from ENSC's DSM Potential Study, filed January 14, 2014 and/or from NS Power's 2014 IRP process.

through energy savings than it does through capacity avoidance. Both of these factors are a critical piece of a system-planning analysis, but focusing on minimum requirements, either for capacity avoidance or minimum renewable energy standards (RES) compliance does not take into account the benefits experienced by customers through lower bills, as the avoided costs total provided by NS Power demonstrates.

These calculations also show that DSM has an increased avoided energy benefit over the Mid-DSM Scenario on a per-MWh basis ($107/MWh for the Base-DSM Scenario compared to $102/MWh for the Mid-DSM Scenario). This is because the energy savings do not reduce NS Power's low-cost fuel mix to the extent of that associated with the Mid-DSM Scenario. In other words, the Mid-DSM Scenario achieves enough energy savings to reduce NS Power's use of lower-cost, non-renewable fuels, which are less expensive than the fuel purchases avoided with ENS's proposed DSM Resource Plan. Stated differently, on a per-MWh basis, ENS's proposed Plan, with energy savings aligned with the Base-DSM Scenario, provides increased benefits to Nova Scotians, even though total benefits are lower than would result from a higher level of DSM.

While ENS has received avoided cost calculations for both the Base-DSM and Low-DSM Scenarios, it is using Base avoided costs in its proposed 2016-2018 DSM Resource Plan since the proposed Plan achieves 98.6 percent of the Base-DSM energy savings and 91.1 percent of Base-DSM demand savings. Details on the development of these savings and their achievability within the proposed investment level are included in section 4.1.4 below, Cost Efficiency Opportunities. The additional savings, beyond the Low-DSM Scenario analyzed by NS Power, are of benefit to Nova Scotians in the short-term due to fuel savings resulting in lower bills for DSM participants. The additional savings are also of benefit to all Nova Scotians in the long-term due to both fuel savings and the avoidance of additional capacity. This is in alignment with a no-regrets strategy for DSM.

4.1.2 Balance of Long-Term and Short-Term Considerations

The IRP was an important starting point in the development of the 2016-2018 DSM Resource Plan because it provides a longer-term context within which to view short-term decisions required for the Plan itself. However, ENS also assessed short-term impacts to ensure the Plan considered a wider context as well.

ENS agrees that a Mid-Level DSM Scenario, stated to be the IRP's Preferred Resource Plan in its December 10, 2014 letter to the UARB,[5] would likely have negative rate impacts in the short term. In 2014, the approved investment in DSM was approximately $48 million, with approximately $53 million set aside in rates.[6] In 2015, DSM investment is limited to approximately $39 million, with $35 million the maximum amount to be recovered in rates due to an approved eight-year amortization term. The Mid-DSM Scenario from ENSC's DSM Potential Study indicated investment required in a range of $57.5 million to $66.1 million per year for the 2016-2018 period. DSM is only one factor in NS Power's rate requirements. However, ENS expects that a DSM-related one-year increase from a revenue requirement of $35 million for 2015 to an approximate $58 million revenue requirement would result in short-term rate impacts, particularly with a legislated $100 million cap on amortization of DSM. ENS agrees the impacts would be inappropriate when considering the additional analysis undertaken by NS Power.

While short-term rate impacts are important in developing a DSM Resource Plan, other considerations must be examined. Failing to do so would be inappropriate as it would suggest that DSM could be "paused" for the 2016-2018 period as no DSM is required to avoid capacity additions in that short timeframe. Following this strategy would result in reduced energy benefits (in total dollars, as highlighted above) and cost Nova Scotians. Energy benefits lower bills for Nova Scotians by reducing NS Power's requirement to

[5] NS Power, *NSPI to UARB IRP Preferred Resource Plan Letter*, filed December 10, 2014, p. 6.
[6] "Investment" refers to dollars required for current-year activities. It does not include Balance Adjustment numbers. The $53 million includes ENSC's Balance Adjustment, which was primarily related to an adverse HST decision by Canada Revenue Agency.

purchase fuel, not only for one year, but for year after year for the same initial investment.

Further, while pausing, stopping, or significantly reducing DSM may provide short-term rate benefits, it would come at a significant cost beyond increasing fuel purchase requirements. Such an approach would result in the additional start-up dollars needed when larger volumes of DSM are required to avoid capacity additions. These issues can be avoided by maintaining a consistent level of DSM activity. This Plan provides that consistency: DSM investment was approximately $39 million in 2014 and $39 million is approved for 2015.

Beyond an increase in fuel costs and costly start-up dollars, reducing DSM below the 2015 investment level of approximately $39 million would have negative short- and longer-term impacts. These include:

- Loss of industry capacity: For example, this would include loss in trained and certified experts such as Natural Resources Canada-certified home auditors, local appliance recycling facilities that reduce costs of not having to ship appliances outside the province, etc. When higher DSM levels are needed in the future, this capacity must be redeveloped, which is not efficient when certifications, training, and experience currently exist. There is a cost associated with the lag time for building this capacity, as 2011 demonstrated, when ENSC did not achieve its energy savings because target nearly doubled from 2010 (81.1 GWh to 158.5 GWh). As the capacity to meet that requirement was not available, Nova Scotians did not receive the short- or long-term benefit of low-cost energy savings.
- Erosion of an energy-efficient culture: Since more Nova Scotians are aware of ENS and its services, program-specific marketing is currently not required to the same extent as in 2011, leading to cost-efficiencies. ENS is currently able to achieve its targets through higher levels of program participation due to higher levels of willingness and awareness which could be lost if ENS were required to reduce its presence in the market.

- Steep rate increases in the future: When higher levels of DSM are required in the future to avoid generation capacity additions on the system, the required ramp-up of DSM activity could be significant enough to cause steep rate increases at that time.
- Loss of economies of scale: Loss of a competitive market for DSM implementation contractors is a risk if DSM activity levels are reduced below a level that sustains having multiple delivery agents. For example, if services in which multiple delivery agents operate in a specialized capacity (such as Home Energy Assessment) are reduced to a level for which individual delivery agents do not have enough business to sustain operations and remove themselves from the market, ENS could lose the cost advantage of a competitive system. If the programs remain at a level for which multiple delivery agents perform the work but each one's business is reduced, their ratio of fixed costs to variable costs will increase, leading to lower cost efficiencies.
- Reduced benefits to Nova Scotians: In addition to removing the Home Energy Report program, ENS has reduced investment in all of its programs from past years. Every reduction in DSM investment means fewer energy savings for the system, fewer participants, and lower corresponding bill savings for Nova Scotians.

Should future IRPs indicate that a Mid-DSM level continues to be required, reducing activities in the near term will cause additional resources to be invested in the future to redevelop capacity that currently exists. It is not cost-efficient to reduce ENS and industry capacity now only to rebuild it again in the future. If the current IRP had indicated that a lower level of DSM is required in the long term, then ENS agrees that maintaining existing capacity would not be appropriate.

In its IRP Final Report, NS Power stated that "the risk of underperformance associated with unprecedented levels of DSM may require additional investment in firm capacity,

exerting further pressure on power rates." [7] This statement would support the appropriateness of maintaining existing DSM levels, since reducing DSM now, below that of current levels, creates a risk of requiring higher DSM levels than have been achieved in Nova Scotia to-date. Maintaining current DSM levels has the additional benefit of providing DSM-related rate stability over time. Reducing DSM lower than existing levels, only to increase them in future years, has the potential of creating rate instability related to DSM: short-term rate reductions require greater increases in later years if the Mid-DSM scenario continues to be required.

By maintaining existing DSM levels, ENS is meeting NS Power's objective, stated in its 2014 IRP Terms of Reference, of implementing a "no regrets strategy." To reduce DSM levels below current ones creates a risk of requiring greater DSM levels in the future to make up the lost energy and demand savings that would have been achieved in earlier years. Such actions have the potential to cause steeper rate increases than would be required by a stable, maintained level of DSM. ENS is confident it can achieve the required levels of DSM as analyzed in the IRP, but reducing DSM in the short term, potentially forcing it to achieve those unprecedented levels in the longer term, adds avoidable risk, considering that DSM has benefits in the longer-term as well as the short-term.

Similarly, a Mid-DSM scenario for the 2016-2018 period would likely add avoidable risk. The rate increases required, particularly considering that the 2015 DSM investment is deferred and must be repaid over the next eight years, would likely face resistance from stakeholders. This is particularly true considering that DSM is subject to a legislated $100 million cap on deferral and amortization, so a significant portion of a Mid-DSM investment would need to be expensed, leading to short-term rate impacts. ENS's proposed 2016-2018 DSM Resource Plan has additional energy (fuel)-related benefits beyond minimum compliance and other requirements, it creates DSM-related rate

[7] NS Power, *2014 IRP Final Report,* filed October 15, 2014. p. 78.

stability, and it maintains industry capacity, whereas a Mid-DSM scenario would not meet ENS's objective of developing a Plan that balances short- and long-term considerations.

ENS believes that NS Power was correct in its statement in its October 15, 2014 IRP Final Report when it stated that:

> High investment in DSM in the early years poses a risk of increasing pressure on power rates in the near term….Low investment in DSM in the early years carries the risk of missed opportunity to reduce demand and provide immediate fuel cost savings in the near term, while providing extended benefits for the life of the program.[8]

ENS understands the IRP was based on a set of assumptions, some of which could change, altering the results. However, these assumptions were used in every Candidate Resource Plan, and they were the ones that had an opportunity to be vetted by stakeholders and the UARB.

An additional analysis that stakeholders and the UARB had an opportunity to provide input into was NS Power's Maritime Link analysis. Throughout this process, NS Power made the following arguments in relation to DSM:

- NS Power's Director of Generation Asset Management, explained in the hearing: "I do believe that Nova Scotia's DSM targets [which at the time included energy savings of 139-149 GWh per year in the 2016-2018 period] are aggressive and ambitious, as they should be."[9]
- NS Power's Vice President, Power General & Delivery stated that, "Nova Scotia Power is very supportive of demand-side management. It's identified as an economic choice for Nova Scotians and providing part of that solution. I think the

[8] NS Power. *2014 IRP Final Report* filed October 15, 2014. p. 78.
[9] NSUARB, *Maritime Link Hearing Transcript*, May 30, 2013 page 709, lines 12-14.

part we want to acknowledge is that by 2040, with the assumptions that are set out in the low case [NS Power's low forecast used for the Maritime Link analysis], 40 percent of the energy from a non-DSM environment is achieved through savings of the demand-side management program. So nearly 3.5 terawatts [terawatt hours] of savings have been achieved with that assumption. And so obviously that's quite valuable."[10]

- NS Power's Vice President, Power General & Delivery also stated that "I think it's important to context that the demand side management [is a] very, very important initiative in Nova Scotia and very good for our customers, and the assumption is appropriately aggressive."[11]
- In relation to the 25-year DSM projection of saving nearly 3.5 terawatt hours of energy, NS Power's Vice President, Power General & Delivery also explained that, "Of course, that helps solve a number of our emission constraints."[12]

The UARB and stakeholders also vetted the Maritime Link assumptions and inputs, and DSM at levels higher than what is currently being proposed by ENS were strongly supported by NS Power. Through these analyses, DSM is shown to not only be cost-effective, but to have energy and capacity requirements that benefit Nova Scotians, for a cost that is less than any existing or contemplated supply-side resource. NS Power is on the record as supporting higher levels of DSM than what is currently being proposed by ENS. Additionally, ENS believes the level proposed is not only affordable, but appropriate given the wide range of potential futures.

Given the UARB- and stakeholder-vetted information and analyses currently in place, ENS believes a balance between the short- and long-term benefits of DSM must be sought. An analysis that relies solely on an examination of short-term rate impacts of DSM does not take into account "fuel-cost savings in the near term" or "extended benefits for the life of the program." As ENS's rate and bill impact analysis shows, DSM

[10] NSUARB, *Maritime Link Hearing Transcript*, May 30, 2013 page 710, lines 17-22; page 711, lines 1-5.
[11] NSUARB, *Maritime Link Hearing Transcript*, May 30, 2013 page 711, lines 9-12.
[12] NSUARB, *Maritime Link Hearing Transcript*, May 30, 2013 page 713, lines 15-16.

increases short-term rates, but decreases them in the long-term due to its ability to avoid future capacity additions. ENS's 2016-2018 DSM Resource Plan provides balance of both short- and long-term considerations.

4.1.3 Affordability

The Province of Nova Scotia issued an Electricity Review Report on February 18, 2015, which states that a "large part of Nova Scotia's electricity future relates to increasing energy efficiency. One of the best ways to manage future electricity supply costs is to use less electricity."[13] In regards to managing growth through efficiency and the related costs, the report later states the "public is looking for a balance and many are asking that affordability be taken into account."[14] ENS's proposed electricity efficiency and conservation activities for 2016-2018 take into consideration affordability for electricity ratepayers, both in the short-term and the long-term:

- ENS's proposed DSM investment level, over the 2016-2018 period, is $61.1 million less than the DSM Potential Study's preferred Mid-DSM Scenario. The Mid-DSM Scenario was determined to result in the lowest revenue requirement over the 2014 IRP period, making it more cost-efficient in the long-term; however, this scenario would have the greatest impact to rates in the short-term. The proposed plan for 2016-2018 strikes a balance between short-term and long-term affordability by reducing the revenue requirement in the short-term but also preserving the long-term benefits of established DSM.
- The proposed annual DSM investment level is at the DSM investment level of 2011.
- ENS's proposed Plan considers short-term affordability while maintaining a level of DSM that sets the foundation to progress to higher levels of DSM in later years.

[13] Province of Nova Scotia, *2015 Electricity Review Report Draft*, February 18, 2015, page 12.
[14] Province of Nova Scotia, *2015 Electricity Review Report Draft*, February 18, 2015, page 37.

- The Plan provides for long-term affordability as it avoids the adverse consequences of investing in new capacity over the long-term.

Navigant's report, *Investing in Demand-Side Resources: Considering Affordability*, included in Appendix E, states that "Demand-side management is a highly cost-effective resource and is expected to decrease Nova Scotia Power's overall revenue requirements as projected over the 25-year period in the 2014 Integrated Resource Plan (IRP) Process. Absent demand-side resource investments, Nova Scotia Power's revenue requirements would be higher over time and the affordability of electric service would suffer over the next 25 years."[15]

Navigant's report points out that DSM has been recognized in North America as a "means for reducing customer costs," with some jurisdictions instructing utilities "to procure all cost-effective demand-side resources in recognition of its significant value to the electricity system and its customers." Analysis of jurisdictions in the United States identified that each dollar invested in energy efficiency yields $1.24 to $4.00 USD in benefits. Navigant's Electricity Resource Assessment Model (EL-RAM) identified net benefits to Nova Scotians from the Plan of more than $200 million.[16] Conversely, failure to invest in DSM results in a sizable opportunity cost of preventable electrical expenditures.

ENS' rate and bill impact analysis demonstrates that while DSM lowers participants' bills, it may impact short-term rates. However, the analysis also demonstrates that DSM decreases rates in the long-term due to its ability to avoid future capacity additions. The analysis also identifies that all NS Power customers benefit over the long-term from DSM programs, and participants of the DSM program benefit to a greater extent. More information on the Rate and Bill analysis is presented in section 5.2.

[15] Navigant, *2015 Investing in Demand-side Resources: Considering Affordability,* February 26, 2015, page 1
[16] Navigant, *2015 Investing in Demand-side Resources: Considering Affordability,* February 26, 2015, page 4

Navigant states in its report that "While all electricity customers benefit from investments in demand-side resources, program participants further benefit due to lower bills." In addition, "Maximizing the number of customers that directly benefit from ENS' demand-side services over time is a valuable goal that will result in more customers with reduced bills and improve the affordability of electric service."[17] The Plan ensures that programs and services are accessible to the broadest possible base of residential, commercial, and industrial ratepayers through a balanced portfolio of program and service offerings. Participation in these programs will reduce electricity bills and therefore lower electricity spending for participants. The lower net-usage of electricity by participants more than offsets the cost of DSM, providing a direct financial return to participants on their bills.

4.1.4 Cost Efficiency Opportunities

The 2016-2018 DSM Resource Plan is cost effective, per legislative and UARB requirements for DSM. Results from Navigant's EL-RAM show that all programs are cost-effective in each year of the Plan, using both the UARB-approved Total Resource Cost (TRC) test and ENS's proposed Program Administrator Cost (PAC) test.

For multiple reasons, including affordability considerations, ENS is proposing not only a cost-effective Plan, but also one that is based on a lower unit cost than prior proposed Plans. In the development of this Plan, ENS has been able to build on its growing history and experience delivering DSM services in Nova Scotia to determine ways in which it can reduce costs and increase cost-efficiencies from 2016 to 2018, including through the removal of the Home Energy Report program, a reduction in budgeted Enabling Strategies investment, and an increased emphasis on program components with lower unit costs. ENS has developed its 2016-2018 DSM Resource Plan to reflect such experience and increased cost efficiencies, resulting in lower unit costs than found in prior approved DSM Plans.

[17] Navigant, *2015 Investing in Demand-side Resources: Considering Affordability,* February 26, 2015, page 4

ENS has addressed short-term affordability considerations in multiple ways. This Plan deviates from the 2014 IRP's Preferred Resource Plan level, which included a Mid-DSM level as provided in ENS's DSM Potential Study. This level would have required ENS to achieve 518.7 GWh, at an investment of $182.6 million, versus 405.9 GWh for $121.5 million, over the 2016-2018 period, in the proposed Plan. While the IRP Preferred Resource Plan indicated a Mid-DSM level would be the lowest cost or most affordable in the long term, over the short term it is expected to have resulted in DSM-related rate increases above and beyond the 2014 amount in rates currently being repurposed for NS Power's Fuel Adjustment Mechanism repayment.

ENS initially modelled a Plan based on its 2014 level of activity at an investment level in the high $40 million to low $50 million range. Based on NS Power's analysis of system requirements, ENS developed its proposed Plan at a lower investment level ($27.9 million less over three years compared to ENS's initial modelling) to address short-term affordability. ENS's proposed Plan achieves energy savings comparable to the Base-DSM Scenario as analyzed in the IRP. ENS's initial model would have achieved higher energy and demand savings but would have required additional investment.

Through discussions with NS Power, and ENS's incorporation of the utility's, and stakeholders', questions and concerns, ENS found cost reductions during its Plan development process. The proposed 2016-2018 DSM Resource Plan therefore incorporates key elements of these negotiations and discussions, bringing forward lower short-term costs than ENS would have proposed if it were taking a solely long-term view. Through considering ways to reduce its costs, ENS's proposed Plan includes the elimination of programs and activities, and includes cost containment measures as detailed below.

ENS has removed the Home Energy Report, which has been administered under the Residential Energy Savings Actions program since 2013 and is contracted to continue into the first part of 2016. DSM jurisdictions across North America are increasingly offering the Home Energy Report as a service within their portfolios. As the first

Canadian jurisdiction and an early North American one, Nova Scotia was at the forefront of incorporating behaviour-based change into its overall portfolio. However, when considering short-term affordability, ENS had to make decisions that impacted specific programs. The Home Energy Report was a pilot, and it had the highest lifetime unit cost in ENS's portfolio. In addition, as it was administered by a delivery agent outside the province and, since it uses a standardized report that may not require upfront capacity-building work should it be offered again in the longer term, a loss of industry capacity is less likely with this program. For these reasons, the removal of the Home Energy Report was determined to be appropriate given the constraints faced by ENS.

ENS determined that, to reduce DSM investments below 2014 levels, elimination of the Home Energy Report was an action that would address many of the short-term considerations contemplated within this Evidence. As explained in Appendix A, ENS plans to continue work on behaviour-based change. In the 2016-2018 period, ENS will conduct research and development into potential offerings through its Enabling Strategies work.

ENS has reduced its Enabling Strategies investment from initial modeling by $4.7 million over the three years of the Plan. The increasing amounts in years two and three of the Plan are related to increasing Regulatory costs for the 2019-2021 DSM Resource Plan development and regulatory process. Enabling Strategies are a critical part of an overall DSM portfolio in order to drive future program participation and foster market transformation. They also provide ENS with the information it requires to reduce program costs through the optimization of incentive levels, and to file evidence-based regulatory filings as well as obtain stakeholder feedback and input. A description of proposed Enabling Strategies is provided in Appendix A.

ENS has worked with Navigant to refine the assumptions of the EL-RAM model to put a greater emphasis on lower first-year unit cost ($/kWh) programs. Doing so puts a greater emphasis on lower-cost measures, which reduces overall investment required in the short term. It is critical that ENS not focus entirely on lower-cost measures, as doing so would

result in market saturation for these measures, leaving only higher-cost measures available in future years. In addition, lower-cost measures often have shorter measure lives than higher-cost measures, meaning that costs may be lower in the short term but are higher over the long term. ENS's approach of a balanced portfolio (discussed in section 4.1.5) identifies the importance of this consideration.

ENS expects to reduce its costs through its ability to claim HST Input Tax Credits under the new model for DSM administration. However, expectations of increasing market saturation for maturing programs, which is expected to raise unit costs as identified in the 2015 DSM Resource Plan, Appendix A, filed May 14, 2014 will require ENS to implement cost containment initiatives as well. Some of these strategies are expected to be identified through the development of a cost containment audit, per the 2015 DSM Resource Plan Settlement Agreement.

4.1.5 Balanced Portfolio

The overall DSM Resource Plan portfolio, as in past DSM Plans, has been based on a balanced portfolio approach. A balance has been sought between short- and long-term cost considerations, an ability to ensure access to services by a wide range of Nova Scotians who are investing in DSM, and ENS's ability to achieve its energy and demand savings target within the UARB-approved investment level. Appendix F provides a more detailed explanation of a balanced portfolio concept and considerations recommended by Dunsky Energy Consulting.

4.2 Evaluation

ENS proposes that its evaluation activities include an annual impact evaluation for each program in each of the three years, with some modification to the evaluation methodology and reporting structure, as outlined below. Annual impact evaluations will provide ENS, stakeholders, and the UARB with up-to-date impacts on energy and

demand savings as progress indicators towards the overall approved 2016-2018 DSM Resource Plan three-year energy and demand-savings targets.

Rather than focus solely on annual program process evaluations, as had occurred in the past, ENS proposes that its 2016-2018 process evaluations begin including organizational processes that support program implementation. ENS's DSM programs have reached a level of maturity in which recommended changes to overall program structure are rarely being made in evaluation reports. The process evaluation will follow a rolling schedule over the 2016-2018 period. Process evaluations will occur at a program level as required. Examples of instances in which a program-level evaluation would occur include newly created program components that have not yet been evaluated, program components that have incurred major changes, program components that received a large number of recommendations from the evaluator, or program components that have a variance of energy savings larger than 25 percent of planned.

ENS will work to lower evaluation costs over 2016-2018. This can be achieved by providing full impact evaluation reports in 2016, but more condensed reports in 2017 and 2018. The condensed reports are expected to consist of energy and demand savings results and distortion effects. Methodology and related calculations would be referenced to the 2016 evaluation reports. The condensed reports would also include any changes or updates to programs and measures that occurred following the filing of the 2016 evaluation reports. In addition, some mature program evaluations may be based on confirmation of tracked savings. These proposed actions would still result in annual impact evaluations by a third-party evaluation; they would, however, involve a different level of activity, which would lower costs. The rolling process evaluation, described above, is also expected to contribute to lower evaluation costs.

4.3 Reporting

Consistent with the DSM Settlement Agreement for 2013-2014, approved by the UARB on June 4, 2012, ENS proposes to undertake the following regular reporting to the UARB

and DSM Advisory Group for the 2016-2018 DSM Resource Plan:

- Annual Progress Report (APR)
- Quarterly Meetings and Reports
- Evaluation Reports
  - Impact Evaluation (annual)
  - Process Evaluation (rolling)

Additional requirements for the Annual Progress Report and Quarterly Meeting and Reports are found below.

4.3.1 Annual Progress Reports

In the first quarter of the calendar year of each intervening year between multi-year filings, ENS proposes to continue publically filing an Annual Progress Report (APR), which may be the subject of questions and comments. The APR will include the following information:

- A summary of the context, activities and milestones achieved in the prior year and include status of annual performance indicators. The annual performance indicators that are proposed to be included in the APR are outlined in section 4.4.
- A management discussion and analysis of any major discrepancies relative to the original plan's intent and forecasts.
- A summary of costs and savings for each program or target market area. If the total reported results fall below 75 percent of the original plan's forecast cumulative annual incremental energy savings up to that point, ENS will also file a Corrective Action Plan designed to achieve the total approved energy savings target, within the approved multi-year budget.

In the event ENS contemplates proposing significant changes to elements within the approved 2016-2018 DSM Resource Plan, advance notice will be provided to the UARB and Stakeholders within the APR. ENS proposes that significant changes would include:

- Adding a new Program;
- Terminating an existing Program;
- Increasing the 3-year plan budget for the total Residential sector by more than 25%;
- Decreasing the 3-year plan budget for the total Residential sector by more than 25%;
- Increasing the 3-year plan budget for the total BNI sector by more than 25%;
- Decreasing the 3-year plan budget for the total BNI sector by more than 25%;
- Increasing the 3-year plan savings target for the total Residential sector by more than 25%;
- Decreasing the 3-year plan savings target for the total Residential sector by more than 25%;
- Increasing the 3-year plan savings target for the total BNI sector by more than 25%; and
- Decreasing the 3-year plan savings target for the total BNI sector by more than 25%.

4.3.2 Quarterly Meetings and Reports

ENS proposes to continue filing quarterly reports with the UARB for quarters one through three of each year, and meet with the DSM Advisory Group no less than three times per year. The meetings and reports will provide quarterly status updates and highlights, as well as communicate course adjustments within the approved 2016-2018 DSM Resource Plan.

4.4 Performance Requirements

Efficiency Nova Scotia retained Dunsky Energy Consulting to provide advice on a set of performance requirements that ENS should propose for the UARB's consideration in this Application. Dunsky was asked to conduct a jurisdictional scan of performance indicators and targets used in other jurisdictions to evaluate the performance of DSM program administrators. Dunsky was also asked to recommend a set of indicators and targets for ENS that reflect Nova Scotia's specific context. The Dunsky report, "*DSM Performance*

Indicators" is attached as Appendix G.

To provide clarity in this discussion, the following definitions are being used by ENS:

- Performance Metric: A quantifiable measure that is used to track and assess the status of a specific achievement.
- Performance Indicators: A set of particular performance metrics used to indicate or monitor progress toward performance targets. Performance Indicators are management tools that provide information to allow an organization to take action to help it deliver on performance targets.
- Performance Target: A performance metric expressed as a specific quantified goal that identifies the desired outcome of an activity at a specific point in time. In this Application, Performance Targets refer to UARB-approved targets.
- Performance Threshold: A predefined quantity, percentage, or range, which identifies the allowable deviation from a Performance Target within which the actual outcome is considered to have achieved success. In this Application, Performance Thresholds refer to UARB-approved thresholds.

Dunsky's scan of North American jurisdictions revealed that over 80 percent have restricted their Performance Targets to include the metrics of energy savings and peak demand savings. Jurisdictions also sometimes include a metric associated with costs or expenditures.

ENS Performance Targets: ENS agrees with Dunsky's recommendation for ENS to propose the UARB-approved Performance Targets include the cumulative annual energy and peak demand savings (the three-year total) at the portfolio level. Such a focus on energy and peak demand savings aligns with Subsection 79A(b)(v) of *The Public Utilities Act*, namely "the delivery of a reduction in the amount of electrical energy or capacity that Nova Scotia Power Incorporated would otherwise be required to supply…".

ENS Performance Indicators: ENS proposes the inclusion of annual incremental energy and peak demand savings in its set of Performance Indicators for annual reporting. ENS

agrees with Dunsky to consider including lifetime energy savings as an annual Performance Indicator for reporting purposes, recognizing that some methodological work and analysis would be required before it could be considered to be proposed as Performance Target in a future Plan.

In terms of other Performance Indicators put forward by Dunsky for consideration in annual reports, ENS proposes to include Total Ratepayer Benefits, Total Spending by ENS, and Customer Satisfaction. The metrics for these are readily available and ENS agrees they would serve to clarify the value of, and contextualize, ENS's performance results.

With respect to Total Spending, ENS recognizes that it has no recourse to seek additional revenue in the event of over-expenditure and accepts this as an inherent business risk that ENS must manage. Therefore, ENS proposes that an associated Performance Target for Total Spending is not required.

ENS considered including Total Resource Benefits in its proposal for Performance Indicators but is not doing so at this time since it involves the determination of non-energy benefits and, to date, non-energy benefits have not been an area of significant consideration in Nova Scotia.

ENS is not proposing to include a Pipeline of Projects as a standard Performance Indicator given the likelihood that the savings associated with long lead time DSM projects would be relatively small in comparison with ENS's total Performance Targets. ENS proposes to treat pipeline project reporting on a case-by-case basis and would only include them in its annual reporting in the event such projects are significant enough to skew its annual savings indicators.

The figure below provides ENS's proposed Performance Indicators and Targets:

Figure 4.2 - Proposed Performance Indicators and Targets

Performance Metrics (Portfolio Level)	Units	Annual Reporting Performance Indicators	Approved 2016-2018 Performance Targets
Energy Savings:			
- Annual Incremental	GWh	✓	
- Cumulative Annual	GWh	✓	✓
- Lifetime Savings	GWh	✓	
Peak Demand Savings:			
- Annual Incremental	MW	✓	
- Cumulative Annual	MW	✓	✓
Other Indicators:			
- Total Ratepayer Benefits	$M	✓	
- Total Spending	$M	✓	
- Customer Satisfaction	%	✓	

ENS Performance Thresholds: Dunsky's paper points out that, in almost all of these regions, the achievement of Performance Targets is the basis for awarding a financial bonus to the DSM Administrator. As an example, in its response to NSPI IR-1 b), filed July 3, 2014 as part of the 2015 DSM Resource Plan process, ENSC filed Vermont's Order of Appointment addressing Vermont Energy Investment Corporation's (VEIC) responsibilities as an Energy Efficiency Utility (EEU). Pages 19 to 33 of that document discuss the treatment of performance awards that VEIC could earn over the 3-year period of 2009 to 2011. For the metric of cumulative energy savings over that period, VEIC would start earning a bonus of $359,700 for achieving "superior performance" starting at 80% of its energy savings Performance Target and this bonus would be scaled up to $719,400 for achieving 100% of its energy savings Performance Target.

For clarity, ENS is not seeking the award of such a financial bonus for achieving success in its performance. Rather, ENS is seeking approval from the UARB to define success as having achieved minimum Performance Thresholds associated with the UARB-approved Performance Targets. ENS believes it is both appropriate and necessary to define success

as an acceptable range around a target, given that landing precisely on target is not possible. This is especially important given the new structure that establishes DSM as a contracted supply over a three-year term. Since precisely hitting a three-year target with a Plan that is developed four years in advance is not a realistic expectation, ENS is seeking UARB approval to set Performance Thresholds at 90% of the UARB-approved Performance Targets. ENS understands that, in the event that ENS falls short of achieving its Performance Thresholds, the UARB would use its discretion to determine appropriate action.

The figure below provides ENS's proposed minimum Performance Thresholds associated with approved Performance Targets:

Figure 4.3 - Minimum Performance Thresholds

Approved 2016-2018 Performance Target (Metrics)	Units	Approved 2016-2018 Performance Thresholds
Energy Savings:		
- Cumulative Annual	GWh	90% of Target
Peak Demand Savings:		
- Cumulative Annual	MW	90% of Target

4.5 Considerations and Items Related to Legislation

4.5.1 Transition Update

The *Public Utilities Act* established "Efficiency Nova Scotia" as a franchise starting January 1, 2015. The franchise holder has the exclusive right to supply NS Power, which must purchase all reasonably available, cost-effective electricity efficiency and conservation activities. The franchise holder is considered to be a public utility in relation to these activities.

ENSC created a transition plan in June 2014 and, per this plan, the organizational transition from ENSC to the first franchise holder has concluded. The first franchise

holder is EfficiencyOne, incorporated in July 2014 under the *Canada Not-for-profit Corporations Act*. The Board of Directors of EfficiencyOne consists of the same individuals as the Board of Directors of ENSC, absent the Provincially-appointed non-voting representative.

EfficiencyOne signed the franchise agreements with the Province of Nova Scotia in December 2014. In addition to providing NS Power with cost-effective electricity efficiency and conservation activities, the franchise agreement also allows EfficiencyOne to use the Efficiency Nova Scotia brand when offering efficiency and conservation activities for other fuels, under contract with the Province of Nova Scotia.

In accordance with the *Act*, all business information, agreements, employees, assets, liabilities and obligations of ENSC were transferred to EfficiencyOne on January 1, 2015. The sole exception, as per the *Act*, was that any claim related to ENSC's historical HST issue was not transferred. This asset, along with the subsequent collection of such, will remain with ENS Transition Corporation (ENSTC), to address. Throughout 2014, agreements between ENSC and third parties, where assignment was not covered by legislation, were assigned to EfficiencyOne (effective January 1, 2015).

In December 2014, delivery agents and other stakeholders operationally impacted by the transition were provided an update on the upcoming change from ENSC to EfficiencyOne. Similarly, changes were made to the ENS website and on participant application forms to explain the new franchise arrangement. As per the franchise terms and conditions, all participants (and the general public) will continue to see the activities funded by NS Power and the Province as "Efficiency Nova Scotia" activities.

In summary, EfficiencyOne is fully operational and running the Efficiency Nova Scotia franchise.

4.5.2 HST

ENSC filed a ruling request with the Canada Revenue Agency (CRA) in October 2010 on the following two issues: 1) is the corporation making a taxable supply to NS Power and, as a result, whether the corporation is required to charge and collect HST on the payments received from NS Power; and 2) is the corporation entitled to claim full Input Tax Credits (ITCs) for the HST paid on expenses incurred in the course of delivering DSM programs. A ruling was received in April 2012 which denied both issues presented to CRA. In May 2012, ENSC requested a second level review of the ruling. On February 25, 2015 a Notice of Confirmation was received by ENSC from the CRA Appeals Division. The notice states that CRA has reviewed the position taken by CRA Audit Division and considered the additional information provided by ENSC and confirms the original ruling set out by CRA Audit Division. CRA remains of the position that ENSC is not making a taxable supply to NS Power.

Pursuant to section 306 of the Excise Tax Act (Canada), ENSTC may appeal to the Tax Court of Canada to have the CRA Appeals Division decision overturned. The corporation has 90 days from the date of the Notice of Confirmation to file a Notice of Appeal. The corporation remains of the view that a taxable supply is being provided by delivering DSM programs and is entitled to claim full ITCs. Therefore, the HST receivable will remain as an asset with ENSTC until it is determined whether the issue will be pursued through the Tax Court of Canada.

With the franchise model created by the Electricity Efficiency and Conservation Restructuring (2014) Act, it is expected that ENS will be in a position to claim ITCs in 2015.

4.5.3 Establishment of an ENS Reserve Fund for DSM Expenses

As a result of the recent legislative changes, EfficiencyOne, as the ENS franchise holder, assumes all financial risk associated with the delivery of DSM in Nova Scotia.

As a standard, prudent financial management tool for not-for-profit organizations, it is reasonable to establish an adequate financial reserve. While a reserve fund is generally established for an organization as a whole, ENS recognizes that, as investment in the fund would be recovered from ratepayers, the fund should be associated with the DSM portion of the ENS franchise. In May 2010, Grant Thornton issued a white paper titled *Maintaining Sufficient Reserves to Protect your Not-for-profit Organization* to inform users as to why reserves are necessary in the not-for-profit environment and what factors should be considered in reasonably estimating the value of such reserves. The white paper stated that "the importance of maintaining adequate reserves cannot be overstated. With so many constituencies relying on the work of not-for-profit organizations, it would be fiscally irresponsible not to accumulate and maintain an adequate level of reserves."[18]

In the article, not-for-profits are identified as mission driven and not profit driven; in order to sustain this mission and execute their activities effectively, they must also ensure adequate financial resources are raised and sustained to fund programs, closely monitor operating budgets and take steps to ensure they operate within these budgets, manage cash flow to avoid disruption in operations and maintain strong internal control systems. A reserve fund is created to mitigate the risk of future unforeseen or unlikely events that may result in higher-than-anticipated expenses and apply pressure to an organization's cash flow, potentially impacting its financial stability. Most reserve funds for not-for-profits are established and maintained using operating surplus balances. Use of the fund is governed by a reserve fund policy.

Establishment of a reserve fund for the ENS franchise does not shift ENS's responsibility to closely monitor and spend within UARB-approved investment levels. A reserve fund is meant only to strengthen the ability of the organization to react to adverse factors that may impact its cash flow.

[18] Grant Thornton, *Maintaining sufficient reserves to protect your not-for-profit organization,* Spring 2010 *p. 7.*

ENS has identified the following risk factors:

- Termination or expiration of the franchise;
- Reduction in other funding sources that impact the ability of DSM programs to continue realizing the efficiencies of shared costs; and
- Other factors external to the organization.

Termination or Expiration of the Franchise:

Under the Public Utilities Act, Subsection 79F(1)(a), upon termination or expiration of the franchise, ENS would be responsible for all payments accrued before the date of the assignment and all liabilities arising from any disputes arising from such agreement before the date of assignment. Therefore, any DSM costs associated with the wind up of the franchise are required to be absorbed by ENS. Costs would include staff severance payments, contractual liabilities and other wind up costs of the organization.

ENS recognizes that, as investment in the fund would be recovered from ratepayers for the purposes of DSM activities, any residual reserve balance after the settlement of debt for the wind up of DSM activities by ENS would be transferred to the new franchise holder for the DSM portion of its business.

Changes in Other Funding Sources:

The 2016-2018 DSM Resource Plan assumes the existence of cost synergies as a result of sharing certain costs associated with administration of provincially funded programs. In the event funding from the Province is significantly reduced or eliminated, there would be non-discretionary DSM costs that would remain with the organization and may be required to be absorbed by the DSM programs until the next contract NS Power contract was negotiated.

Impact of External Factors:

ENS may be subject to external risk factors that impact its financial ability to offer programs that are consistent with its long term plans including:

- Legislative or regulatory risk, which includes the risk associated with the introduction of new acts or changes to existing acts leading to loss of energy savings potential within approved price structures. This would also include the introduction of unanticipated new codes and standards that would impact the energy efficient measures offered.
- Technological risk, which includes unexpected changes or defects to technology that would impact savings and how savings are evaluated.
- Economic risk, since an economic downturn may result in fewer people investing in energy efficiency upgrades as disposable income decreases.
- Operational risk, which includes external factors that result in an unforeseen increase in cost for the delivery of programs. Examples of such costs could include material shortages, changes to recycling and disposal requirements, or the unexpected loss of a partner with unique expertise for administering a program.

Funding of the Reserve Fund:

Under the new DSM administration model, ENS is solely responsible if it is unable to meet its obligations to provide NS Power with the UARB-approved, contracted amount of energy savings within the contract price. ENS is not able to request additional dollars if unforeseen events occur, as ENSC did with the 2012 HST decision from CRA. However, ENS also understands that any investment used to establish a DSM reserve fund would be available through ratepayer-funded investment.

ENS proposes to establish a reserve fund, allowing it to follow prudent financial practices. The fund would have a limit, subject to UARB approval, at the step levels recommended in the table below plus any accrued interest. The reserve fund would be created and maintained if there were a surplus balance at the end of a contract period with NS Power, with the first contribution being proposed after audited financial statements are received for the 2015 year. Establishing the fund after the first (one-year) contract period with NS Power, if a surplus occurs, would be a step towards providing financial stability, which is prudent financial practice for ENS.

To recognize that DSM activities are paid for by NS Power but recovered from ratepayers, ENS proposes that up to 50 percent of the organization's surplus balance could be contributed to its reserve fund, with the remaining 50 percent being returned to NS Power as an offset to the next DSM supply agreement. Any surplus beyond that required to reach the cap of the reserve fund would be returned to NS Power as an offset to the next DSM supply agreement.

As stated in the 2015 DSM Resource Plan, ENS is reducing its 2015 spending to offset HST costs should the new structure not meet CRA's requirements. ENS therefore proposes any contribution to the reserve fund resulting from a surplus would be calculated after 2015 HST amounts are returned to NS Power for the benefit of ratepayers.

Calculation of the Reserve Fund:

The reserve fund balance has been calculated using assumptions regarding the three risks identified which include DSM portion only of wind up costs, loss of cost synergies and the impact of external factors. Collins Barrow was engaged to review and confirm the assumptions used and the reasonableness of the reserve calculation (please see Appendix H). The reserve fund escalates from 2015 to 2024 due to an assumption of increasing DSM employee severance costs. Figure 4.5 below outlines the reserve fund balance calculated over the ten years by the risk categories identified.

Figure 4.4 – Reserve fund balance calculation

Reserve Fund Balance ($ millions)	**2015** $M	**2018** $M	**2021** $M	**2024** $M
Costs of Wind Up	-	3.1	3.6	4.9
Loss of Cost Synergies	2.4	2.4	2.4	2.4
Impact of External Factors	1.7	1.7	1.7	1.7
Reserve Fund Required	4.1	7.2	7.7	9.0

5. ADDITIONAL ITEMS

5.1 Cost-Effectiveness Testing

The Total Resource Cost (TRC) test has been the primary cost-effectiveness test for demand-side management in Nova Scotia since the commencement of DSM-related activities in the province. In the early years, TRC screening was applied at the measure level.

Subsequently, during the filing of its 2012 Electricity Demand Side Management Plan[19], ENSC requested approval to apply primary cost-effectiveness screening at the program level rather than at the measure level. Measure-level screening was still to be performed, but a measure having a TRC ratio of less than one could be included in the program, such that it "may provide strategic or long-term benefits, such as stimulating demand for newer technologies to achieve economies of scale."[20] In its June 30, 2011 Decision, the UARB approved ENSC's requested change.[21]

In addition to TRC screening, the 2012 and 2013-2015 DSM Plans, as well as the currently proposed 2016-2018 DSM Resource Plan, all provide results of the Program Administrator Cost (PAC) Test, for information purposes. The Program Administrator Cost test provides a ratio of energy-efficiency program benefits (e.g. utility avoided costs) to program administrator (utility) costs (e.g. incentives, administration).

Based on the Evidence presented below, as well as the Dunsky Energy Consulting analysis presented in Appendix I, ENS requests UARB approval to change the primary cost-effectiveness testing methodology from the TRC to the PAC for subsequent DSM Resource Plans.

[19] ENSC, *2012 Electricity Demand Side Management Plan,* filed February 28, 2011
[20] *Ibid.,* p. 17
[21] NSUARB, *NSUARB-E-ENSC-R-10 ORDER,* June 30, 2011

ENSC and its stakeholders[22] as well as industry experts [23] have noted concerns associated with the use of the TRC test prior to the filing of the 2016-2018 DSM Resource Plan. ENS's primary concerns with the existing test, of the ones noted in Appendix I, are accuracy (not all inputs are calculated appropriately), bias (there is a lack of inclusion of all appropriate customer benefits), and ratepayer value (the TRC is not an accurate reflection of ratepayer value).

A primary cost-effectiveness test directly informs DSM Planning and decision making processes, and it is ENS's position that it is essential for the primary cost-effectiveness test under which DSM is screened in Nova Scotia, to ensure an accurate decision-making guide is in place. The 2016-2018 DSM Resource Plan passes TRC cost-effectiveness testing methodologies as currently implemented in Nova Scotia. The proposed shift from the traditional TRC test to the PAC test is a result of ENS's commitment to the accurate accounting of DSM costs and benefits, as opposed to a specific operational need.

Based on advice provided by Dunsky Energy Consulting, two options to rectify issues with the standard TRC test could be contemplated. The first represents an attempt to more accurately quantify benefits within the TRC framework. The second represents adoption of the Program Administrator Cost test. Both of these options were given serious consideration by ENS and reviewed with the DSM Advisory Group over the last two years. The PAC test is recommended by ENS, based on the following input from Dunsky:

- The PAC test is inherently balanced. In this manner, the PAC requires no regulatory effort to balance appropriately, which could likely be significant for a modified TRC-based approach.
- The PAC is more reflective of a ratepayer value approach. In this manner, it allows fairer competition between supply-side and demand-side planning options.

[22] Reed, G., *Evidence of Glenn Reed - E-ENSC-R-10,* filed April 8, 2011, p. 8
[23] Energy Efficiency Screening Coalition, *Recommendations for Reforming Energy Efficiency Cost-Effectiveness Screening in the United States,* November 18, 2013, p. 1

- The PAC cost is consistent with a least-cost procurement view, which aligns with the *Public Utilities Act*.

Dunsky Energy Consulting's report makes three additional recommendations for which ENS is not requesting approval at this time:

1. *The PAC test should be applied for information purposes at the program and portfolio levels, and for decision-making purposes at the sector level.* It is ENS's view that the program-level screening methodology currently provides balance between flexibility and ensuring the cost-effectiveness of individual programs. ENS will begin providing cost-effectiveness testing results at a sector level for information purposes.
2. *Critical inputs, particularly the discount rate, should be re-examined for consistency with Nova Scotia's DSM context as well as risk.* ENS would like to further examine the details and ramifications of such a change, and would like to ensure stakeholders are engaged in a discussion on the issue before considering whether to bring forward this proposed change.
3. *A transparent reporting template, adapted from the National Efficiency Screening Project (NESP)'s Resource Value Framework, should be developed to facilitate future understanding of critical test choices by all parties involved.* ENS strives to make cost-effectiveness testing choices as transparent and explicit as possible. A shift to the PAC test would alleviate many of the input complexities associated with cost-effectiveness testing. ENS believes this change would mitigate a need for such a template.

5.2 Rate and Bill

As part of the 2016-2018 DSM Resource Plan, ENS is filing a forward-looking Rate and Bill analysis. This is in accordance with requests from Synapse Energy Economics. This is the first time ENS has filed a forward-looking Rate and Bill Impact Analysis that does not include historical results. Input assumptions were shared and discussed with stakeholders at a February 4, 2015 DSM Advisory Group meeting. In addition to

stakeholder feedback submitted subsequent to ENS's October 1, 2014 filing of its Rate and Bill impact analysis, ENS requested that stakeholders submit feedback in February 2015, which ENS took into consideration for its final assumptions. The forward-looking Rate and Bill Impact Analysis is available in Appendix D.

5.3 Cost Allocation Method

The new legislative structure, under which NS Power is required to purchase cost-effective, reasonably available DSM, NS Power is able to recover UARB-approved DSM investments from ratepayers. For this reason, it is the understanding of both ENS and NS Power that NS Power will be responsible for the allocation and recovery of DSM-related procurement costs. ENS requested that NS Power provide an overview of its proposed approach so ENS could determine potential impacts on the implementation of the proposed Plan and provide input on those impacts to NS Power, but this information is not yet available.

Once NS Power's cost allocation proposal is available, ENS will provide its perspective on the operationalization of the methodology, if required. In the interim, ENS and stakeholders continue to see the impacts of the operationalization of the previously approved cost-allocation methodology. In 2014, ENSC committed to monitoring its rate class expenditures with the purpose of informing the UARB and stakeholders as to variances from forecast. Figure 5.3 includes unaudited expenditures by rate class.

Figure 5.1 - 2014 Rate Class Expenditures (unaudited)

Rate Code	2014 Budget Adjusted to UARB Compliance Filing	2014 YTD Expenditures	YTD Expenditures as percentage of Full Year Budget
	$M[1,2]	$M[3]	%
Residential/Charitable (2,3,4)	26.2	20.6	78.4
Small General (10)	2.5	1.9	74.8
General Demand (11)	11.8	10.5	88.8
Large General (12)	2.4	1.6	66.1
Small Industrial (21)	0.9	0.6	65.4
Medium Industrial (22)	1.2	0.9	78.1
Large Industrial (23, 25)	1.0	1.6	169.2
Municipal (24)	0.8	1.1	135.4
Unmetered (999)	0.7	0.0	2.1
Total	**47.5**	**38.7**	**81.5**

* Numbers may not sum due to rounding

[1] Includes HST

[2] The 2014 Budget Adjusted to UARB Compliance Filing was developed by summing the values from three tables in the 2014 DCRR Compliance Filing, filed January 27, 2014: Appendix A, Table 2, Column K; Appendix C, Table 1, Column I; and Appendix A, Table 7, Column E.

[3] Unaudited; includes HST

ENSC did not require the level of investment forecast in each rate class except for the Municipal and Large Industrial rate classes. In the Q1 Demand Side Management Report submitted to the UARB on May 14, 2014, ENSC anticipated overspending in the Municipal rate class and brought this to the attention of the class's DSM representative. During 2014 ENSC managed participation, to the extent possible, in the Municipal rate class to limit additional expenditures where possible. Approximately 38 percent of the investment in the Large Industrial rate class occurred in the last month of the year and was not forecasted by ENSC.

Monitoring, mitigating and reporting are important tools that ENS remains committed to doing. However, they do not address the fundamental drawbacks to the system currently in place, which have been identified by ENS since 2013. For example, if investment were limited to forecast levels, ENS could be at risk of not meeting its energy savings targets, which is the overall requirement for DSM: to reduce demand on the system, regardless of

where that demand is coming from. If customers in a particular rate class are willing to participate in ENS's programs, ENS should be able to allow those willing customers to contribute to its achievement of energy savings.

If an individual rate class is close to its expenditure for the year, ENS would be required to limit program participation in that rate class if it was expected to not exceed forecasted investment. Although this is possible in some programs, ENS is not able to do so for many of its program components in which customers apply for rebates after installing energy-efficient measures, such as in Efficient Product Rebates (BNI) or Green Heat. In addition, there are serious customer service and lost opportunities issues to restricting willing participants from participating in programs when their neighbours or colleagues are able to by virtue of the fact they are in a different rate class.

Internal ENS reporting processes also make it difficult to monitor the last months of the year. For example ENS is not able to complete its monthly reporting for the previous month until the middle of the following month. Therefore, if there was an issue identified from November, it would be hard to mitigate these issues in December for year-end. Forecasting is an important tool to help mitigate higher-than-forecast investment, but at year-end, when many customers are trying to close out projects due to the close of their business cycles, ENS must also ensure it meets its energy-savings targets. Additional examples of issues with constraining rate-class participation based on forecasted investment is provided in Figure 5.2, originally developed in response to IG IR-20 from the 2015 DSM Resource Plan filing.

Figure 5.2 - Issues with Constraining Rate-Class Participation

Mitigation Strategy	Potential Impact and/or Uncertainty
Cancelling programs once the full investment amount has been reached	• ENSC's ability to meet 2014 targets • Confusion and dissatisfaction among customers, delivery agents and consultants who are familiar with current program terms

Mitigation Strategy	Potential Impact and/or Uncertainty
Restricting participation for specific rate classes that have reached PCR (forecast) investment levels	• ENSC's ability to meet 2014 targets • Customer satisfaction (and accessibility) issues when customers are not able to participate even though others in their rate class could earlier in the year, or when similar customers in another rate class can still access them
Reducing incentives to slow down or reduce participation levels	• ENSC's ability to meet 2014 targets • Increased free-ridership
Removing measures that are attractive to specific rate classes	• ENSC's ability to meet 2014 targets • Confusion and dissatisfaction among customers, delivery agents and consultants who are familiar with current program terms
Changes to incentives or eligible measures	• Confusion and dissatisfaction among customers, delivery agents and consultants who are familiar with current program terms.
Redirecting delivery agents to non-affected rate classes in which the near-term demand for programs is not as high	• ENSC's ability to meet 2014 targets (for example, if a Large Industrial or Municipal Electric Utility customer was interested in participating, but delivery agents were told to consider them "off limits", this could be a lost opportunity to achieve cost-effective savings) • Delivery agents and consultants work directly with customers, over a timeframe that can exceed one year, to develop projects for programs such as Custom. These businesses invest considerable effort and money to sell their services to specific clients, with the expectation that the projects will proceed on schedule after agreement is reached with the customer. • Delivery agent dissatisfaction in restrictions that may cause them to miss their targets (which are set prior to the start of the year). • Could create a competitive disadvantage for potential participants in these areas.

Mitigation Strategy	Potential Impact and/or Uncertainty
Program cancellation or project deferrals	• ENSC's ability to meet 2014 targets • Dissatisfaction among customers who pay the DSM rider on their electricity bills but cannot access programs due to the timing of their application. The issue of rate-class cost allocation is difficult to communicate to customers as a rationale for refusal of funding.
Funding deferrals or refusals	• Could affect customers that schedule large projects to align with their budget cycles (if project uptake earlier in the year is higher than expected). • Some customers discover late in the year they have extra room in their budgets to complete a project that year; if ENSC does not approve it, the opportunity for achieving those energy savings may be lost.
Restricting Program Enrollment	• Participants in programs such as Home Energy Assessments and Residential New Construction (participated in by Municipal Electric Utility customers) have up to one year to complete their upgrades; therefore, immediate restriction in program enrollment will have a limited effect on 2014 allocations. • Contractual obligations: Projects in programs such as Custom and Direct Installation (participated in by Municipal Electric Utilities customers and Large Industrial customers) can often take several months to obtain customer approval after receiving an estimate. ENSC commits to providing the rebates and incentives offered at the time of customer registration.

As described above, ENS will be pleased to provide input into NS Power's proposed cost allocation methodology once available.

6. CONCLUSION

The 2016-2018 DSM Resource Plan provides an evidence-based approach that enables Nova Scotians to achieve reasonably-available, cost-effective electricity energy and demand savings. The plan was developed with emphasis on affordability, while balancing considerations of long-term resource savings objectives (per the 2014 IRP), industry capacity, and maintaining a broad portfolio of programs and services for diverse groups of Nova Scotians.

With this Application, ENS is seeking UARB approval of:

- The 2016-2018 DSM Resource Plan, provided as Appendix A;
- The agreed form of Supply Agreement, provided as Appendix J;
- The outstanding items of the Supply Agreement, as proposed in Appendix B;
- The Performance Indicators, Performance Targets, and Performance Thresholds as proposed in section 4.5;
- A change in the primary test for cost-effectiveness screening from the Total Resource Cost Test to the Program Administrator cost test; and
- The establishment of a reserve fund, subject to the terms described in Section 4.5.3 of this Evidence.

Appendix A

2016-2018 DSM Resource Plan

This page has been intentionally left blank

TABLE OF CONTENTS

1. INTRODUCTION 1
1.1 2016-2018 DSM Resource Plan Savings and Investment 2
1.2 Programs and Services Overview 5
2. RESIDENTIAL PROGRAMS AND SERVICES 7
2.1 Efficient Product Rebates (Residential) 7
2.2 Existing Residential 8
2.2.1. Low-Income Initiatives 9
2.3 New Residential 10
2.4 Update on Energy Saving Actions 11
3. BUSINESS, NON-PROFIT AND INSTITUTIONAL (BNI) PROGRAMS AND SERVICES 12
3.1 Efficient Product Rebates (BNI) 12
3.2 Custom Incentives 13
3.3 Direct Installation 16
4. ENABLING STRATEGIES 18
4.1 Education and Outreach 19
4.2 Development and Research 22
4.2.1 Primary and Secondary Research 22
4.2.2 Development of DSM Information Management and Program Execution Systems 23
4.3 Other Enabling Strategies 24
4.3.1 Property-Assessed Clean Energy (PACE) Financing 24
4.3.2 Working with Governments 25
4.3.3 Capacity Building 25
4.3.4 Regulatory Affairs 26

TABLE OF FIGURES

Figure 1.1 - 2016-2018 DSM Resource Plan Investment and Savings 2
Figure 1.2 - 2016 DSM Resource Plan Investment and Savings 3
Figure 1.3 - 2017 DSM Resource Plan Investment and Savings 4
Figure 1.4 - 2018 DSM Resource Plan Savings and Investment 5

This page has been intentionally left blank

1. INTRODUCTION

The 2016-2018 DSM Resource Plan has been developed based on ENS's growing experience and history in delivering successful DSM programs and services to Nova Scotians. As part of the process, ENS engaged Navigant Consulting and Dunsky Energy Consulting to assist in developing inputs and proposals to the Plan.

The proposed Plan represents a comprehensive suite of program and service offerings for Nova Scotia electricity users. The programs and services included in the Plan have been developed, assessed and modelled based on ENS's experience delivering DSM, expected market conditions, technology availability, and customer behaviour. As with prior DSM Plans, this Application is not an implementation Plan; it has been developed for planning and cost-effectiveness testing purposes. Over the course of the three-year implementation period, ENS anticipates continuing its flexibility to make appropriate mid-course adjustments that react to lessons learned through program implementation experience and independent evaluations, as well as circumstances such as changing market conditions, changes in technology and changes in codes and standards. Such flexibility to make appropriate mid-course adjustments is an essential tool in providing ENS with the ability to achieve its overall energy and demand savings performance requirements. As with prior DSM implementations, mid-course adjustments will continue to be reported to stakeholders and the UARB through quarterly and annual progress reports.

The Plan addresses affordability by balancing multiple short- and long-term considerations, including bill impacts, rate impacts, and long-term planning analyses. The Plan maintains a balanced portfolio of program and service offerings, enabling opportunities for participation by a broad range of Nova Scotian electricity consumers while ensuring that capacity additions to the electrical system are avoided, per NS Power's IRP and subsequent analyses.

This Plan outlines ENS's proposed programs and strategies for achieving the energy and demand savings targets. In 2016-2018, ENS's programs and services will continue to

advance a personalized, customer-centric approach, aimed at reducing the need for customers to research exactly which technologies are eligible for rebates and incentives.

Enabling Strategies will also continue to be included in ENS's portfolio in 2016-2018. As in past years, Enabling Strategies activities have the objectives of strengthening Nova Scotia's energy efficiency culture, allowing for best-practice evolution of program and service offerings, encouraging market transformation for efficient technologies, and allowing for ENS to continue to complete and advance its regulatory obligations.

Section Two of this Plan describes ENS's proposed Residential programs. Section Three describes the proposed programs for Business, Non-Profit and Institutional (BNI) customers. Enabling Strategies are discussed in Section Four.

1.1 2016-2018 DSM Resource Plan Savings and Investment

Figure 1.1.1 provides a summary of the energy savings and investment for the 2016-2018 DSM Resource Plan.

Figure 1.1 - 2016-2018 DSM Resource Plan Investment and Savings

Year	Investment ($ million)	Lifetime Benefits ($ million)[a]	Incremental Annual Net Energy Savings at Generator (GWh)	Incremental Annual Net Demand Savings at Generator (MW)	Total Resource Cost Test (TRC)[b]	Program Administrator Cost Test (PAC)[c]
2016	38.5	127.3	133.1	20.4	1.9	3.6
2017	40.3	139.8	136.5	21.0	2.0	3.8
2018	42.6	150.5	136.3	21.0	2.1	3.9
Total	**121.5**	**417.5**	**405.9**	**62.5**	**2.0**	**3.8**

Currency is expressed in 2016 dollars. Columns may not add correctly, due to rounding.
Annual avoided costs, calculated using ENSC's DSM Potential Study at the Base Level, were provided by NS Power. They include the cost of energy and capacity.
[a] Lifetime benefits are expressed as the net present value of the avoided costs, including energy and capacity, over the life of the program measures.
[b] TRC is a benefit/cost ratio comparing lifetime benefits to the sum of ENS's and participants' costs.
[c] PAC is a benefit/cost ratio comparing lifetime benefits to ENS's costs.

Figures 1.2, 1.3, and 1.4 provide the program level investment and savings for 2016, 2017, and 2018, respectively.

Figure 1.2 - 2016 DSM Resource Plan Investment and Savings

2016	Investment ($ million)	Lifetime Benefits ($ million)[a]	Incremental Annual Net Energy Savings at Generator (GWh)	Incremental Annual Net Demand Savings at Generator (MW)	Total Resource Cost Test (TRC)[b]	Program Administrator Cost Test (PAC)[c]
Residential DSM Programs						
Efficient Product Rebates	2.5	6.6	11.0	1.1	1.6	2.7
Existing Residential	12.0	50.9	41.0	7.5	1.8	4.3
Low Income Participation[d]	*2.0*		*7.8*	*1.0*		
New Residential	1.7	6.7	3.5	1.0	2.5	3.9
Business, Nonprofit and Institutional Programs						
Efficient Product Rebates	6.7	23.8	34.1	5.3	2.0	3.5
Custom Incentives	8.2	32.0	34.0	4.2	2.5	3.9
Direct Installation	4.2	7.3	9.5	1.3	1.0	1.8
Enabling Strategies						
Education and Outreach	1.6					
Development and Research	1.1					
Other Enabling Strategies	0.6					
Total	**38.5**	**127.3**	**133.1**	**20.4**	**1.9**	**3.6**

Currency is expressed in 2016 dollars. Columns may not add correctly, due to rounding.
Annual avoided costs, calculated using ENSC's DSM Potential Study at the Base Level, were provided by NS Power. They include the cost of energy and capacity.
[a] Lifetime benefits are expressed as the net present value of the avoided costs, including energy and capacity, over the life of the program measures.
[b] TRC is a benefit/cost ratio comparing lifetime benefits to the sum of ENS's and participants' costs.
[c] PAC is a benefit/cost ratio comparing lifetime benefits to ENS's costs.
[d] Reflects ENS's planned participation by low income customers, per the 2015 DSM Resource Settlement Agreement.

Figure 1.3 - 2017 DSM Resource Plan Investment and Savings

2017	Investment ($ million)	Lifetime Benefits ($ million)[a]	Incremental Annual Net Energy Savings at Generator (GWh)	Incremental Annual Net Demand Savings at Generator (MW)	Total Resource Cost Test (TRC)[b]	Program Administrator Cost Test (PAC)[c]
Residential DSM Programs						
Efficient Product Rebates	2.7	7.3	12.0	1.1	1.7	2.8
Existing Residential	13.6	58.3	44.2	8.0	1.9	4.3
Low Income Participation[d]	*2.3*		*8.2*	*1.1*		
New Residential	1.8	7.2	3.6	1.0	2.6	4.1
Business, Nonprofit and Institutional Programs						
Efficient Product Rebates	6.5	25.4	33.6	5.4	2.2	3.9
Custom Incentives	8.2	33.9	34.1	4.3	2.7	4.1
Direct Installation	4.0	7.5	9.0	1.2	1.1	1.9
Enabling Strategies						
Education and Outreach	1.7					
Development and Research	1.2					
Other Enabling Strategies	0.7					
Total	**40.3**	**139.8**	**136.5**	**21.0**	**2.0**	**3.8**

Currency is expressed in 2016 dollars. Columns may not add correctly, due to rounding.
Annual avoided costs, calculated using ENSC's DSM Potential Study at the Base Level, were provided by NS Power. They include the cost of energy and capacity.

[a] Lifetime benefits are expressed as the net present value of the avoided costs, including energy and capacity, over the life of the program measures.

[b] TRC is a benefit/cost ratio comparing lifetime benefits to the sum of ENS's and participants' costs.

[c] PAC is a benefit/cost ratio comparing lifetime benefits to ENS's costs.

[d] Reflects ENS's planned participation by low income customers, per the 2015 DSM Resource Settlement Agreement.

Figure 1.4 - 2018 DSM Resource Plan Savings and Investment

2018	Investment ($ million)	Lifetime Benefits ($ million)[a]	Incremental Annual Net Energy Savings at Generator (GWh)	Incremental Annual Net Demand Savings at Generator (MW)	Total Resource Cost Test (TRC)[b]	Program Administrator Cost Test (PAC)[c]
Residential DSM Programs						
Efficient Product Rebates	2.7	7.9	12.2	1.1	1.8	2.9
Existing Residential	14.8	61.8	43.6	8.0	1.9	4.2
Low Income Participation[d]	*2.6*		*7.7*	*1.0*		
New Residential	1.8	7.8	3.7	1.1	2.8	4.3
Business, Nonprofit and Institutional Programs						
Efficient Product Rebates	7.0	28.9	33.6	5.3	2.2	4.1
Custom Incentives	8.3	36.4	34.4	4.3	2.9	4.4
Direct Installation	3.9	7.7	8.6	1.2	1.1	2.0
Enabling Strategies						
Education and Outreach	1.8					
Development and Research	1.3					
Other Enabling Strategies	0.9					
Total	**42.6**	**150.5**	**136.3**	**21.0**	**2.1**	**3.9**

Currency is expressed in 2016 dollars. Columns may not add correctly, due to rounding.
Annual avoided costs, calculated using ENSC's DSM Potential Study at the Base Level, were provided by NS Power. They include the cost of energy and capacity.
[a] Lifetime benefits are expressed as the net present value of the avoided costs, including energy and capacity, over the life of the program measures.
[b] TRC is a benefit/cost ratio comparing lifetime benefits to the sum of ENS's and participants' costs.
[c] PAC is a benefit/cost ratio comparing lifetime benefits to ENS's costs.
[d] Reflects ENS's planned participation by low income customers, per the 2015 DSM Resource Settlement Agreement.

1.2 Programs and Services Overview

The 2016-2018 Residential and Business, Non-profit and Institutional (BNI) programs are expected to include ongoing gradual evolution in order to address the following objectives:

- Respond to changes in the market, such as updated codes and standards;
- Incorporate the findings of ongoing research, such as assessments of technology penetration;

- Maintain access to programs and services across residential, commercial and industrial ratepayers;
- Provide the stability required to ensure availability of industry capacity to achieve future targets; and
- Continue to sustain a reasonable balance of investments between the Residential and BNI sectors.

ENS will focus on program and service changes aimed to further improve the customer's experience and simplify participation. These changes will also allow more industry partners to supply services and products through programs, and encourage participants to achieve more energy savings with each transaction. ENS is referring to this evolution as Programs 2.0. It will include alterations to marketing and delivery that provide access to all services through a one-window approach; enhanced information technology for tracking of participant information; and more flexible support options that allow tailoring of incentives and technical support to match the requirements of each participant. These modifications are being researched, designed and piloted in Q1 through Q3 of 2015, with rollout expected in Q4 and full implementation expected in 2016. The intent is to enhance the customer experience while streamlining access to programs and services, without altering the inherent structure and operation of ENS programs and services. ENS will continue to report on its results under the programs proposed in this Application throughout 2016-2018.

2. RESIDENTIAL PROGRAMS AND SERVICES

Efficiency Nova Scotia's Residential sector offerings include a variety of initiatives to help homeowners, renters and landlords become more efficient in their use of electricity. Educating potential participants about the benefits of energy efficiency is an important component of these initiatives to help encourage them to take action. Incentives vary from the installation of low-cost energy efficiency products at no charge, to incenting the removal of old inefficient appliances, to offering incentives to upgrade or replace inefficient products. For customers, interactions with ENS will range from instant rebates for purchasing an efficient product at a participating retail location to an in-depth test and assessment of the energy use of the home.

Through its Residential service offerings, ENS educates participants on the benefits of taking part in more than one energy efficiency service. The intent is to help participants save electricity by encouraging multiple actions to help them maximize their energy savings. For reporting purposes, the services offered to Nova Scotians are categorized into the following programs:

- Efficient Product Rebates
- Existing Residential
- New Residential

Efficiency Nova Scotia will continue to enhance its Residential services over the three-year agreement, in response to new product availability, market shifts, client needs, and program evaluations.

2.1 Efficient Product Rebates (Residential)

Nova Scotians benefit from energy savings by using products that are energy efficient. In many cases, this involves making a decision to purchase an energy efficient product,

often at a higher upfront cost, rather than a less-expensive and less-efficient product. ENS will continue to work with retailers and distributors to provide a service that educates consumers and helps to offset the higher price of the more efficient product.

Incentives for energy-efficient products are available to all Nova Scotians. Financial incentives are offered for selected products that meet or exceed the ENERGY STAR® level of performance. For some energy efficient products for which ENERGY STAR® certification is not currently available, rebates will continue to be offered to help participants reduce electricity use. Eligible measures include a variety of lighting products, appliances and electronics.

ENS will continue to offer a financial incentive, no-charge pick-up and recycling of inefficient, but functioning, large appliances such as refrigerators, freezers and room air conditioners. This service permanently removes old, inefficient appliances from use in Nova Scotia, eliminating them as a load on the system. While ENS has already removed many of these appliances from homes, more recently, a growing number of landlords are taking part. ENS is also exploring options for offering incentives for energy-efficient appliances to participants with multiple inefficient ones.

2.2 Existing Residential

The Existing Residential program is designed to help reduce electricity consumption for space and water heating and lighting. The goal is to promote cost-effective energy efficiency improvements to Nova Scotia's housing stock of single detached houses, duplexes, rental housing, mobile/mini homes and multi-family buildings. Most Existing Residential services are offered to participants via service organizations, contracted to deliver the services following a competitive Request for Proposals process.

A broad range of incentives are available for Nova Scotians, including rebates or financing for electrically heated buildings to improve the efficiency of the structure. These particular types of upgrades are especially valuable within older buildings as they

provide energy savings as well as non-energy benefits, such as increased comfort in the residence and a potential increase in resale value. In addition, rebates or financing are offered for installing efficient heating systems, which can lead to reductions in electricity use for both space and water heating systems. Additional services include the installation of efficient lighting and other low-cost products at no cost to participants.

Services are offered province-wide and modifications can be made over time to include new products and additional offerings. Recent examples include offering a personal energy planner to participants in the Home Energy Assessment service, working with a municipality to pilot financing on property tax bills for energy efficiency improvements to the home, and providing a searchable list of trade partners on the ENS website to help Nova Scotians seek out contractors to conduct various upgrades. ENS will continue to conduct promotional activities with contractors across the province to raise awareness and provide details on how they can be added to the list.

2.2.1. Low-Income Initiatives

Beginning in 2015, NS Power shareholders are committing up to $37 million dollars over 10 years to support the HomeWarming program. The program, in partnership with the Clean Foundation, will offer free energy efficiency improvements to nearly 6,600 low-income homeowners who heat with electricity. Intake will be completed by ENS.

ENS will continue to explore and support opportunities for electricity efficiency upgrades for low-income Nova Scotians through its direct installation service. In addition, in 2015, Efficiency Nova Scotia is working with Housing Nova Scotia to develop a building-envelope initiative for multi-unit residential buildings under their authority. This initiative is expected to continue into the 2016-2018 time period.

In 2015, ENS will be conducting research on low-income rental accommodations with electric heating, per ENSC's 2015 DSM Resource Plan Settlement Agreement, approved

by the UARB on September 8, 2014. Additional opportunities for low-income services will be assessed and developed, where appropriate, following this research.

2.3 New Residential

To encourage energy efficient design and use of energy efficient products in new residential construction, Efficiency Nova Scotia's New Residential services are offered to builders and owners of new houses, including row housing and semi-detached houses, in Nova Scotia. It is expected that incentives will continue to focus on having homes meet or exceed the ENERGY STAR® certification. The Federal government, in consultation with building professionals, developed the ENERGY STAR® for New Homes standard. On average, homes achieving the ENERGY STAR® certification use 20 percent less energy than a home built to the Nova Scotia Building Code.

As part of the current service, energy assessments and design advice are provided to builders before construction. Data on the planned building envelope, equipment and minimum Building Code standards are used to determine the expected energy consumption of the home. A Certified Energy Advisor then recommends options that will improve the energy efficiency of the home design, allowing for informed decisions. After the home is constructed, a final inspection and rating is provided.

The Nova Scotia Building Code requires all new houses to either comply with specific prescriptive requirements or perform better than the modeled energy use of a reference home that meets those prescriptive requirements. Based on an Efficiency Nova Scotia study, a new home meeting prescriptive requirements achieves an EnerGuide score of 78. The EnerGuide rating system is maintained by Natural Resources Canada and uses software to estimate the energy use of a home. The ENS service requires the house to achieve an ENERGY STAR® certification or an EnerGuide score of 85 (or higher) to obtain incentives. If the minimum Building Code requirement for new homes is updated, Efficiency Nova Scotia will adapt its offering as appropriate to continually encourage further energy efficiency improvements in new homes.

2.4 Update on Energy Saving Actions

Efficiency Nova Scotia's 2016-2018 DSM Resource Plan does not include a target or investment for Energy Saving Actions. ENS piloted the Home Energy Report in 2013, and it will continue until early 2016. ENS is not proposing to continue the pilot due to near-term affordability considerations, which have resulted in a lower DSM Plan level than was approved for 2013 and 2014. Given the need to reduce and/or eliminate programs to address these considerations, the Home Energy Report was determined to have the least negative impact on ENS's ability to deliver a balanced portfolio and on industry capacity, despite its success in terms of achievement of energy savings. If future DSM Resource Plans require a higher level of energy savings and corresponding investment, ENS expects to reconsider whether or not it would be offered.

Behaviour-based energy efficiency activities are important components to a balanced portfolio of options for customers. While ENS is not able to offer the Home Energy Report due to short-term affordability considerations, ENS will continue exploring ways in which it can offer incentives or services for customers in this area. As specific plans have not been developed, ENS will conduct research and development through its Enabling Strategies during 2016-2018. If research and/or pilots result in offerings that achieve energy savings, ENS will categorize these services within its existing program offerings, with the specific program depending on the service offered.

3. BUSINESS, NON-PROFIT AND INSTITUTIONAL (BNI) PROGRAMS AND SERVICES

Efficiency Nova Scotia's Business, Non-Profit and Institutional (BNI) programs are designed to provide customers with easy access to energy efficiency solutions. The programs and services combine technical and financial support to improve the demand for, and affordability of, energy efficient technologies and practices. Aspects of these programs and services also encourage incorporation of energy efficiency into customers' business practices and long-term plans. The BNI initiatives are packaged, wherever possible, to provide a full suite of solutions for a range of businesses, industries and institutions to facilitate a 'one-window' service-based approach.

In the lead-up to 2016, ENS will continue to adopt and modify the BNI programs to better meet changing market demands. The focus will shift by adopting a more customer-centric approach when delivering services, providing BNI customers with a simplified, one-window approach to maximizing energy savings. These efforts are intended to enhance access to ENS services, maintain high levels of customer satisfaction and maximize energy savings per customer. ENS will also continue to leverage the support of qualified industry professionals to deliver BNI initiatives.

While ENS continues to adapt programs and services to improve the customer experience, reporting will continue to be based on the following three services:

- Efficient Product Rebates
- Custom Incentives
- Direct Installation

3.1 Efficient Product Rebates (BNI)

The BNI Efficient Product Rebates program provides financial incentives, through prescriptive rebates, on a wide variety of products to encourage BNI end-users to reduce

electrical energy consumption and peak demand. Customers are able to select from a predefined list of energy efficient measures that correspond to a per-unit rebate. The program is designed to provide end users with a streamlined application process and quick turnaround times. Rebates are delivered through mail-in applications or discounts at the point of purchase through a province-wide network of distribution partners.

As in 2015, supported measures include lighting; heating, ventilation and air conditioning (HVAC); adjustable speed drives for motors; refrigeration; compressed air; food service and hospitality equipment; agricultural and food processing equipment; and IT technologies. Supported measures will continue to change as the market transforms and more efficient technologies are available. For example, in 2016, ENS expects to begin offering rebates for pumping technologies employing electronically commutated motors.

The objectives of this program are to:

- Raise customer awareness of energy efficient products;
- Encourage the use of energy efficient products in the design of new facilities and retrofits;
- Increase the market penetration of supported technologies; and
- Transform the market by raising the efficiency of standard practices.

Commercial, industrial, not-for-profit and institutional customers are eligible to participate in the program.

In 2016-2018, the Efficient Product Rebates (BNI) program will continue to leverage the support of qualified trade partners, expand on rebate offerings as the market transforms, and continue to work on ways to streamline the program.

3.2 Custom Incentives

The Custom Incentives program provides financial incentives to help commercial, industrial, not-for-profit and institutional customers reduce their electrical energy

consumption and peak demand. Incentives are provided to help eligible participants complete energy audits and implement technical changes within their existing or new facilities.

The program is designed to accommodate a wide range of customer requirements. Delivery of the program is structured so customers may participate by incorporating energy-efficient options or designs at any phase of their project, regardless of their current level of energy management expertise. Project energy and peak demand savings are assessed on a case-by-case basis. The program supports engineering studies and installation of energy efficient measures for which operation and characteristics are not conducive to a prescriptive rebate structure. Eligible measures within the Custom Incentives program must save electrical energy and vary based on custom applications. Measures may include energy efficiency upgrades to existing or new compressed air, refrigeration, heating, cooling, and ventilation systems as well as other technologies not offered through other ENS programs. ENS also intends to offer feasibility study support, incentives and financing for cogeneration projects that are not participating in the Province's Community Access Feed-In Tariff (COMFIT) program. Supported measures are categorized in the following ways:

- New or replacement-on-burnout: intended for equipment replacement, new construction and renovation and expansion, by which the program can result in higher efficiency choices than would otherwise have been purchased;
- Discretionary retrofit: efficient components intended to replace existing equipment before the end of its useful life as a cost-effective retrofit.

Technical and financial services supporting the above measures are intended to achieve the following:

- Provide rebates for initial scoping studies and incentives or technical assistance towards detailed engineering assessments for specific retrofit projects at new or existing facilities;

- Provide project financing through low- or no-interest repayable loans, or, where available, other financing options to support the program;
- Direct program participants to qualified third-party sources of technical expertise;
- Promote the implementation of complex and innovative energy efficient technology and designs in BNI facilities;
- Provide incentives for the use of best practices in commissioning existing building systems; and
- Influence electrical energy conservation projects within Nova Scotia.

The implementation of energy efficiency measures is conducted by third parties or qualified participant staff, as selected by the participant. The recruitment of participants depends largely upon direct contact, referrals and networking among industry professionals.

While all BNI customers will remain eligible to participate in the Custom Incentives program, ENS will continue refinement of services for targeted retrofit and new construction market segments. This is in alignment with ENS's customer-focused approach, where custom and prescriptive services can provide a unique solution for the needs of specific types of participants. Targeted markets could include retail services, schools, universities, small-large commercial buildings and industrial facilities.

The New Construction component of the Custom Incentives program is expected to continue providing participants with financial and technical support to design and build efficient facilities. ENS will explore the promotion of a cost-effective structured commissioning process for new buildings. A structured commissioning process would offer technical support and guidance for participants who are interested in commissioning their new building to ensure it operates as designed. Financing will be made available as an incentive option for these participants. Additional implementation incentives through the Custom Incentives and Efficient Products Rebates programs will be available for measures that qualify but that are not supported by the New Construction Program.

The Custom Incentives program will continue to provide offerings tailored for market segments and targeted end uses such as the following:

- Retro-commissioning;
- Compressed air system optimization;
- Support for Energy Management Information Systems (EMIS), which are performance management tools that allow organizations to monitor and analyze their energy usage;
- Strategic Energy Management (SEM), which provides organizations with a comprehensive approach to energy management through continuous business process and energy performance improvements, along with organizational culture change;
- Onsite Energy Manager (OEM) service, which places a trained technical energy manager at a customer's workplace in order to have a dedicated person for the development of energy management plans and to facilitate participation in ENS programs; and
- Employee engagement.

ENS also expects to continue developing services for new market segments, recruiting additional trade partners and building expertise through program staff training as required.

3.3 Direct Installation

The Direct Installation program is designed to assist small to medium-sized businesses reduce their energy consumption with turnkey solutions identified through a no-charge assessment.

Direct Installation is delivered through contracted Delivery Agents that manage product procurement, product installation, and disposal and recycling of removed products. The

total project cost is shared with the customer, with the option for approved customers to finance their portion for up to 24 months of interest-free payments on their power bills.

Typical customers of the program are small offices, retail shops, convenience and grocery stores, service stations, restaurants, lodgings, non-profit and community organizations, churches, cafeterias, pharmacies, bakeries and farms. Because the program targets smaller customers, many of which are independent operations with small staff complements, much of the value of the service is provided through the initial assessment and direct installation. Owners and managers do not need to devote time to, or develop expertise in, understanding their facilities' energy uses and options for the installation of more efficient technology, making this support a key offering for this program.

In 2016-2018, supported measures are expected to include lighting and occupancy controls; electric hot water tank and pipe insulation; various water saving devices; heat pumps and hot water heat pumps; outdoor air economizers; and electronically commutated motors. Additional measures may be offered based on research and changing market conditions over the time period.

In 2016-2018, ENS will continue its evolution of the Direct Installation program to meet changing market demands. Delivery of the program is expected to shift away from a smaller set of contracted Delivery Agents to a broader group of eligible contractors who will provide the turnkey solutions to eligible customers. Such changes will provide access to more products to meet a variety of needs and support the ongoing development of industry capacity.

4. ENABLING STRATEGIES

Enabling Strategies are essential to ensure that ENS is able to increase awareness about energy efficiency, evolve services, and provide information and tools needed by Nova Scotians to make informed energy choices. This, in turn, drives program participation and fosters market transformation. Enabling Strategies include the following categories:

- Education and Outreach;
- Development and Research; and
- Other Enabling Strategies:
  - Property-Assessed Clean Energy (PACE) Financing Support;
  - Working with Governments;
  - Capacity Building; and
  - Regulatory Affairs.

Enabling Strategies have three key objectives:

1. To increase awareness and education of DSM programs and services, which is key to driving participation in energy efficiency activities;
2. To evolve DSM services through innovation and improve delivery of these services to Nova Scotians; and
3. To drive market transformation.

It is through Enabling Strategies that ENS is able to conduct activities that help to increase its overall efficiencies. As stated in the 2015 DSM Resource Plan, examples of cost efficiencies identified through research for the purposes of evolving DSM services include market research for optimal incentives for the Appliance Retirement service and the attribution of energy savings for participants in the Home Energy Assessments service who did not receive rebates. Other efficiencies are also created through Enabling Strategies activities. For example, through the LED Holiday Light Exchange, ENS achieves a small amount of energy savings from an outreach-based activity.

It is through Enabling Strategies that ENS will continue to develop innovative and cost-efficient ways in which to deliver on its DSM targets. Examples outlined below include a continued commitment to financing as a complement to tradition incentives; ongoing work to support codes and standards development; and initiating market transformation activities related to building construction, called Passive House. These initiatives are planned within an average investment that was evaluated at, or lower than, that of comparison jurisdictions in 2013[1], and has been reduced further for the 2016 to 2018 period in consideration of short-term affordability concerns. ENS remains committed, however, to the important results achieved through its Enabling Strategies activities and is of the position that, while it understands the need for short-term affordability considerations, increasing Enabling Strategies levels would help the organization achieve higher DSM results in the longer term.

4.1 Education and Outreach

The complexity of the electricity system means that many concepts and terms are not familiar or accessible to most Nova Scotians. The concept of energy efficiency is equally challenging to communicate effectively. Nova Scotians are more likely to embrace and adopt energy-efficient behaviours if they understand the value of energy efficiency to their own interests, to those of their communities and to the broader economy. As such, reaching out to Nova Scotians through Education and Outreach is a critical component of DSM efforts. Understanding the benefits of something intangible like energy efficiency is complex and takes time. This, along with the continual emergence of new technologies, changes in service delivery to improve programs and increase accessibility, and the cementing of energy efficiency as a part of Nova Scotia's electricity supply per the *Electricity Efficiency and Conservation Restructuring (2014) Act*, make education and

[1] Econoler, "Enabling Strategies Evaluation Final Report", February 21, 2014, pages 5 and 6

outreach activities as relevant and important now as they were when DSM was first introduced in Nova Scotia in 2008. The advancements made in public awareness of ENS (unaided awareness was at 35 percent in 2014) demonstrate that Enabling Strategies activities are having an impact on ENS's results. However, these same results also demonstrate that opportunities remain to reach additional Nova Scotians.

The objectives of Education and Outreach activities are to effectively communicate what energy efficiency is and the individual and collective benefits it provides, with an objective of achieving increased levels of participation in DSM programs. For example, as shown in ENS's rate and bill impact analysis, all NS Power customers benefit over the long-term from DSM programs, and participants benefit to a greater extent. However, the rate and bill impact model is a technical analysis that does not lend itself to quick understanding: "selling" intangible benefits is not easy, but it is required in order to maintain and increase uptake in programs.

Education and Outreach strategies for 2016 through 2018 will build on existing outreach efforts, services, research, and the continual feedback collected from Nova Scotians. This feedback includes customer and other input collected through surveys and at presentations, speeches, trade shows, online dialogue and experience gained through past DSM initiatives.

Areas of focus will include:

- Educating customers about energy efficiency through efforts to make it tangible;
- Educating customers on the value and collective and individual benefits provided by energy efficiency;
- Educating and engaging students and the education industry on energy and the role of efficiency;
- Educating customers on ways to conserve energy, reduce peak demand, achieve cost-effective energy savings and lower their electric utility bills;

- Increasing public awareness of the value of participating in DSM programs;
- Enabling and encouraging the adoption of energy efficiency as a social norm through a focus on both individual and community-based commitments to energy efficiency;
- Connecting customers to relevant DSM programs and services; and
- Learning from our customers – ensuring their experiences and advice are incorporated to improve programs and services.

The following components support this strategy:

- Engaging Nova Scotians on the ENS website with information, tools and calculators;
- Engaging Nova Scotians through social media (Facebook, Twitter, YouTube, LinkedIn) to drive awareness of energy efficiency;
- Electronic newsletters emailed to past participants;
- Advertising to increase awareness and understanding of programs and services offered by ENS;
- Continuing to build the Green Schools program, to supplement learning and educate teachers and students about energy efficiency to help build an energy-efficient culture in Nova Scotia;
- Making inroads into the education system with a goal of building energy efficiency into the P-12 curriculum;
- Working with post-secondary education institutions to build awareness of the opportunities and alignment of energy efficiency across all disciplines;
- Public speaking and presentations on energy efficiency;
- Stories in the media on energy efficiency; and
- Additional activities as opportunities arise.

Efficiency Nova Scotia staff will work with delivery agents, industry partners and educational institutions to develop, manage and deliver education and outreach programs.

4.2 Development and Research

Efficiency Nova Scotia uses evidence-based decision-making to improve program design and delivery and to guide business strategy. This approach ensures ENS is making the best possible decisions for evolving business requirements and reduces the risk and cost of making incorrect assumptions. ENS will invest in two areas of Development and Research:

1. Research and development initiatives to support the evolution of DSM Resource Plans and DSM programs;
2. Development activities that improve delivery of services and information to Nova Scotians.

4.2.1 Primary and Secondary Research

Innovation is critical to ensure ENS programs reflect current technologies and consumer behaviour patterns. As such, an important focus of research will be to explore new opportunities for DSM programs and services. The knowledge and experience gained through development and research activities are intended to increase the effectiveness of all DSM programs and develop new DSM opportunities for future years. ENS will use primary and secondary research, and partner with other DSM experts, to obtain evidence-based insights into business opportunities and risks. Specific research initiatives will include:

- Research and development work related to the development of the 2019-2021 DSM Resource Plan;
- Examining motivations and barriers to participation;
- Examining trends and preferences in energy consumption behaviour;

- Researching opportunities from other jurisdictions;
- Researching new measures, of which demand-response and/or demand-control measures are expected to be included;
- Piloting new programs and changes to existing programs, of which results from ENS's expected research into demand-response and/or demand-control options may be included, with savings expected to be tracked under Existing Residential or New Residential programs as applicable; and
- Testing alternative marketing approaches.

4.2.2 Development of DSM Information Management and Program Execution Systems

Changes to enhance the customer experience through Programs 2.0 will require an information management system that can easily track and provide insight into all relevant customer interactions. This system will:

- Provide a better service experience for Nova Scotians (interactions with ENS will be improved through enhanced tracking of customers' historical interactions);
- Ensure ENS is communicating the right message at the right time to customers (better customer life-cycle messaging and marketing); and
- Streamline information management and reporting (easier access to information).

The system is expected to create efficiencies for program delivery, research, and marketing purposes. Efficiencies are expected to be in the form of reduced time spent on data processing and reporting, a reduction in external consultants required to develop reporting capabilities, and improved program uptake by using database marketing techniques. The changes will also enhance ENS's tracking of customer data for the purposes of its rate and bill impact analysis, per Synapse's recommendations through the 2013-2015 DSM Plan process. Due to the enhanced tracking, which is expected to automatically remove duplication of customers across programs, the new system is expected to result in efficiencies to the manual process ENS must complete for the filing

of its analysis. ENS will continue to invest in these systems throughout 2016-2018, building on improvements completed in previous years.

4.3 Other Enabling Strategies

4.3.1 Property-Assessed Clean Energy (PACE) Financing

ENS recognizes a lack of upfront capital can be a barrier to customers adopting energy efficiency measures. For this reason, financing DSM activities is a complementary incentive structure to standard rebates. While uptake in existing financing initiatives has been historically low (the median participation rate in financing programs across North America was calculated at less than 0.5% in 2011)[2], ENS is continuing to support financing initiatives within its Residential and BNI programs.

To further these initiatives, ENS will provide support and a suite of tools for municipalities to use in developing and administering Property-Assessed Clean Energy (PACE) financing programs. Such programs allow participants to pay for energy efficient upgrades through an add-on to their property taxes. In 2016-2018, ENS will continue its work in supporting municipalities to launch and administer PACE programs. As the service is administered by the municipalities, the support provided by ENS is an Enabling Strategy, rather than a program or service provided by ENS. Individual participants in the municipalities' PACE programs would be eligible to enroll in ENS programs, under which related energy savings would be recognized.

[2] American Council for an Energy Efficiency Economy, 2011. *What have we learned from energy efficiency financing programs?*

4.3.2 Working with Governments

In 2016-2018, ENS will continue to work to advance discussion, development and implementation of energy efficiency related codes and standards. This will include discussions with provincial and federal stakeholders and will provide relevant market information to governments for decision-making purposes. In addition, ENS will participate in the technical development of energy efficiency related product standards through work with organizations such as the Canadian Standards Association.

4.3.3 Capacity Building

ENS will continue to foster industry capacity-building, focusing efforts in several areas, including enhancing existing training and quality assurance for ENS partners and contractors and providing marketing support for delivery partners and contractors.

ENS will continue promoting new home building standards and will explore opportunities to advance the introduction of the Passive House concept in Nova Scotia. The Passive House concept originated in Germany and has evolved for more than 15 years, becoming widely adopted in Europe as the top standard in energy-efficient buildings. The standard applies to all buildings, whether residential, commercial or institutional and incorporates energy efficiency engineering concepts of design, components, and construction to create buildings that function as comfortable, highly efficient units requiring minimal heating and cooling systems. For example, using Passive House design, heating an average-sized, single-family home would cost less than $500 per year.

To advance the Passive House concept in Nova Scotia, ENS intends to work with designers, architects, engineers, builders, component manufacturers, community colleges, universities, government, and stakeholders to educate and begin developing the capacity to incorporate the concept in newly constructed and retrofitted buildings.

4.3.4 Regulatory Affairs

As approved in the 2015 DSM Resource Plan, Regulatory Affairs initiatives outside of specific research conducted for DSM Resource Plans or Potential Studies are categorized as Enabling Strategies. As with other Enabling Strategies, regulatory activities lay the groundwork for future energy savings: without approvals for ongoing activities and changes to existing ones, future savings would not be possible. These activities include UARB costs, DSM Advisory Group and stakeholder consultation work, as well as legal work relating to regulatory initiatives.

Appendix B

Supply Agreement Outstanding Items

The following items remain outstanding in the 2016-2018 Supply Agreement with NS Power:

Schedule A: Electricity Efficiency and Conservation Activities

1. Quantity of Electricity Efficiency and Conservation Activities (DSM)

The 2016-2018 DSM Resource Plan proposes to supply NS Power with energy savings of 405.9 GWh and peak demand savings of 62.4 MW at an investment of $121.4 million. Support for this level of DSM is included in the Evidence, and details as to the planned activities that will enable ENS to provide the supply are included in Appendix A: 2016-2018 DSM Resource Plan.

The 2016-2018 DSM Resource Plan is an evidence-based approach that enables Nova Scotians to achieve cost-effective energy and demand savings. The plan was developed with emphasis on minimizing short-term rate effects, while balancing considerations of long-term resource savings objectives (per the 2014 IRP), industry capacity, and maintaining a broad portfolio of programs and services for diverse groups of Nova Scotians.

2. Contracted Deliverables

ENS is proposing a three-year contracted deliverable of cumulative energy and peak demand savings. A three-year deliverable is consistent with previous multi-year DSM Plans, other jurisdictions and the *Public Utilities Act*.

Multi-Year Plans

A Dunsky report, *Regulatory Oversight – A Balanced Approach for Efficiency Nova Scotia,* January 24, 2012, included in ENSC's 2013-2015 DSM Plan Application as Appendix B, points out that ENS operates in an extremely complex market environment, in which it competes with myriad non-energy opportunities for scarce participant time, attention and money. Furthermore, ENS's "product", energy efficiency, is discretionary:

except in extreme situations, the purchase of energy efficiency improvements (unlike the purchase of electricity, for example) is not necessary to live, to run a business or to operate a government. The Dunsky report identifies that the DSM administrator must be able to quickly and easily adjust to ongoing market dynamics. It must be in a position to capitalize on external opportunities as they arise; adjust its portfolio and strategies as markets respond (or fail to respond); and sufficiently customize its offerings to ensure it is meeting the differing needs of participants.

The 2016-2018 DSM Resource Plan is designed to ensure that programs and services are accessible to the broadest possible base of residential, commercial and industrial ratepayers through a balanced portfolio of program and service offerings. Multi-year plans with cumulative targets reflect the reality that ENS must be responsive to market conditions and adjust plans as necessary to continue to offer a balanced portfolio.

Other Jurisdictions

ENS retained Dunsky Energy Consulting to provide advice on a set of performance requirements that ENS should propose for the UARB's consideration in this Application. The Dunsky report, *DSM Performance Indicators,* is attached as Appendix G. Dunsky performed a jurisdictional scan across North America (mostly in the U.S.) and recommends ENS propose the UARB-approved Performance Targets include the cumulative annual energy and peak demand savings (the three-year total) at the portfolio level.

Public Utilities Act

Under Section 79I of the *Public Utilities Act*, NS Power is required to purchase reasonably available, cost-effective energy efficiency and conservation activities. NS Power is obligated to meet this requirement by entering into an agreement with the franchise holder. Furthermore, Section 79J of the *Public Utilities Act* makes it clear that the agreement *must* be for a term of *three years*.

For these reasons, ENS believes it is appropriate for the contracted deliverable of its supply to NS Power be the three-year cumulative annual energy and peak demand savings.

Schedule B: Compensation

3. Contract Price

In the Supply Agreement, Section 4.2 states the Contract Price shall constitute full compensation for the Electricity Efficiency and Conservation Activities, and no additional compensation shall be payable to, arising out of, or resulting from any productivity losses, overhead or indirect costs. With respect to total spending, ENS recognizes that it has no recourse to seek additional revenue in the event of over-expenditure or other costs and expenses of any kind whatsoever and accepts this as an inherent business risk that ENS must manage. This implies that the contract is not subject to price adjustments as the full risk of controlling costs is assumed by the franchise holder.

As noted previously, ENS requires flexibility to adjust its portfolio and strategies as markets respond, and is therefore proposing three-year cumulative annual energy and peak demand savings as contracted deliverables. As such, it is critical that the Contract Price aligns with the principle of a three-year period.

ENS will not know if it requires the full Contract Price until the end of the three-year term. Surplus funds (if any) returned to NS Power must only take place after the end of the contract. Included in Evidence is a proposal that up to 50 percent of any DSM-related surplus balance at the end of the three-year term could be contributed to a reserve fund, with the remaining 50 percent being returned to NS Power for the benefit of ratepayers. Any surplus beyond that required to reach the cap of the reserve fund would also be returned to NS Power for the benefit of ratepayers.

Appendix C

Update on Implementation of 2013 Verification and Evaluation Recommendations

	B	C	E	F	G	K
1			As Shared with DSM Advisory Group November 2015			Updated February 2015
2	**Recommendation Text**	**Source**	**Status**	**ENSC Comments on Recommendation**	**Expected Period of Completion**	
3	The Savings Verification study recommends acceptance of the 2013 evaluation results for energy savings and for demand-reduction.	**Savings Verification Recommendation No. 1**	**Complete**	ENSC agrees with this recommendation.	**N/A**	Complete
4	Efficiency Nova Scotia should take steps to carefully establish a Nova Scotia TRM. This would facilitate both program planning and evaluation.	**Savings Verification Recommendation No. 2**	**In Progress**	ENSC agrees with this recommendation. ENSC has completed a draft TRM, and is working in the fourth quarter of 2014 to operationalize the TRM into business practices.	**Q4**	The TRM will be completed in 2015, following the incorporation of the 2014 evaluation results.
5	For each evaluation that involves many cases and a range of conditions, an *active* Excel spreadsheet corresponding to the equation(s) operative in the evaluation should be embedded into the report or otherwise be made available, for example in the cloud through an icon. Each spreadsheet can be represented by a small icon that may be opened in an electronic copy of the report. For some programs, the spreadsheet should include all cases included in the evaluation to facilitate transparency and independent review; for others four or five example cases illustrating the range of conditions may be appropriate.	**Savings Verification Recommendation No. 3**	**Not recommended for action**	ENSC appreciates this recommendation. However, providing complete tracking sheets with all equations used to calculate gross and net savings would bring significant operational challenges, including the time and resources required to complete the recommendation within schedule constraints. Because the equations behind the revised gross and net savings tables presented in the report are the same for each program, a spreadsheet with an example of the calculations will be included as an Appendix in the Overall Executive Summary.	**Not recommended for action**	Not recommended for action
6	The free rider, spill over and net-to-gross tables should each be accompanied by a few example calculations in the text of the report. The equation should be presented, then each line in the step by step algebraic solution should be provided, then values should be inserted for each example, then the result for each case demonstrated. These examples should demonstrate the range of effects (maximum effect, minimum effect, effects for most frequent cases), similar to a classroom demonstration.	**Savings Verification Recommendation No. 4**	**In Progress**	ENSC agrees with this recommendation in principle. Since the free-ridership and spillover methodologies are quite similar for all programs, except for Appliance Retirement, The evaluator will provide examples for a few programs only. This will be presented in the Overall Executive Summary.	**Q4**	Complete
7	In each program analysis, the evaluator should discuss the possibility of bias and any steps taken to control bias in the data and analysis and to insure that correct indicator variable(s) are being measured through an identified procedure (for example, electrical measurement using current transformers) along with an operational description of the procedure.	**Savings Verification Recommendation No. 5**	**In Progress**	ENSC agrees with this recommendation. The evaluator already considers bias in its analyses and ensures that any biases are within acceptable ranges. The evaluator will continue to do so for the next evaluation and will provide some justifications in the evaluation reports when necessary.	**Q4**	Complete
8	**Improve the definition of "Sampling Error."** Currently, the definition is given as "the amount of inaccuracy in estimating some value that is caused by examining only a portion of a population (i.e. a sample) rather than the whole population." This definition is technically correct in that it could encompass both probability and non-probability errors. However, it would be useful if the evaluator would refine this definition and then expand the table of definitions to also provide definitions for accuracy, precision and bias and then provide text to contrast these three concepts for the reader. The evaluators should define accuracy, precision and bias. The evaluator should clarify for the reader the difference between random error and non-probability errors (including so-called Type III errors and bias). The evaluator should clarify that the type of sampling error controlled in the evaluations through the introduction of measures of statistical confidence and precision is limited to random sampling error.	**Savings Verification Recommendation No. 6**	**In Progress**	ENSC agrees with this recommendation. In the next evaluation reports, the evaluator will integrate definitions and discussions on these types of potential errors.	**Q4**	Complete
9	Throughout the Executive Summary and the individual program evaluation reports there is a tendency to use an acronym for a program rather than the program name. Particularly in tables, in the text of the study and in the appendices, it is helpful to the reader to see the full name of a program rather than an acronym ("Appliance Retirement Program rather than "ARet"). The evaluator should, in the future, refer to the programs by their names rather than by use of acronyms.	**Savings Verification Recommendation No. 7**	**In Progress**	ENSC agrees with this recommendation, in part. This approach will be taken for the 2014 Overall Executive Summary, but acronyms will still be used in individual evaluation reports.	**Q4**	Complete
10	**Increase site visits to thirty.** The evaluator used a very small sample of on-site visits (n=3) for this program and the evaluator recommends that some on-sites are necessary for this program, but that a statistical sample is not necessary because this requirement is covered by the design of the participant telephone survey (n=201). This is a reasonable argument. However, we recommend increasing the number of on- sites to strengthen the ability to pick up on any patterned variations that are discoverable in-person outside the limitation of the survey format (for example, the on-site sample size could be adjusted to n=30).	**Appliance Retirement SV-1**	**Not recommended for action**	ENSC does not agree with this recommendation. It is understood that there is the ability to pick up on patterned variations through in-person surveys; however, the appliance has already been collected. ENSC believes there is very little to evaluate on-site that cannot be evaluated via the phone. Econoler is conducting telephone surveys as part of the annual evaluation and ENSC is conducting monthly quality assurance customer experience surveys that should bring forward any issues.	**Not recommended for action**	Not recommended for action

	B	C	E	F	G	K
1			As Shared with DSM Advisory Group November 2015			Updated February 2015
2	**Recommendation Text**	**Source**	**Status**	**ENSC Comments on Recommendation**	**Expected Period of Completion**	
3	The Savings Verification study recommends acceptance of the 2013 evaluation results for energy savings and for demand-reduction.	**Savings Verification Recommendation No. 1**	**Complete**	ENSC agrees with this recommendation.	**N/A**	Complete
11	**ENSC program manager should focus on upgrading one of the Delivery Agents (DA).** According to the evaluator, one of the two Delivery Agents for this program was unable to explain exact customer complaints, though the number of complaints (twelve, in all) was recorded (Page 16). We recommend that the Program Manager confirm that this Delivery Agent has sufficiently improved their recording of the exact nature of each customer complaint to insure this problem will not recur and that the evaluator will be provided with full information on the content of customer complaints in the next evaluation. Since failure to record customer complaints might be an indicator of more important problems in meeting customer expectations, the program manager should focus on this delivery agent to insure fully adequate customer service.	**Appliance Retirement SV-2**	**In Progress**	ENSC agrees with this recommendation. To clarify, there is only one Delivery Agent for this program, but the Delivery Agent uses a call centre to book appointments and address customer calls. The Delivery Agent was advised of this issue and directed to improve their recording of customer complaints to ensure the exact nature of the complaint and its resolution is clearly documented.	**Q4**	This will be completed by Q2 2015. The recording of complaints has improved. The Delivery Agent is working to improve integration of its system with the subcontractor, which should further improve customer service.
12	**Correct table entries.** In the table, "Appendix IX – Algorithm for Free-Ridership Calculation," the final step is to take the average of three values developed in the table. These are given as PA1, PA2 and PA3. These variables are not defined in the table. The table also references F5 and FR4b; but these are also not located in the table. The evaluator should correct the presentation of calculation method for this appendix.	**Appliance Retirement SV-3**	**In Progress**	ENSC agrees with this recommendation. The evaluator will make the recommended corrections.	**Q4**	Complete. The algorithm has changed.
13	**Free Ridership.** As noted by the evaluator, the free-ridership computed for this program is likely high. Or, in other words, it is likely that program savings is higher than stated in the evaluation. While staying within the general framework of the Universal Methods Protocol (the grid approach) and keeping an additive and averaging approach for cases in which indicator variables are combined, the evaluator should consider the specific questions and scoring method used in Appendix IX and determine if the method somewhat overestimates free-ridership.	**Appliance Retirement SV-4**	**In Progress**	ENSC agrees with this recommendation, in part. It is not possible to compare the old and new (UMP) free-ridership approach because the evaluator does not use the same questions (this would require conducting two surveys). The evaluator will continue to use the UMP, but for the next evaluation, some adjustments will be brought to questions that seemed to be less understood by the respondents or that would need more consistency checks.	**Q4**	Complete
14	While within acceptable practice, the evaluator's questions and calculation methods for free-ridership should be reviewed by the evaluator. It is likely that free-ridership is being somewhat over-estimated and that savings are somewhat higher than reported.	**Instant Savings Recommendation SV-1**	**Not recommended for action**	ENSC disagrees with this recommendation. According to the evaluator, the relatively high level of free-ridership level obtained for regular CFLs is not surprising since it can be explained by the fact that this product has now largely penetrated the market and is becoming a current practice (ENSC has phased out incentives for regular CFLs in 2014). For LEDs, the free-ridership level was quite low, at 17 percent, which is largely acceptable for an instant rebate program.	**Not recommended for action**	Not recommended for action
15	The evaluator and ENSC should conduct a Nova Scotia hours of use study.	**Instant Savings Recommendation SV-2**	**Not recommended for action**	ENSC appreciates this recommendation; however, ENSC intends to use relevant literature and studies as a more cost effective approach.	**Not recommended for action**	Not recommended for action
16	The evaluator and ENSC should plan for an update to the Nova Scotia sockets study for either the next program and evaluation cycle or the cycle following.	**Instant Savings Recommendation SV-3**	**Deferred**	ENSC appreciates and this recommendation and will consider it for 2016, as funding permits.	**Consideration in future years**	Deferred for consideration in future years
17	**Include Key Data Elements.** The Program Manager should prioritize and take direct steps to insure that the utility account number and the housing type are included in the data tracking system for each home.	**Home Energy Assessment SV-1**	**Complete**	ENSC agrees with this recommendation. The utility account number and housing type have been added to the data tracking system.	**N/A**	Complete
18	**Participant Observation.** The evaluator should participate in a few holiday lighting exchange events and tabulate wattage and counts for baseline strings of lights exchanged.	**Holiday Light Recommendation SV-1**	**Not recommended for action**	ENSC disagrees with this recommendation. Given the relatively small size of this program, it is far more cost effective for counts and wattage tabulation to be performed by ENSC and the Delivery Agent.	**Not recommended for action**	Not recommended for action

	B	C	E	F	G	K
1			As Shared with DSM Advisory Group November 2015			Updated February 2015
2	**Recommendation Text**	**Source**	**Status**	**ENSC Comments on Recommendation**	**Expected Period of Completion**	
3	The Savings Verification study recommends acceptance of the 2013 evaluation results for energy savings and for demand-reduction.	**Savings Verification Recommendation No. 1**	**Complete**	ENSC agrees with this recommendation.	**N/A**	Complete
19	**Lighting Hours.** The evaluator uses 4,380 hours for wall pack/garage canopy lighting which would be correct. However, some of this lighting is normally installed outdoors and some indoors. In the case where these lights are installed inside of a parking garage, the Mid- Atlantic Technical Reference Manual from NEEP says that they should use 8,760 hours. To get an accurate determination of hours for this measure then the usage of the product needs to be tracked as either "parking garage" or "other." If the balance is 50/50 for parking garage usage then the average hours would be 6,750 or a 50% increase in savings. The minimum value is the one being used, so a 50% increase in savings for this measure is very likely. Note that parking lights are also installed in the custom retrofit projects, and the value in the tracking documents for these is 8,760 hours. Therefore we suggest an average assumption of 50% of total sales for parking garage application and raising the annual hours of operation to 6,750, unless a more specific count of units for parking garage applications can be determined.	**Business Energy Rebates SV-1**	**In Progress**	ENSC agrees with this recommendation in principle. The evaluator recommends to keep using 4,380 hours for tracked savings. For evaluated savings, the evaluator will adjust the hours of operation based on the data on parking usage versus outdoor usage that could be collected during BES site visits (because no site visits can be conducted for BER-Instant Rebate) and BER Mail-In site visits. The evaluator will then modify lighting hours assumptions for this measure category. ENSC will also be modifying the lighting hours reported in the data tracking system.	**Q4**	Complete
20	**Address Electrical Measurement.** The evaluator should explain the frequency and type of direct electrical measurement involved in this evaluation, how the measurement was performed and which entities carried out the measurement. The evaluator should provide a partition of energy savings and demand reduction claimed according to the percentages based on direct electrical measurement and the percentage developed without electrical measurement.	**Custom Retrofit SV-1**	**In Progress**	ENSC agrees with this recommendation. When possible, the evaluator will provide more details in the report on the measurement and verification (M&V) that was conducted on the projects in the evaluator's sample.	**Q4**	Complete
21	**Electrical Measurement Protocol.** It is strongly recommended that a comprehensive pre-installation and post-installation metering requirement be established for this program.	**Custom Retrofit SV-2**	**In Progress**	ENSC currently conducts comprehensive measurement and verification (M&V) for projects with energy savings 100,000 kWh per year or greater. ENSC does agree with the spirit of this recommendation; however, M&V cannot be cost effectively carried out for all projects. Changes to the program in 2014 have freed up resources so that more focused M&V protocols can be implemented. The program will strive to achieve this level of project evaluation in future years.	**Q4**	Complete
22	**Funding.** The evaluator has proposed a true-up step to compare simulation expectations to actual building energy use. This would be a valuable study to insure that future modeling is better calibrated. ENSC should add funds to this area of evaluation to allow the independent evaluator to carry out this true-up.	**Custom New Construction SV-1**	**In Progress**	ENSC agrees with this recommendation and will implement it as worded. A billing calibration on past projects will be conducted for the 2014 evaluation of New Construction.	**Q4**	Complete
23	**Code.** Wait until practice approximates code before adopting code as baseline. In the meanwhile, gradually adjust.	**Custom New Construction SV-2**	**In Progress**	ENSC agrees with this recommendation and will implement.	**Q4**	Complete
24	**Hours of Use Study.** The evaluator and ENSC should conduct a Nova Scotia hours of use study.	**MURB SV-1**	**Deferred**	ENSC appreciates this recommendation; however, ENSC intends to use relevant literature and studies as a much more cost effective approach. A literature review will be conducted in 2015.	**2015**	Deferred for implementation in 2015
25	**Research Questions.** The next process evaluation should begin not at the level of official documents, the expectations of executive management and the mechanics of balanced scorecard and key performance indicators but with a practical and empirical perspective to answer questions, such as: "How and how well does this organization work in actual practice (considering the organization as the ENSC core plus all contractors and trade allies who together create and deliver the programs)? Where does it experience problems? What are the realities, pressures and benefits of work life for staff at different levels? Is there adequate challenge to individuals and is there adequate empowerment in scope of independent decision making and action for staff at all levels to both self-actualize and develop and, at the same time, to conscientious responsibility for service relationships with the people and institutions that ENSC serves? What are the restrictions on scope and to what extent are they needed or unnecessary? How and how well does ENSC maintain good faith and quality of service in the work done in customer homes and in businesses and industrial and institutional facilities? Are there any problems or unintended consequences or side effects in how this work is organized and carried out, and how might they be addressed? What are the informal realities experienced in work in the organization as well as the formal realities? Is the organization a good place to work? What might a new worker to the organization expect and are there career ladder possibilities? Is there also cynical knowledge in the organization and is there an experience of irony in some aspects of work? What do people who have left the organization think about it? Are there cases of underservice as well as good service? Why do cases of underservice occur – are they just products of contingencies or is anything patterned or built-in by organizational processes or requirements. Are there experiences of unanticipated side- effects, and how have programs be adapted to encounter these realities?	**Process Evaluation SV-1**	**Deferred**	ENSC agrees with this recommendation. ENSC will work to implement the suggested change in perspective during subsequent traditional process evaluations. ENSC will discuss this issue with stakeholders.	**Consideration in future years**	This recommendation will be considered for the 2016-2018 process evaluation, pending discussion with stakeholders.

	B	C	E	F	G	K
1			As Shared with DSM Advisory Group November 2015			Updated February 2015
2	**Recommendation Text**	**Source**	**Status**	**ENSC Comments on Recommendation**	**Expected Period of Completion**	
3	The Savings Verification study recommends acceptance of the 2013 evaluation results for energy savings and for demand-reduction.	**Savings Verification Recommendation No. 1**	**Complete**	ENSC agrees with this recommendation.	**N/A**	Complete
26	**Boundary for Analysis.** The next process evaluation should draw the boundary for the study around ENSC plus its service delivery agencies and other extensions.	**Process Evaluation SV-2**	**Deferred**	ENSC agrees with this recommendation. ENSC will work to implement the suggested change in analysis boundary during subsequent traditional process evaluations. ENSC will discuss this issue with stakeholders.	**Consideration in future years**	This recommendation will be considered for the 2016-2018 process evaluation, pending discussion with stakeholders.
27	**Selection of Evaluator.** The next process evaluation should be conducted by a sociologist or social-psychologist who has experience conducting process evaluations and community studies or social impact evaluations in the area of energy or health or environment or social ecology or in other areas of community dynamics.	**Process Evaluation SV-3**	**Deferred**	ENSC will work to implement the suggested change in the selection of evaluator during subsequent traditional process evaluations. ENSC will discuss this issue with stakeholders.	**Consideration in future years**	ENS will consider this recommendation, but will not limit the selection for this component of the evaluation to a sociologist or social-psychologist. The evaluator will be selected through an RFP process.
28	**Inclusion.** Interviews and surveys should be inclusive of all staff levels, delivery agent staff and others who do the work.	**Process Evaluation SV-4**	**Deferred**	ENSC agrees with this recommendation. ENSC will implement this recommendation in any subsequent traditional process evaluations.	**Consideration in future years**	This recommendation will be considered for the 2016-2018 process evaluation.
29	**Confidentiality.** Rather than focus groups, group settings or surveys which require personal identification, the evaluator should engage in dialog with individuals and guarantee confidentiality.	**Process Evaluation SV-5**	**Deferred**	ENSC agrees with this recommendation. ENSC will implement this recommendation in any subsequent traditional process evaluations.	**Consideration in future years**	This recommendation will be considered for the 2016-2018 process evaluation.
30	**Readability.** The next organizational level process evaluation should be written in a style that would be understandable to any resident of Nova Scotia without special training. In particular the model originally developed by the military for top-down strategic theater-level control of warfare and later transformed by Kaplan and others to nearly universal application to mission oriented businesses and non-profit organizations should be kept in the background since it is only the formal only part of the story. Special language like balanced scorecards and integration of key performance indicators for top down computer assisted reporting and control should be present as a dimension but minimized. The story of the organization and why it works and how it really works and how it provides real value and authentic service relationships should be told in everyday language and in a way that is inherently interesting and understandable.	**Process Evaluation SV-6**	**Deferred**	ENSC agrees with this recommendation. ENSC will work to implement the suggested change in readability during subsequent traditional process evaluations. ENSC will discuss this issue with stakeholders.	**Consideration in future years**	This recommendation will be considered for the 2016-2018 process evaluation, pending discussion with stakeholders.

	B	C	F	G	I	M
1	**Recommendation Text**	**Source**	**As Shared with DSM Advisory Group November 2015**			**Updated February 2015**
2			**Status**	**Comments**	**Expected Period of Completion**	
3	**Document major program modifications in the program manual:** In the Document Revision section of the program manual, it is necessary to report on the "what" and the "why" of a major modification made to a program component. This recommendation is meant to facilitate the Evaluator's comprehension of the program from one evaluation to another, as programs very often change following an evaluation. It is also necessary to indicate the section in the program manual that provides more details on these modifications. Such details should include the elements in place before the modification. For instance, if the list of eligible products or the incentive offers have changed, information on the previous list of products or incentive offer should be documented in the program manual.	**OV-R1.**	**Complete**	ENSC agrees with this recommendation, which was implemented.	**N/A**	Complete
4	**Merge the program manual's sections on justifications and objectives:** In the program manual, Section 3.2, which describes the justifications, and Section 3.3, which describes the objectives, should be merged into one section since they are closely related. Generally, a justification is concerned with an existing barrier to be overcome. By the same token, eliminating or overcoming this barrier becomes the program objective.	**OV-R2.**	**Complete**	ENSC agrees with this recommendation, which was implemented.	**N/A**	Complete
5	**Provide a complete list of the variables and assumptions that are used to calculate unitary savings:** While this is already included in the "Program Base case" section of most of the evaluation plans, unitary savings are not presented for some program components such as MURB and BES. In other cases, the relevant documentation on which the savings calculation is based is not cited. For instance, in the BER Instant Rebates evaluation plan, there is no mention of the Master Product Code List, where all unitary savings for approved products are calculated. The "Program Base case" section of the evaluation plan is especially important in keeping track of improvements to savings calculations and the rationale behind them. It is also a useful tool to help the Evaluator follow-up on the results of previous years' recommendations. The Evaluator notes, however, that the template used for the "Program Base case" section may not be suitable for all program components. When needed, Excel sheets could be used to better document how savings are calculated.	**OV-R3.**	**Complete**	ENSC agrees with this recommendation. This has been completed for applicable programs and measures.	**N/A**	Complete
6	**Include a revision date for the 2012 recommendations follow-up file:** As mentioned in the process evaluation of the program components, ENSC listed all the 2012 recommendations and follow-up actions in a table in a separate file to allow the PM to monitor their progress. This follow-up file should have a revision date included in the footer. This addition is important to keep track of the latest actions and timeframes.	**OV-R4.**	**Complete**	ENSC agrees with this recommendation, which was implemented.	**N/A**	Complete
7	**Fill out the control file for a number of selected projects to ensure quality and make it possible to evaluate this new tool in future:** As mentioned above, the control file was not filled out in 2013 but was rather followed by program staff to make sure all control steps were followed. This approach does not leave any trace for the Evaluator to assess if the control file meets the objectives for which it has been created. Therefore, the Evaluator recommends that, when evaluating the effectiveness of internal controls, the internal audit staff fill out the control file for a number of projects selected through the QA program. The selection criteria should be defined for each individual program component, based on the size and/or risk. Still with the ultimate aim of assessing the control file, the Evaluator noted that the standard template used for the control file seems a bit excessive and perhaps somewhat rigid. Considering that this is only a preliminary impression, the Evaluator recommends interviewing the PMs on this control file during the next process evaluation interviews to get their impressions on it through specific evaluation criteria. Finally, to arrive at a better understanding of how the control file is used by ENSC, the Evaluator suggests defining the seven criteria indicated in the control file using scales or indicators. The control file should also include the program component name and a revision date at the bottom.	**OV-R5.**	**Deferred**	ENSC will implement this recommendation. The completion of the control file is an activity intended for an internal control auditor. Program internal controls will be part of the internal audit process. Use of the internal control files for internal audit purposes will commence in January 2015.	**2015**	Deferred for implementation in 2015
8	**Continue to work on including as much information as possible in standardized database format:** In 2013, more information was available on the DSMDS in the form of automated reports. In order to facilitate savings tracking and future evaluation activities, ENSC should continue to work on including all necessary information in the DSMDS in the form of standardized entries. This includes technical specifications of equipment, answers to pre-screening questions and savings equations.	**OV-R6.**	**In Progress**	ENSC agrees with this recommendation. ENSC continues to evolve the data management system (DSMDS) to facilitate data tracking for all programs. Standardization of information in the database is expected in 2015.	**2015**	In Progress for implementation in 2015

	B	C	F	G	I	M
1			As Shared with DSM Advisory Group November 2015			
2	**Recommendation Text**	**Source**	**Status**	**Comments**	**Expected Period of Completion**	**Updated February 2015**
9	**Obtain direct and immediate feedback from partners following an information session such as Efficiency 101:** Most DAs and CEAs reported having attended the Efficiency 101 information session offered by ENSC since July 2012. Although the Evaluator has obtained feedback on this information session through the in-depth interviews conducted under the 2013 process evaluation, it is recommended that ENSC ask partners to fill out an evaluation form following such a session to evaluate how useful it is, whether it meets the partners' expectations and what can be changed to improve it.	**OV-R7.**	**Complete**	ENSC agrees with this recommendation. Discussions have occurred with the marketing department and a feedback mechanism will be incorporated into the Efficiency 101 webinar that is in development, which is expected to launch in Q1 2015. Current training programs have incorporated direct and immediate feedback into the end of the sessions.	**N/A**	Complete
10	**Provide participants with more information about the appliance disposal:** In 2012, the ARet marketing material included a brochure about appliance disposal. This brochure was exhausted in early 2013 when ENSC moved to a standardized rack card, which did not provide the same level of detail as the 2012 brochure. Compared with 2012 and 2011 survey results, the 2013 survey results indicated that participants were less likely to know what happened to old appliances after they were picked up. Therefore, the Evaluator recommends that ENSC review its marketing material in order to better inform and educate participants about ARet's purpose and operations.	**ARet-R1.**	**Complete**	ENSC agrees with this recommendation. An Appliance Retirement Recycling Process booklet is now online and in PDF format.	**N/A**	Complete
11	**Improve the accuracy of the metering protocol by metering appliances only when they have reached their setpoint temperatures and by increasing the sample sizes:** For this year's evaluation, refrigerators and freezers were metered from the moment they were turned on, which implies that they did not reach their setpoint temperatures. While this might not have had a major impact on the average consumption metered, it is still difficult to estimate this impact and determine if an adjustment should be applied. Therefore, the Evaluator recommends that ENSC modify its protocol by adding the requirement that the metering shall not start until new appliances reach their setpoint temperatures, even if this requirement may reduce the total metering time. Indeed, the New York Department of Public Service protocol requires as little as a minimum of 2 hours of measurement for appliances that are already functioning at the time of metering. Therefore, it seems unnecessary to record appliance consumption for as long as 48 hours. Reducing the metering time could also allow ENSC to perform metering on a larger number of appliances. Indeed, due to the wide differences in the age of the appliances, their condition and their energy consumption, the Evaluator also recommends that ENSC consider increasing the metering sample size for the next evaluation.	**ARet-R2.**	**Complete**	ENSC agrees with this recommendation and conducted its metering activity from May to October 2014. Due to logistics, appliances were metered for approximately 24 hours each after they have reached set point. Protocols were implemented to ensure the metering would not start until new appliances have reached their set point temperatures. The sample size has been increased in 2014.	**N/A**	Complete
12	**Continue using the UMP methodology for estimating ARet's net savings:** Following a recommendation made in the Verification Review of Program Year 2012 Evaluation report, the Econoler team completely reviewed the savings calculation methodology this year to validate its compliance with the general guidelines of the UMP developed by the National Renewable Energy Laboratory. To comply with the UMP guidelines, significant modifications were made to the algorithm of the original methodology used in previous evaluations. Using the UMP methodology for this year's evaluation, net savings for ARet were estimated on a grid-based approach, which the Evaluator considers more accurate and recommends continuing using this approach. However, due to the high cost of conducting a general population survey to capture appliance-retirers and appliance-buyers who did not participate in ARet, the default values for estimating the secondary market impacts had to be used. The Evaluator is aware that, although these default values do not accurately represent the Nova Scotia secondary market, the secondary market impacts are much less significant than the free-ridership effect, which is measured through the participant survey conducted for each round of ARet evaluation. However, for the next evaluation, the Evaluator suggests adjusting the survey questionnaire and using multiple questions to assess the induced replacement. Indeed, the result obtained this year for this parameter was considered relatively high. Given the fact that it is really difficult to estimate participants' intentions in the absence of the program with one question (even if supported by follow-up questions), the Evaluator considers that a more accurate estimate could be obtained with multiple questions used to assess the induced replacement scenario.	**ARet-R3.**	**Complete**	ENSC agrees with this recommendation and will continue using the UMP methodology for estimating net savings for Appliance Retirement.	**N/A**	Complete
13	In the logic model, the first barrier is addressed in the short-term outcome section (Number 5) of the program theory, where the participant achieves immediate electricity savings. The second barrier is overcome through the recycling activity, which prevents retired appliances from finding their way into a secondary market. The Evaluator recommends specifying how these barriers are being overcome in the program theory section of the logic model. More specifically, ENSC should indicate that the immediate savings address the barrier related to old appliances kept plugged in, while the recycling activity prevents the transfer of retired units to a secondary market.	**ARet-R4.**	**Complete**	ENSC agrees with this recommendation. The changes have been made to the logic model.	**N/A**	Complete

	B	C	F	G	I	M
1	Recommendation Text	Source	As Shared with DSM Advisory Group November 2015			Updated February 2015
2			Status	Comments	Expected Period of Completion	
14	The metering equipment, although new, was sitting upon an overturned five gallon plastic bucket. A more stable location for the metering equipment should be considered to avoid any possible disconnection from the appliances and subsequent loss of data.	**ARet-R5.**	**Complete**	ENSC agrees with this recommendation. In 2014, the metering equipment was attached directly to the wall.	**N/A**	Complete
15	The final recommendation involves recording metering data. Currently, a paper copy is stored in the test room and updated by ENSC personnel during each on-site visit (three times/week). The data recorded on the paper copy is then transcribed into an electronic spreadsheet after each visit. This methodology creates risk for data loss and errors during transcription. Implementing an electronic recording system at the recycling facility would minimize the potential for metering data losses.	**ARet-R6.**	**Complete**	ENSC agrees with this recommendation. All data is being captured in an Excel spreadsheet. All metering information is being documented onsite using an electronic recording system.	**N/A**	Complete
16	**Increase promotion of products other than CFLs and LED lamps:** Findings from the intercept survey indicated that under half of participants were aware of other products discounted through Instant Savings, besides the CFLs or LED lamps they had purchased. However, only a minority of those participants indicated having purchased or having the intention of purchasing those other products. The Evaluator recommends doing further promotion of products other than CFLs and LED lamps to increase the purchase of those other products during the discount periods, while maintaining advertising of CFLs and LED lamps.	**Instant-R1.**	**Complete**	ENSC agrees with this recommendation. ENSC recently completed a pricing study and determined the optimal price point to increase uptake. This has resulted in an increased rebate for many of the lesser known products. In-store engagement events are also used to educate customers and encourage sales for lesser known products. Research on bundling products was considered that would pair lighting and other products. However, this will not be implemented due to budgetary constraints.	**N/A**	Complete
17	**Move forward with the transition from CFLs to LED lamps in 2014:** The free-ridership level of 44 percent obtained for CFLs, despite being lower than in 2012, remains relatively high. The penetration of regular CFLs in the market may explain this result. The socket study conducted in 2011 indicated that Nova Scotia households have an average of 36 sockets, of which an average of 16 contained CFLs; this value has certainly increased in the last two years. Overall, this is good news for ENSC as a promoter of energy-efficient products. Nonetheless, different elements, such as the relatively high level of free-ridership and the new federal regulation that will increase the minimum energy performance standard of general service incandescent lamps, in effect since January 1, 2014, now indicate that it might be the time to move forward to using more energy-efficient products such as LED lamps. Following a recommendation made in the 2012 evaluation report, ENSC is now considering removing the rebate offered for regular CFLs.	**Instant-R2.**	**Complete**	ENSC agrees with this recommendation. CFLs are no longer included in the Instant Savings 2014 fall campaign.	**N/A**	Complete
18	**Review wattage entries in the tracking sheet for LED lamps and LED recessed lamps:** While extracting information from retailers' and manufacturer's websites for the highest selling LED products to calculate unitary savings, the Evaluator found that a significant proportion of wattage information entered in the tracking sheet contained errors. Indeed, the data in the "Wattage" column seemed to come from the "Product Technical Info" column, which often did not match the description given on the websites. It is therefore recommended to conduct a verification on the wattage given, at least for the most popular products, in order to better evaluate the average wattage of the LED products sold.	**Instant-R3.**	**Complete**	ENSC agrees with this recommendation. All LED wattage information documented in the "Wattage" column and the "Product Technical Info" column is being confirmed by the Delivery Agent and ENSC. All wattage information for lighting is based on the ENERGY STAR website. ENSC recommends that manufacturers websites not be used to determine product wattage. The ENERGY STAR website is based on third party testing and is regularly updated. ENSC considers this to be the most accurate.	**N/A**	In progress. Overall, the evaluator noted an improvement in accuracy. However, this recommendation is now considered partially implemented after the evaluator found errors for LED recessed lamps.
19	**Continue conducting general population surveys to assess key parameters used for the gross savings calculation of CFLs and LED lamps:** Key parameters such as CFL replacement and indoor/outdoor installation ratios were evaluated this year through the Quarterly Atlantic survey conducted by ENSC. This approach, using a general population phone survey, has proved better than the intercept survey to estimate such parameters. Questioning participants on their future use of the lighting products they had just purchased did not provide any conclusive results. Therefore, the Econoler team recommends that ENSC continue conducting this kind of general population survey to assess the key parameters used in the gross savings calculation for lighting products. Moreover, since the number of LED products sold in the market has increased considerably, additional questions could be added to the survey to assess some of the key parameters used in the savings calculation of this specific category of product. Questions on the wattage replacement practices should also be added to the survey to validate that participants are still referring to the recommendations on the package, especially since this element has not been evaluated since 2011.	**Instant-R4.**	**In Progress**	ENSC agrees with this recommendation. The Atlantic Quarterly survey in Q2 and Q3 is being used to conduct a general population survey to address key parameters for the gross savings calculation for CFLs and LEDs.	**Q4**	Complete

	B	C	F	G	I	M
1			As Shared with DSM Advisory Group November 2015			
2	**Recommendation Text**	**Source**	**Status**	**Comments**	**Expected Period of Completion**	**Updated February 2015**
20	**Consider adjusting the hours of operation used in the unitary savings calculations for lighting products in the upcoming years:** New studies that metered the hours of operation of residential lighting were found during this evaluation, but the Evaluator concluded that the hours of operation coming from the Hydro-Québec study should still be used for this year because of the similar market characteristics that the provinces of Quebec and Nova Scotia have. On the other hand, the Evaluator noted that the Hydro-Québec study only metered the hours of operation of CFLs. Certainly, it can be assumed that the CFLs installed first were installed in sockets that had the longest hours of operation to maximize the investment in more expensive bulbs. Yet, as the market evolves, the incandescent and halogen lamps to be replaced by CFLs or even LEDs will be lamps with lower hours of operation. Consequently, ENSC may have to consider adjusting the hours of operation for their savings calculations in the upcoming years. While a metering study in Nova Scotia would be the most accurate way of estimating operation hours, a more affordable option could be to use the U.S. Department of Energy (DOE) study and potentially adjust the number of sockets per household when using its findings.	**Instant-R5.**	**In Progress**	ENSC agrees with this recommendation. ENSC will pursue an option based on a review of relevant literature as a more cost effective approach.	**Q4**	Complete
21	**Continue to ask for the store identifier to be filled in:** As in 2012, the retailer where each product was sold is always identified in the tracking sheet. However, the specific retail store where the sale occurred is provided in only approximately half the cases or, in other instances, the store identifying information is too general. ENSC should keep reminding the retailers to provide this information, which would facilitate the organization of field activities such as intercept surveys. Nonetheless, the Evaluator understands that this could be difficult for some retailers, since they all use different approaches to collect retail store information.	**Instant-R6.**	**Deferred**	ENSC appreciates this recommendation; however, past and current attempts to obtain this data from certain retailers have failed. Some retailers are providing this data.	**Consideration in future years**	Deferred for consideration in future years
22	**Continue to make efforts aimed at involving DAs in HEA planning and informing them about upcoming marketing initiatives:** The 2011 and 2012 evaluations revealed the DAs' desire to be more actively involved in HEA, specifically in regard to program modifications and planning in general, and to be better informed ahead of time about upcoming marketing initiatives. Acting on the Evaluator's recommendations, ENSC has deployed efforts over the last couple of years to strengthen its relationship with DAs and create a constant communication channel. All DAs were consulted and given a chance to provide their input prior to any changes made to HEA in 2013. This consultation was held in the form of meetings between ENSC and the six DAs to improve the program design and better coordinate delivery. Despite continued efforts, ENSC should find additional opportunities to further engage partners, who expressed an interest in scheduled meetings with ENSC and other partners to address delivery issues and discuss potential solutions. As such, it would be advisable for ENSC to set up a formal communication mechanism to ensure that delivery agent feedback is considered when making HEA modifications. Furthermore, keeping partners informed of upcoming marketing initiatives can assist DAs with resource planning, thus reducing wait times, ensuring consistent delivery timeframes throughout the year, and helping CEAs manage their workloads.	**HEA-R1.**	**In Progress**	ENSC agrees with this recommendation. A marketing survey has been developed and will be shared with Service Organizations in Q4 to give them a formal mechanism for providing input and insight into Home Energy Assessment marketing initiatives. Upon receiving feedback from Service Organizations, marketing initiatives will be planned for 2015.	**Q4**	Complete
23	**Include additional information in monthly reports to DAs:** Also in an effort to involve DAs more in 2013, ENSC published and distributed to all DAs a monthly report that showed several performance indicators related to activities conducted by DAs. In-depth interview findings indicated a high level of satisfaction with the monthly report, particularly because it provided information that facilitated resource-planning. That being said, DAs would like to see data broken down by region and access historical information on the number of monthly assessments performed for each individual region, thus providing them with an additional tool for resource-planning.	**HEA-R2.**	**In Progress**	ENSC agrees with this recommendation. Additional information will be included in reports as of the December 2014 report.	**Q4**	Complete

	B	C	F	G	I	M
1			As Shared with DSM Advisory Group November 2015			
2	**Recommendation Text**	**Source**	**Status**	**Comments**	**Expected Period of Completion**	**Updated February 2015**
24	**Consider regional marketing initiatives and expand the outreach program:** DAs interviewed during the process evaluation were not pleased with marketing activities. There was a call for increased regional marketing. While marketing to homeowners was considered valuable, they also mentioned the need to keep pursuing outreach activities that target builders, contractors and tradespeople, such as the Partner Network contractors list that was added to the ENSC website in 2013, because they are often the first point of contact for homeowners regarding incentive programs. At the same time, consideration should be given to approaching independent utilities across the province in addition to Nova Scotia Power to ensure all electricity customers are informed about HEA through billing inserts.	**HEA-R3.**	**In Progress**	ENSC agrees with this recommendation. A marketing campaign in 2014 included a television commercial that was supported by Service Organizations. A marketing survey has been developed and will be shared with Service Organizations in Q4 to give them a formal mechanism for providing input and insight into Home Energy Assessment marketing initiatives. This survey also includes questions about regional marketing. Direct mail-outs will be considered as marketing initiatives that can help to ensure that Nova Scotians across the province would be informed of the Home Energy Assessment service. This will also be completed in Q4. The Trade Partner list continues to grow and all Trade Partners receive Efficiency 101 and Home Energy Assessment specific training to ensure they can promote the service when engaging with customers.	**Q4**	Complete. This recommendation has been partially implemented. In addition to the HEA television commercial and trade partner initiatives outlined in November, an article on HEA was also published in a local magazine. ENSC participated in a number of outreach events across the province to highlight its service offerings. ENS is no longer planning to provide a survey to Service Organizations or direct-mail outs.
25	**Adapt the tracking system (DSMDS) to the QA program:** A QA program was implemented in 2013 by ENSC and will become more mature in 2014. This continuous process will involve reviewing a sample of files, particularly targeting projects with low EnerGuide ratings or high delta EnerGuide. The Evaluator commends ENSC on this action and therefore recommends that the results of these reviews be tracked in the DSMDS.	**HEA-R4.**	**Deferred**	ENSC agrees with this recommendation. The DSMDS will be adapted in coming years, once the Quality Assurance system has matured.	**To be implemented in a future year**	Deferred for implementation in a future year
26	**Enhance the D assessment procedures to fully respect the NRCan protocol:** The on-site visits conducted with three CEAs revealed that the main steps of the D assessment such as the blower door test and data collection were well performed, but these steps took up a large portion of the assessment time. In order to continuously improve the assessment process, the Evaluator recommends that, once the data is collected, that the CEAs make sure, even if limited in time, they fully explain the home energy assessment report in detail and any moisture/indoor air quality problems, and provide some ecofriendly advice - also an NRCan requirement. Furthermore, acquiring measurement devices such as an infrared radiation thermometer or moisture detection device would allow making a more accurate analysis and preventing moisture or potential indoor air quality problems, without necessarily requiring much time. Finally, to facilitate and improve the D assessment process, the Evaluator recommends that the DAs systematically perform a pre-evaluation phone interview. It only takes a couple of minutes and can really help make the assessment process more efficient by informing homeowners of the preparation needed in some parts of the house prior to the assessment or of the assessment time needed to ensure homeowners are present during the whole process.	**HEA-R5.**	**Complete**	ENSC agrees with this recommendation. Service Organizations are contractually required not only to perform all required aspects of the Natural Resources Canada (NRCan) protocol, but also to spend a minimum of 15 minutes talking to the homeowner and explaining the report and the recommendations that they will make. ENSC has not procured any additional measurement devices, and will not be purchasing such equipment in 2014. Service Organizations were asked to share their pre-screening interview questions to ensure they align with NRCan protocol. It was confirmed that they already align.	**N/A**	Complete
27	**Collect and analyze participants' billing data to detect errors in the HOT2000 simulation results:** The HOT2000 simulation review showed wide differences in the quality of the simulation, notably due to the fact that the ecoENERGY Data Collection Forms used by some CEAs were too simplified and led to omissions. This situation was already identified by ENSC through the QA program implemented in 2013 and some actions have already been taken to solve this problem. In addition, the Evaluator recommends that the CEAs systematically collect the participant billing data to validate if the modeled energy consumption values using HOT2000 simulation are in the same range as the participant's actual consumption. Thus, the CEA can rapidly detect potential calculation errors. This additional action, along with the QA program being implemented, could significantly improve the reliability of the HOT2000 simulations. As a result, the adjustment ratio of -18 percent, applied to the modeled consumption, could be reduced and therefore should be re-evaluated in the next evaluation.	**HEA-R6.**	**Deferred**	ENSC agrees with this recommendation. ENSC will discuss this option with Delivery Agents in 2014, for possible implementation in 2015.	**Consideration in future years**	Not recommended for action. Upon further consideration, ENS does not agree with this recommendation and does not plan to implement. Three Delivery Agents were consulted. The information would not contribute to a more refined model as it would go against NRCan modeling protocol and it would be difficult to obtain.
28	**Track the utility account number in a separate field:** ENSC has recently started to document the utility account number in the tracking sheet. However, this information is recorded in one field that contains other pieces of information, separated by semi-colons. The Evaluator recommends tracking the utility account number in a separate column to facilitate the retrieval of this information when, for instance, a billing analysis is required. For the next evaluation, the Evaluator could re-evaluate the accuracy of the modeled energy consumption obtained from the simulations, based on a calibration of the HOT2000 software, which requires having the utility account number for each participant.	**HEA-R7.**	**In Progress**	ENSC agrees with this recommendation and will update the Home Energy Assessment tracking sheet.	**Q4**	Complete

	B	C	F	G	I	M
1	Recommendation Text	Source	As Shared with DSM Advisory Group November 2015			Updated February 2015
2			Status	Comments	Expected Period of Completion	
29	**Review information provided to participants to determine whether enhancements or clarifications are required:** Participant survey results indicated that for some, there may be an issue with information provided regarding Green Heat. Specifically, one in five participants felt there were challenges when installing the new equipment or energy sources rebated through Green Heat, and some of those challenges were said to be linked to lack of information. Moreover, a few participants recommended improving communication and providing more information on the equipment being recommended or the qualified contractor. Some of the few participants who found the Green Heat application difficult also wanted more information about the participation process. It may be beneficial to review current literature and information to determine whether improvements could be made, although this was not identified by a majority of participants.	**GH-R1.**	**Complete**	ENSC agrees with this recommendation. ENSC has reviewed and made changes to the application form. The steps for financing and rebates have been broken out and clarified for applicants. Additional resources on heating types have been added to the ENSC website. ENSC will review current literature and improve tactics and messaging.	**N/A**	Complete
30	**Consider extending the deadline for participants to complete the installation:** There was a high level of satisfaction with Green Heat. However, the main challenge or barrier faced by participants had to do with having the equipment installed before the deadline. The timeline for installing the new equipment was changed from four months to two months in 2013 to align with the financing deadline. In a small marketplace such as Nova Scotia, it is not uncommon to have difficulty finding certified contractors to carry out work, which can turn the two-month timeline into a tight deadline by which to have the equipment ordered and installed. ENSC may wish to extend the timeline to be more accommodating and to ensure this does not interfere with participation.	**GH-R2.**	**Complete**	ENSC agrees with this recommendation. The forms and website have been updated with the new six month deadline. ENSC extended the deadline for participants to complete installation from 60 days to six months at the end of Q2.	**N/A**	Complete
31	**Consider requiring additional submittal information and photo documentation of the old primary heating system:** Additional information such as the number of full-time occupants, number of bedrooms, normal set points and typical occupancy schedule could be useful for ongoing evaluation. Moreover, additional information about the new system to be installed as well as of the old primary heating system could be collected, such as Btu/h or kW, pictures of the name plate, efficiency rating for new equipment and specification sheets. This information could be stored in the Data Management System (DMS) and given to the evaluator upon request (for an on-site visit, for example).	**GH-R3.**	**Complete**	ENSC agrees with this recommendation. The forms and website have been updated with the new information being requested. The Green Heat application form was updated at the end of Q2 to collect additional information, including building type, house size, year built and number of full time residents.	**N/A**	Complete
32	The Evaluator reviewed the unitary savings values used for geothermal and ducted central air source heat pumps by performing a literature review. The unitary savings research was focused on identifying more recent technical reference guides and actual metered studies for the different equipment types. However, the Econoler team did not find any new or revised guidance documents to further validate or adjust the unitary savings values currently used. Therefore, the Evaluator recommends that no changes be made to the tracked unitary savings values for any of these equipment types.	**GH-R4.**	**Complete**	ENSC agrees with this recommendation. ENSC will continue to use tracked unitary savings as provided by Econoler.	**N/A**	Complete
33	Air-to-water heat pumps were a new addition to Green Heat this year, so the Evaluator performed a literature review to assess the currently tracked unitary savings values. Since the technology is relatively new to the North American market, there is little evidence of any reliable metering studies or performance rating standards. Based on the results of this review, the Evaluator recommends that ENSC continue using the tracked unitary savings values. If air-to-water heat pumps become a large portion of Green Heat savings, ENSC should consider carrying out a metering study or a calibrated model simulation of installed units to confirm consumption and demand savings.	**GH-R5.**	**Complete**	ENSC agrees with this recommendation and will continue to use the tracked unitary savings values. If air-to-water heat pumps become more popular in the program, ENSC will consider carrying out a metering study or a calibrated model simulation of installed units to confirm consumption and demand savings.	**N/A**	Complete
34	**Educate participants regarding the LIH participation and assessment processes:** Findings from partner interviews showed that participants were confused with regards to the different parties involved in LIH, the steps included in the assessment process and understanding how homes need to be prepared before the assessment. While this information is verbally provided by selected DAs when the assessment appointment is scheduled, there is merit in providing written information to participants to ensure consistency.	**LIH-R1.**	**In Progress**	ENSC agrees with this recommendation. ENSC plans to create a one-page co-branded document that Delivery Agents would share with participants during their initial assessments. The document will help clarify program roles and highlight important parts of the service for the homeowner. This document is in development and is expected to be in circulation in Q4. Similarly, ENSC is also compiling a list of activities to help clients prepare for the D audit. This will be shared among Delivery Agents to help standardize the process.	**Q4**	Complete
35	**Provide ongoing training on LIH to CEAs:** With ongoing changes to the building industry and varying building construction complexity, CEAs expressed a desire for ongoing training sessions by ENSC on LIH updates. These sessions would also provide an opportunity for CEAs to clarify LIH requirements and guidelines and exchange with their peers.	**LIH-R2.**	**Deferred**	ENSC agrees with this recommendation. This recommendation has been deferred for implementation in a subsequent year.	**To be implemented in a future year**	This recommendation is no longer applicable. LIH is no longer an ENS DSM program.

	B	C	F	G	I	M
1			As Shared with DSM Advisory Group November 2015			
2	**Recommendation Text**	**Source**	**Status**	**Comments**	**Expected Period of Completion**	**Updated February 2015**
36	**Adapt the next tracking system (DSMDS) to the QA program:** A QA program will be fully implemented by ENSC in 2014. This continuous process will involve reviewing a sample of HOT2000 simulation files, particularly targeting projects with low EnerGuide ratings or high delta EnerGuide. The Evaluator commends ENSC on this action and recommends that these review results be tracked in the DSMDS.	**LIH-R3.**	**Deferred**	ENSC agrees with this recommendation. This recommendation has been deferred for implementation in a subsequent year.	**To be implemented in a future year**	This recommendation is no longer applicable. LIH is no longer an ENS DSM program.
37	**Encourage CEAs to collect and analyze participants' billing data to detect errors in the HOT2000 simulation results:** The HOT2000 simulation review showed wide differences in the quality of the simulations, notably due to the fact that the ecoENERGY Data Collection Forms used by some CEAs were too simplified and led to omissions. This situation will be likely identified by ENSC through the QA program, which is currently being implemented in 2014. In addition, the Evaluator recommends that CEAs collect the participants' billing data to validate if the modeled energy consumption values using HOT2000 simulation are in the same range as the participants' actual consumption. Thus, CEAs can rapidly detect potential calculation errors. This additional action, along with the QA program under implementation could significantly improve the reliability of the HOT2000 simulations. However, collecting and analyzing participants' billing data should not be viewed as an action that is more important or deserves a greater priority than following the Natural Resources Canada's (NRCan) protocol. As a result of this additional action, the calibration factor of -18 percent applied to the modeled consumption could be reduced and should therefore be re-evaluated for the next evaluation.	**LIH-R4.**	**Deferred**	ENSC agrees with this recommendation. This recommendation has been deferred for implementation in a subsequent year.	**To be implemented in a future year**	This recommendation is no longer applicable. LIH is no longer an ENS DSM program.
38	While the 2013 process evaluation did not involve a thorough assessment of LIH documentation, the Evaluator has a recommendation aimed at improving the participant process flow chart. Since late 2012, all LIH participants are provided with an EnerGuide report like the one given to HEA participants, except that the LIH report only includes the recommended upgrades covered under the scope of the program. Minimal information is supplied by the DAs to avoid any misunderstanding about the program on the participants' end. ENSC should include this report in the participant process flow chart to help participants better understand the participation process.	**LIH-R5.**	**Complete**	ENSC agrees with this recommendation, which was implemented.	**N/A**	Complete
39	Continue the implementation of the new savings calculation method using the modeled energy consumptions from HOT2000: ENSC rapidly implemented the new savings calculation method in the tracking sheet following the recommendation in the 2012 evaluation report. However, the former method using the EnerGuide points was still used in 2013 for 24 percent of participants. For the new participants to come, ENSC should put in more effort to obtain the modeled energy consumptions from NRCan and apply the new method.	**LIH-R6.**	**Complete**	ENSC agrees with this recommendation and continues to require Delivery Agents to submit H2000 files to NRCan and receive data transfers from NRCan.	**N/A**	Complete
40	Conduct a pre-evaluation interview with homeowners: Again this year, the Evaluator noticed that CEAs rarely conducted a full pre-evaluation interview as required by the NRCan guidelines. As observed in 2012, the homeowner was not well prepared for the assessment, since the CEA had difficulty accessing major areas of the home (house foundation and attic). The CEA had to make an assumption for the house foundation; the assumption seemed to be relevant, but could still increase the error margin on the space heating consumption. Moreover, during this interview, the CEA could give a brief summary of the LIH process so as to spend time communicating energy efficiency principles during the on-site visit.	**LIH-R7.**	**Complete**	ENSC agrees with this recommendation. ENSC has talked with the Delivery Agents about the pre-evaluation interview and stressed the importance of clearly describing how to prepare for the energy assessment when they set up the appointments with clients. Additionally, ENSC has added some key points on how to prepare for the assessment in the welcome letter that all clients receive when their application is approved.	**N/A**	Complete
41	**Adapt the next tracking system (DSMDS) to the QA program:** A QA program will be fully implemented by ENSC in 2014. This continuous process will involve reviewing a sample of files of HOT2000 simulation results compared with low EnerGuide ratings or high delta EnerGuide. The Evaluator commends ENSC on this action and recommends that these review results be tracked in the DSMDS. However, the Evaluator is aware that this process might take time to be perfectly implemented. In the meantime, ENSC can track the QA results on a separate spreadsheet using an identification number that allows merging the information easily with the tracking system. Moreover, the QA results should include the identification of the CEAs who conducted each assessment to provide more support or training to CEAs with less experience.	**PP-R1.**	**Deferred**	ENSC agrees with this recommendation. The DSMDS is the long term goal, however in 2014, results of all QA activities will be tracked in Excel tracking sheets. The DSMDS is not currently able to accommodate the QA results. Excel tracking sheets will be used in the short term until the DSMDS can be developed to document and track this information.	**Consideration in future years**	Deferred for consideration in future years

	B	C	F	G	I	M
1			As Shared with DSM Advisory Group November 2015			
2	**Recommendation Text**	**Source**	**Status**	**Comments**	**Expected Period of Completion**	**Updated February 2015**
42	**Give more ecofriendly advice to homeowners:** CEAs should stress the importance of indoor air quality and the benefits of energy-saving practices to homeowners. These elements are covered in the ecoEnergy protocol and in the standardized Energy Efficiency Evaluation Report, but they should also be mentioned during the assessment visit in order to provide interactive tips to homeowners. Indeed, the Evaluator finds this part of the home assessment to have been slightly lacking. Answering technical questions from clients (proper setting of thermostats and relative humidity, proper operating conditions of high-efficiency heat recovery systems, etc.) and transmitting ecofriendly advice would improve participants' satisfaction and help them acquire good energy-saving habits. In addition, CEAs could take part in technical workshops organized by the DAs or through ENSC's QA program to continuously update their skills on this matter. More specifically, these training sessions could target CEAs with less experience and that are therefore less comfortable answering some of the customers' questions.	**PP-R2.**	**In Progress**	ENSC agrees with this recommendation. There is great value in providing this information to participants and program partners. However, some of the information requested is highly specialized. ENSC will provide information on indoor air quality and humidity via a technical document. The technical document is nearing completion and is expected to be finalized in December 2014. ENSC is no longer considering offering training in 2014, due in financial constraints.	**Q4**	Complete
43	**Require that all CEAs take photos during the assessment visits:** Taking photos during the on-site visits is not required in the ecoEnergy protocol, but the Evaluator recommends that this practice become mandatory for the CEAs working for ENSC. This would provide a visual record of the finished houses and all the mechanical systems. This would also improve the accuracy of the advisor's reviews conducted through the QA program, particularly when elements in the ecoENERGY Data Collection Forms are difficult to understand. The photos taken by both CEAs during the Evaluator's on-site visits were useful to validate some of the input data of HOT2000 simulations. It should be noted that one DA has already asked all its CEAs to take photos during the assessment visits.	**PP-R3.**	**Complete**	ENSC agrees with this recommendation. The requirement has been included in all Service Organization contracts signed as of September 2014.	**N/A**	Complete
44	**Continue using a new house EnerGuide baseline of 78 while following the evolution of the market:** Different sources were analyzed during this evaluation to review the new house EnerGuide baseline used in the gross savings calculation. The conclusion is that, even if energy efficiency behaviors for the Nova Scotia new house market have evolved in the recent years, the EnerGuide baseline of 78 is still adequate. This value corresponds to the average energy efficiency performance level, obtained with HOT2000 version 10, reached when building a house that complies with the Building Code in Nova Scotia. This Code was adopted in Nova Scotia in 2010 and was still in force in 2013. The Evaluator's review indicates that it represents the standard practice in the new house market. However, it is recommended that ENSC keeps following the evolution of the market in the upcoming years in order to adjust the baseline if there is a sign that the current baseline no longer represents the standard practice. A simple review that could allow for this follow-up is the analysis of the EnerGuide ratings obtained when modeling the house to Code (Building Code Base). This information is available for some houses submitted to Performance Plus.	**PP-R4.**	**Complete**	ENSC agrees with this recommendation and continues to use a new house EnerGuide baseline of 78 while following the evolution of the market.	**N/A**	Complete
45	**Stop tracking unitary savings values for prescriptive measures:** During this evaluation, the Evaluator validated the impact of the prescriptive measures implemented in 2013 through Performance Plus, i.e., CFLs, DWHR, pipe insulation and programmable thermostats, on the EnerGuide rating modeled in HOT2000. The analysis demonstrated that these four types of prescriptive measures, now entered as an energy credit in the HOT2000 software, impact the EnerGuide rating. Therefore, the Evaluator did not consider any additional unitary savings values for prescriptive measures in the 2013 evaluation and recommends that ENSC stop tracking unitary savings values for these measures.	**PP-R5.**	**Complete**	ENSC agrees with this recommendation and has stopped tracking unitary savings values for prescriptive measures as of Q1.	**N/A**	Complete
46	**Export data with only validated participants:** For the next evaluation, the tracking sheet extracted from the DSMDS and used for evaluation purposes should only include validated participants (who completed a project and received an incentive within the evaluated year) and not applicants with incomplete status, who cancelled or reregistered. This would facilitate verification by clarifying which projects are considered by ENSC in the savings calculation for a specific evaluated year.	**PP-R6.**	**In Progress**	ENSC agrees with this recommendation and will only export data with validated participants.	**Q4**	Complete
47	**Perform a short air leakage detection analysis during the blower door test:** Even if it is not mandatory under the ecoEnergy protocol for new houses, the Evaluator considers that air leaks should also be examined during the Performance Plus assessment. Indeed, when air leaks occur in a new house, they represent an important part of heating consumption and a vector for condensation problems. Older houses rarely have condensation problems because they are so leaky that the relative humidity remains lower. However, in a tighter house, the relative humidity goes up and can cause envelope damage. Air leakage detection during the blower door test would provide an opportunity to check on builders' practices and to give them feedback, which would be the first step of a continuous improvement process for builders. It would also allow the CEA to give some advice to the homeowner on how to fix some of the leaks that were detected.	**PP-R7.**	**Complete**	ENSC agrees with this recommendation. The requirement has been included in all Service Organization contracts signed as of September 2014.	**N/A**	Complete

	B	C	F	G	I	M
1			As Shared with DSM Advisory Group November 2015			
2	**Recommendation Text**	**Source**	**Status**	**Comments**	**Expected Period of Completion**	**Updated February 2015**
48	For this first year where a HOT2000 simulation review was conducted, the Evaluator noted the difficulty of gathering all the necessary documents and recommends that ENSC, along with its DAs, be more prepared in the next years for such requests and, once the DSMDS is implemented, should have these documents accessible on the online system.	**PP-R8.**	**In Progress**	ENSC agrees with this recommendation and will ensure all the necessary documents are provided for future HOT2000 simulation reviews. The DSMDS is still in development, however, and will not be able to accommodate this information before year-end.	**2015**	Complete
49	**Continue to provide the participant information sheets and thank you cards for building managers/superintendents:** The tenant information and energy-savings tips sheet received positive feedback from both the DA and participants and should continue to be used to communicate directly with tenants about energy efficiency products. The Evaluator recommends that this sheet be distributed systematically, especially considering survey results indicating that more information on the products being offered would be welcome. Indeed, on-site visits revealed that the information sheet was left behind only to convey a message or explain something specific about the installation. Again in 2013, the DA identified limited assistance from building managers/superintendents as one of the main barriers to MURB delivery. As a way to improve communication and increase their assistance in the MURB process, the Evaluator also recommends continuing to provide thank you cards to building managers/superintendents.	**MURB-R1.**	**Complete**	ENSC agrees with this recommendation and has implemented it in Q1.	**N/A**	Complete
50	**Move forward with the planned transition for CFLs to LED in 2014:** The on-site visits revealed that a non-negligible number of regular CFLs were already installed in MURB tenant units at the time of the DA's visit. This is a sign that more and more tenants are choosing to install CFLs instead of incandescent bulbs. This finding is consistent with the higher level of free-ridership observed for lighting measures (mostly CFLs) in comparison with DHW measures. Furthermore, the new federal regulation gradually banning incandescent bulbs has come into effect on January 1, 2014, which will eventually make CFLs the new standard. All these elements indicate that ENSC has made the right decision by planning to transition from CFLs to LEDs in 2014, and consequently, the Evaluator recommends that they move forward with this transition.	**MURB-R2.**	**Complete**	ENSC agrees with this recommendation and has implemented this transition as of June 2014.	**N/A**	Complete
51	**Continue improving and maximizing the use of the electronic handheld devices; the electronic device that was used by DAs starting in September proved to be very effective at gathering a large quantity of information:** At the moment, it is not possible to import all this information by unit into the main report extracted from the DSMDS, but ENSC is working on this issue. The Evaluator commends ENSC for this major improvement and recommends that additional data be collected through this device to better inform the calculation of unitary savings. For example, the locations of installed CFLs, the number of faucets per unit and the size of the DHW tank would allow a more precise calculation of the unitary savings values and interactive effects.	**MURB-R3.**	**Complete**	ENSC agrees with this recommendation. Upgrades have been made to improve data collection using hand held devices.	**N/A**	Complete
52	**Gather additional data in the DSMDS to closely monitor MURB's participation level:** In 2013, the way the information was tracked in the DSMDS did not allow accurate monitoring of the tenant unit participation level. Without any accurate indicators to allow analyzing the participation level, variations in savings from past years are more difficult to explain. It also makes it difficult to assess the effectiveness of ENSC's new marketing strategy for encouraging participation. The Evaluator therefore recommends that the electronic handheld device be used in conjunction with the DSMDS to extract additional metrics such as the number of units per building, the total number of buildings, the average savings per units, etc. It should be noted that ENSC is already aware of this issue and is currently implementing these changes in the DSMDS. The Evaluator thinks that a better understanding of the participation trends will result in a better marketing strategy to maximize savings.	**MURB-R4.**	**Complete**	ENSC agrees with this recommendation and is now collecting additional information as of Q1.	**N/A**	Complete

	B	C	F	G	I	M
1			As Shared with DSM Advisory Group November 2015			
2	**Recommendation Text**	**Source**	**Status**	**Comments**	**Expected Period of Completion**	**Updated February 2015**
53	**Consider adjusting the hours of operation used in the unitary savings calculations for lighting products in the upcoming years:** New studies that metered the hours of operation of residential lighting were found during this evaluation, but the Evaluator concluded that the hours of operation coming from the Hydro-Québec study should still be used for this year because of the similar market characteristics that the provinces of Quebec and Nova Scotia have. On the other hand, the Evaluator noted that the Hydro-Québec study only metered the hours of operation of CFLs. Certainly, it can be assumed that the CFLs installed first were installed in sockets that had the longest hours of operation to maximize the investment in more expensive bulbs. Yet, as the market evolves, the incandescent and halogen lamps to be replaced by CFLs or even LEDs will be lamps with lower hours of operation. Consequently, ENSC may have to consider adjusting the hours of operation for their savings calculations in the upcoming years. While a metering study in Nova Scotia would be the most accurate way of estimating operation hours, a more affordable option could be to use the DOE study and potentially adjust the number of sockets per household when using its findings.	**MURB-R5.**	**Deferred**	ENSC appreciates this recommendation; however, ENSC intends use a more cost-effective approach. A literature review will be conducted in 2015.	**2015**	Deferred for implementation in 2015
54	The Econoler team had to rely on the data for the entire Province of Nova Scotia, since information on space heating was only entered manually on paper installation forms, while space cooling was not collected. It is therefore recommended to add a field for the type of cooling systems for 2014 and to enter both pieces of information into the DSMDS.	**MURB-R6.**	**Complete**	ENSC agrees with this recommendation and began collecting this information as of Q1.	**N/A**	Complete
55	**Deploy efforts to increase awareness of the two incentive options:** Two incentive options are offered under Solar: a rebate and zero-interest financing. Participant survey results indicated there was only moderate awareness of the zero-interest financing option. Furthermore, discrepancies were observed between the incentive option participants declared having chosen and the one they actually chose, as indicated in the ENSC tracking sheet, suggesting that the terms 'rebate' and 'financing' were perhaps not well understood by participants. Considering that the incentive options were the primary motivation for participating in Solar, increasing awareness of both incentive options may serve to increase overall interest and participation and eliminate confusion among participants.	**SOLAR-R1.**	**In Progress**	ENSC agrees with this recommendation and will work to deploy tactics and improve messaging to raise awareness of the incentive options available for Solar. A rack card highlighting both incentive options has been developed. Revisions have been made to the applications that highlight both incentive options.	**Q4**	Complete
56	**Examine current documentation regarding Solar to provide more information on the technology:** Participant survey results indicated there was a high level of satisfaction with Solar, with very few changes needed. However, participants who were not entirely satisfied with Solar indicated that the information was difficult to understand and that there were no rebates offered for certain measures, or they did not have sufficient information about the technology. As such, ENSC may want to review current Solar information to determine if it could be clarified or expanded. In addition, it may be beneficial to include a contact list of contractors for participants to choose from, which was also identified by participants as a way to improve Solar.	**SOLAR-R2.**	**In Progress**	ENSC agrees with this recommendation. ENSC has developed new marketing material and added the Solar homeowners guide to the website, which provides information on various solar technologies. In Q4, the Program Manager is planning to review and update the website content and plans to add a link to the Solar NS installer directory.	**Q4**	Complete
57	**Change the current energy savings calculation methodology for solar combined systems:** Site visits indicated that participants with many collectors seemed to have greater needs for hot water, which would reduce the opportunity for the system to heat the space, and that they also needed a great amount of tuning for their system to work properly. Considering this, the Evaluator believes that too little energy is likely to be transferred for space heating and that it would be more appropriate to calculate the savings based on a system dedicated to DHW only. Therefore, ENSC should stop applying a space heating unitary savings value for combined systems and should consider that all system collectors are dedicated to DHW heating in its RETScreen model.	**SOLAR-R3.**	**Complete**	ENSC agrees with this recommendation and has stopped applying a space heating unitary savings value for combined systems and considers that all system collectors are dedicated to domestic hot water heating in its RETScreen model.	**N/A**	Complete
58	**Collaborate more closely with distributors:** The short time frame for implementing rebates proved problematic for distributors, in some instances requiring the distributor to absorb losses as a result of the late introduction of a rebate. Furthermore, this issue appeared to have limited the number of applications submitted in 2013 for BER Instant Rebates. However, the experience with the reduction of the LED rebate showed that if ENSC is not careful with its announcement, inventory purchases can occur, which increase program expenditures but do not provide any savings to the program. ENSC should therefore be careful with its advanced notices and should analyze, for each one, the best way and time to provide information to distributors regarding any modifications affecting the delivery and levels of incentives.	**BER-R1.**	**Complete**	ENSC agrees with this recommendation, which was implemented.	**N/A**	Complete

	B	C	F	G	I	M
1	**Recommendation Text**	**Source**	**As Shared with DSM Advisory Group November 2015**			**Updated February 2015**
2			**Status**	**Comments**	**Expected Period of Completion**	
59	**Review current rebate tracking and reporting processes, with an eye toward timeliness and structure:** There were several issues raised by distributors regarding rebate processing, tracking and reporting, and ENSC should therefore review current processes to determine if adjustments are necessary. More specifically, one distributor noticed a discrepancy in the measures that were approved for rebates, while there were also issues noted with the length of time for claims to be reviewed. It is recommended that more timely and structured claim processing approval timelines are implemented to align with distributors' provision of service to their customers.	**BER-R2.**	**In Progress**	ENSC agrees with this recommendation. ENSC is changing its approval process and moving towards an approved list (Energy Star, Design Light Consortium, etc.). This recommendation is expected to be fully implemented by the end of 2014, which will eliminate the need for approvals for most of BER's lighting categories.	**Q4**	Complete
60	**Implement some automation in the calculation of savings in the DSMDS and enter each variable separately:** At the moment, the PM manually inputs into the system the equation as well as the values for each specific piece of equipment. This situation induces human error and does not take full advantage of the power of the DSMDS. In order to get the most out of the DSMDS, some level of automation should be implemented in the savings calculations so that the correct equations appear when a measure is selected. As was the case in 2011 and 2012, the values used for the savings calculations are contained in one cell. This approach to calculation entry hinders the systematic savings validation for each measure. Having separate cells for each variable (for example, unit quantities, wattage, horsepower, efficiency ratio and operational hours) would make the validation more efficient and reduce the likelihood of data entry errors. However, the Evaluator understands that due to the large number of different eligible measures, this might be difficult to implement within a short timeline.	**BER-R3.**	**Complete**	ENSC agrees with this recommendation. ENSC has made improvements to how calculation variables are captured.	**N/A**	Complete
61	**Ensure better completion of the project documentation:** The BER worksheet provides valuable information for the on-site visits and subsequent savings calculations, as the participant must indicate the characteristics of the old and new equipment. It is also the main source of information to validate the quantity of each measure implemented and to determine the rebate. This year, some worksheets were incomplete or had not been filled out using the standard template, which made it difficult for the Evaluator to ensure that tracked savings were accurate. Additionally, more information could be gathered in the worksheets to better understand the intended usage of equipment, and more specifically the old and new hours of operation. In many cases this year, savings were adjusted by the Evaluator because the hours of operation considered by ENSC did not take into account seasonal variations or specificity of the systems being replaced. Adding simple questions such as "Will the equipment be used the same number of hours per week all year round?" to the worksheet could avoid those errors. Another element is the missing entries that were identified in the DSMDS, namely some contact information and answers to pre-screening questions. A more systematic review of the project information should be put in place to avoid having incomplete information that would hinder the subsequent evaluation activities.	**BER-R4.**	**In Progress**	ENSC agrees with this recommendation. Improvements have been implemented to the documentation to ensure ENSC is collecting the necessary information. All worksheets are being updated to reflect this recommendation. Completion of the updates is expected in early 2015.	**2015**	Complete
62	**Implement a follow-up procedure and the QA program to ensure that customers are satisfied with their BER Mail-In refrigeration projects:** In 2013, six of the 17 projects visited in the refrigeration category experienced various forms of malfunctioning of the new evaporator fan motors. In two projects, the electronically commutated motors (ECMs) stopped operating a few weeks after their installation and had to be replaced. In four other projects, severe frost accumulations on the walk-in freezers evaporator coils occurred after the installation of the evaporator fan controllers, which led to the eventual disconnection of the fan controllers. The comments gathered during the on-site visits seemed to indicate that the contractors' responses and solutions regarding the freezing evaporator coil problems did not satisfy all the participants. Moreover, the participants' impression was that the contractors were employed by ENSC and therefore, their performance reflected poorly on ENSC. It is therefore recommended that ENSC follow up with these participants to ensure that their refrigeration equipment now works properly and that they are satisfied with the problem-solving and the program itself. Furthermore, it is recommended that the contractors who did the installation submit a report explaining the source of the freezing coil problem and the solution provided. This would help the same contractors prevent similar problems from occurring in the future. The QA program implemented by ENSC in 2013 should also be used to ensure that these situations do not occur anymore.	**BER-R5.**	**In Progress**	ENSC agrees with this recommendation. ENSC has discussed this issue with the contractors in question, and end-users who dealt with the contractors in question will be contacted to see if they are satisfied or if they have been experiencing any issues. Based on the results of this participant survey, ENSC will consider whether it is necessary for the contractors to submit a report on the issue.	**Q4**	Complete. This has been partially implemented. ENSC contacted all the participants affected. ENSC did not ask contractors to submit a report as it was one particular contractor, who has been suspended from program due to these incidents.

	B	C	F	G	I	M
1	**Recommendation Text**	**Source**	**As Shared with DSM Advisory Group November 2015**			**Updated February 2015**
2			**Status**	**Comments**	**Expected Period of Completion**	
63	**Consider demand savings only for heat pumps with a minimum outdoor temperature limit lower than the lowest temperature in Nova Scotia:** The equation used by ENSC to calculate demand savings is based on the HSPF value provided by the manufacturer. Specifications of heat pump models presented in the tracking sheet show that standard heat pumps will exceed their working limits at a temperature significantly higher than the typical minimum temperature encountered in Nova Scotia. The Evaluator recommends that ENSC start considering demand savings only for heat pumps that have outdoor working temperature limits lower than the lowest temperature encountered in Nova Scotia. In order to identify those heat pumps that will have an impact on the demand, the Evaluator recommends adding a field in the tracking sheet to specify the outdoor temperature limits of the heat pump and use this information for demand savings calculation.	**BER-R6.**	**In Progress**	ENSC agrees with this recommendation. ENSC will review and make the required changes to forms and adjust demand savings calculations. These changes will be implemented in 2015.	**2015**	In Progress for implementation in 2015
64	**Implement the modifications suggested in the past two years for the savings calculations in BER Instant Rebates:** It was found that very few of the modifications recommended for the savings calculations in last year's evaluation report were made this year. Therefore, many recommendations were stated again in this report. Most of those recommendations were related to modifications to the operating hours. Additionally, the recommendation to include the ballast factor and ballast consumption in both the new and old wattage for lamps should be put in place.	**BER-R7.**	**In Progress**	ENSC agrees with this recommendation. ENSC has begun to make the requested changes. These modifications will be implemented by the end of 2014.	**Q4**	Complete
65	**Consolidate all the information collected from the monthly reporting sheets:** The official yearly tracking sheet for BER Instant Rebates only provides overall figures, i.e. the monthly savings for each distributor. However, the detailed information on the products sold by each distributor or the savings values for each product code is only available in the monthly tracking sheets. Consequently, the Evaluator recommends consolidating all the information contained in the individual monthly reporting sheets and the master list of products into one comprehensive tracking sheet, which would facilitate monitoring the products sold yearly through BER Instant Rebates and thereby make it easier to calculate program savings. For instance, the information provided in the Database tab of the monthly tracking sheet could be used in the master tracking sheet and be expanded to include the category to which each product belongs. This would greatly facilitate the application of different NTGRs and interactive effects factors according to the category of product.	**BER-R8.**	**Complete**	ENSC agrees with this recommendation, which was implemented.	**N/A**	Complete
66	**Supplement the information required in the monthly reporting sheets:** In addition to consolidating the monthly report data (see previous recommendation), the Evaluator recommends improving the information required in the monthly reporting sheets in order to facilitate the analysis of each distributor or product category (electronic ballasts, T8 lamps, etc.). The modifications that were made manually this year in the compiled tracking sheet should be kept, namely adding three columns to respectively identify the distributor, the tracking month, and the category of product. The revised template would provide the PM and the Evaluator with a way to better monitor the program results by including both savings and product sales.	**BER-R9.**	**Complete**	ENSC agrees with this recommendation, which was implemented.	**N/A**	Complete
67	**Clean up the Master Product Code List:** Some discrepancies were observed in the calculations used for occupancy sensors for lighting applications, as well as for the hours of operation of many lighting products. It is therefore recommended that a thorough cleanup be done to ensure that all savings comply with the results of this evaluation and are consistent in 2014.	**BER-R10.**	**In Progress**	ENSC agrees with this recommendation. ENSC is in the process of reorganizing the BER Instant Rebate program component, and will have this recommendation completed for 2015.	**2015**	Complete
68	For commercial lighting measures, one persistent issue is the validation of the wattage of the old products. Typically, participants discard the old products and, unless it is an obvious error, the Evaluator must rely on the claimed wattage, which might be inaccurate due to the participants' lack of technical knowledge. Therefore, it is recommended that a standard baseline value be used for replaced lamps wattage in order to avoid using inaccurate values declared by participants.	**BER-R11.**	**Not Recommended for Action**	Upon further review, ENSC believes the data collected from Mail-In participants provides the necessary information and market intelligence to set new baselines.	**Not recommended for action**	Not Recommended for Action

	B	C	F	G	I	M
1	**Recommendation Text**	**Source**	**As Shared with DSM Advisory Group November 2015**			**Updated February 2015**
2			**Status**	**Comments**	**Expected Period of Completion**	
69	For two commercial refrigeration measures, some technical problems occurred and were expressed during this year's on-site visits. One issue experienced by five participants was the build-up of ice on their freezer evaporator coils. At one location, the Evaluator was able to discuss the issue and subsequent resolution with the refrigeration technician. It was determined that some evaporators are designed to have a minimum amount of airflow across the evaporator coil. It appears that the low speed on the new evaporator fan motors does not meet this requirement, and the result is significant ice build-up. In this particular case, the evaporator fan controls were disconnected and the fan runs only at high speed. The savings calculations for this project were adjusted accordingly. In two other projects, the fan motors were replaced shortly after installation due to premature failure. The Evaluator recommends that the contractors submit a validation of existing evaporation coil airflow requirements prior to the rebate approval or contractor acceptance into BER.	**BER-R12.**	**In Progress**	ENSC agrees with this recommendation. These issues had been investigated and resolved. ENSC is currently exploring whether to implement a pre-approval requirement on Electronically Commutated Motors/controls in 2015.	**2015**	Complete
70	The validation of one refrigeration measure was challenging for the Evaluator. The refrigerator door heater controls could not be found in most cases, and the on-site personnel had no knowledge of what was or was not installed. Therefore, door heat control savings were not included in the savings calculations for the sampled projects. However, this measure represented a very small portion of the total savings. To improve validation of this measure for next year, it is recommended that the contractor attach a sticker, such as the company logo, on the doors or the backside of the equipment for which the measure was implemented.	**BER-R13.**	**Deferred**	ENSC will investigate this recommendation in future years.	**Consideration in future years**	Deferred for consideration in future years
71	All ECM projects in the commercial refrigeration category were adjusted to reflect 8,760 hours per year. This value is also supported by the 2011 Efficiency Vermont Technical Reference Manual (TRM). Thus, the Evaluator believes that this should be adjusted in the next revision of the BER – Measure Equations Tool. In addition, Vermont has also identified a new equation specifying the application type and with a slight reduction in hours of operation for freezer applications. As the application type was not always available in this year's impact evaluation, this new equation was not used for this analysis. However, the Evaluator recommends that the application type be collected in the future, to allow the Vermont equation to be used.	**BER-R14.**	**In Progress**	ENSC agrees with this recommendation. Implementation is expected to be complete in 2015.	**2015**	Complete
72	For motor and VSD measures, Efficiency Vermont recommends algorithms based on the kWh and kW savings claimed by the participant multiplied by the operational testing factor (OTF). Since these claimed savings are not available from the participants, the conservative values based on the BER – Measure Equations Tool were used for the energy and demand savings calculations. However, it is recommended to contact any future participants installing VSDs on motors greater than 10 hp to obtain more information so the calculations can be performed with more accuracy.	**BER-R15.**	**In Progress**	ENSC agrees with this recommendation. Implementation is expected to be complete in 2015.	**2015**	In Progress for implementation in 2015
73	Since no information is collected on the sensors' application this year, it is difficult to determine if using average values for the savings is appropriate. Because the value used by ENSC is conservative, the Evaluator recommends that it remain unchanged for 2013. However, the interactive effects factor should be removed from the equation as those are accounted for in the final tracking sheet and determined to be -13% for lighting products under BER Instant Rebates (see section 5.3). To improve the accuracy of savings for 2014, it is recommended that the distributors collect the intended purpose of the rebated occupancy sensors, based on a standardized choice of answers, and include it their monthly reports.	**BER-R16.**	**Not Recommended for Action**	ENSC appreciates this recommendation. Logistically, it is challenging for distributors to collect this information and ENSC templates are not built to collect the intended uses of products. Categories for occupancy sensors have been better defined, which should result in a more accurate savings number.	**Not recommended for action**	Not Recommended for Action
74	**Improve the method for diversity factor calculations and document the assumptions used:** As in 2011 and 2012, the Evaluator team observed that diversity factors used by ENSC for calculating peak demand savings were generally obtained by dividing annual operation hours by the total of hours in one year (8,760 hours). This practice is inappropriate and does not reflect the actual demand savings achieved during the peak period of electricity demand in Nova Scotia. Since an operating schedule can be easily made available by the program participants for each piece of the retrofitted equipment, it is possible to refine the peak demand calculations to ensure that the diversity factor calculated only takes into account whether the retrofitted equipment is operating during the peak period and, if so, at which load factor and duty cycle (if applicable). To facilitate these calculations, ENSC's standard calculation tools (e.g. the lighting retrofit spreadsheet) could be modified to allow for the collection of each piece of equipment's operation schedule and load charge.	**Custom-R1.**	**Deferred**	ENSC agrees with this recommendation. Implementation will occur in 2015.	**Consideration in future years**	This recommendation is in the process of being implemented.

	B	C	F	G	I	M
1	**Recommendation Text**	**Source**	**As Shared with DSM Advisory Group November 2015**			**Updated February 2015**
2			**Status**	**Comments**	**Expected Period of Completion**	
75	**Create new standardized calculation tools to estimate energy savings from energy efficient measures that are not lighting retrofits:** As was the case in 2011 and 2012, extensive use of ENSC's standard spreadsheet was made during Custom Retrofit lighting retrofit projects to estimate the energy and demand savings to be achieved by their project. However, home-made spreadsheets and methodologies were usually used to estimate the potential impacts of the other types of project, such as variable speed drive installation, motor replacement or refrigeration projects. This situation made the tracking, verification and independent evaluation of the energy and demand savings achieved under Custom Retrofit more complex. Moreover, this practice tends to increase the likelihood of errors in energy and demand savings calculations. The Evaluator considers that a number of standardized savings calculation tools could be developed for the most common non-lighting projects (motors, VSDs, etc.). Furthermore, a number of simple software tools are already available (e.g. RETScreen) and could also be used within Custom Retrofit to compute the energy and demand savings of certain projects, such as refrigeration, building envelope and HVAC projects.	**Custom-R2.**	**In Progress**	ENSC agrees with this recommendation. The tools used by a consultant during the feasibility study are thoroughly reviewed and then carried forward through the measurement and verification stages to ensure project document consistency. Templates for some common measures (as mentioned in Custom-R2) will be developed and implemented. The standardized calculation tool is nearly complete and is currently being reviewed by the evaluator.	**Q4**	Complete
76	**Consider performing independent M&V on large Custom Retrofit projects:**. Although M&V is already included in the participation process of a project, ENSC should envisage performing independent M&V if the project generates a significant amount of energy savings (e.g. more than 500 MWh/year) or if it receives a substantial incentive (e.g. higher than $80,000). Moreover, the Evaluator considers that independent M&V could also be conducted on projects for which savings to be achieved depend heavily on equipment operating conditions, particularly those involving industrial components such as compressors, variable-speed drives and manufacturing equipment.	**Custom-R3.**	**Complete**	ENSC agrees with this recommendation. This recommendation has been met through the completion of the measurement and verification procedures. As of Q4 2013, the Custom team now performs independent measurement and verification on those projects involving a third-party measurement and verification firm.	**N/A**	Complete. ENS asserts that the decision to perform independent M&V is not solely based on an energy savings or incentive threshold. The decision is made on a case-by-case basis and also considers the project's impact on the Custom portfolio (i.e. amount of energy savings, project budget available to cover the costs of independent M&V, the project carries an associated ENS liability). The evaluator identified this recommendation as partially implemented.
77	**Develop guidelines for identifying potentially problematic projects:** Guidelines (in percentage) could be developed to trigger projects that may be claiming too much energy or demand savings for the type of energy efficiency measure being implemented. Such guidelines could provide, in percentage, a range of savings to be achieved by each type of measure. This range could be based on a literature review of other similar Custom programs in North America as well as on ENSC' past experience. The projects triggered by these guidelines could then be further reviewed, either by ENSC or an independent technical professional.	**Custom-R4.**	**In Progress**	ENSC agrees with this recommendation. A Custom screening tool is under development and is intended to capture expected energy savings by measure based on ENSC historical figures and appropriate reference material. The screening tool is currently being reviewed by the evaluator. Implementation is expected to occur in Q4.	**Q4**	In progress. Development of a screening tool was completed in 2014. Implementation will occur in 2015.
78	**Retain the spillover assessment approach used in 2013 under Custom Retrofit evaluation in the future:** For 2013, the Evaluator elected to use a new approach to evaluate spillover effects under Custom Retrofit. In spite of using a traditional telephone survey as in previous years, the Evaluator used in 2013 the on-site visits to inquire directly with the participants about any potential spillover effects. Overall, the Evaluator considered that this new approach allows collection of more information on the possible additional energy efficiency measures implemented after participation in Custom Retrofit. Moreover, this approach enabled the Evaluator to verify the appropriate installation and operation of the new energy efficiency equipment through the on-site visits, which increases the precision of the calculations of spillover impacts. Although a small spillover level was observed this year (1%), this approach should still be retained in future evaluation since it can be conducted as part of the project verification site visits and henceforth, does not require additional budget.	**Custom-R5.**	**In Progress**	ENSC agrees with this recommendation. The 2013 spillover calculation methodology will be carried forward in 2014 as discussed in this recommendation; however, additional supporting documentation will be provided from ENSC so that the evaluator is able to accurately ascertain savings associated with participant spill-over.	**Q4**	Complete
79	**Include a contact name, full facility address, phone number and email address:** This information was provided after a request from the Evaluator. This should be standard information already included in the tracking sheet. The facility address should be entered with all the fields properly separated (civic number, street name, city, postal code).	**Custom-R6.**	**Complete**	ENSC agrees with this recommendation, which has been adopted into the current 2014 program evaluation plan.	**N/A**	Complete

	B	C	F	G	I	M
1			As Shared with DSM Advisory Group November 2015			
2	**Recommendation Text**	**Source**	**Status**	**Comments**	**Expected Period of Completion**	**Updated February 2015**
80	**Compile the results of the free-ridership pre-screening process:** ENSC should systematically compile the data from the answers participants give to the free-ridership pre-screening questions. This would allow the PM to monitor whether approved participants had been identified as free-riders. Also, the Evaluator utilizes the free-ridership answers to calculate the free-ridership rate, and including them in the tracking sheet would make for easier calculation.	**Custom-R7.**	**Complete**	ENSC agrees with this recommendation. This has been documented in the Project Development Agreements since 2012. In 2014, it was also adopted into the program evaluation plan for easy reference.	**N/A**	Complete
81	**Include a separate column for the NTGR:** Currently, the tracking sheet does not indicate that the savings shown at the top of the sheet are inclusive of the NTGR. The NTGR should be listed in a separate cell to allow for easier verification and, if necessary, possible modification.	**Custom-R8.**	**Complete**	ENSC agrees with this recommendation. This has been adopted into the current 2014 program evaluation plan.	**N/A**	Complete
82	**Include comments in separate cells:** Several cells in the savings calculation section contain pertinent information and explanations in comment bubbles. Considering the large size of the database, it may be helpful to present this information in a way that facilitates tracking. Create a column named "Comments" where important comments on the project status or adjustments to the savings values could be written.	**Custom-R9.**	**Complete**	ENSC agrees with this recommendation. This has been adopted into the current 2014 program evaluation plan.	**N/A**	Complete
83	**Develop a standardized nomenclature to name and classify the electronic files:** As in 2012, this recommendation was motivated by difficulties encountered by the Evaluator when searching for technical specifications, formulae and assumptions used for savings calculations. A nomenclature for naming and classifying project documents already exists in the program manual, but it seems that it is not being systematically applied. In some circumstances the documents did not contain the project number and was simply listed as C-XXXX. In addition, it was difficult to determine which version of the document was the most up-to-date.	**Custom-R10.**	**Complete**	ENSC agrees with this recommendation, which was implemented.	**N/A**	Complete
84	**Include the peak coincidence factor for each project:** This recommendation was mentioned in the 2012 Evaluation Report based on ENSC's feedback that it would be implemented in 2013. As it has not been implemented in 2013, it is recommended for inclusion in 2014's tracking sheet. The peak coincidence factor is required for the peak demand savings algorithm.	**Custom-R11.**	**Complete**	ENSC agrees with this recommendation, which has been adopted into the current 2014 program evaluation plan.	**N/A**	Complete
85	**Stop using the Internet survey for evaluating free-ridership:** Considering the very low number of answers collected through the Internet survey in 2013, which prevented using this approach for the free-ridership level calculation, the Econoler team recommends that ENSC stop using the Internet survey for evaluating free-ridership. The approach used in 2012 and 2013 (interviews during on-site visits) resulted in the collection of more information and should, therefore, be used for the next Custom NC evaluation.	**NC-R1.**	**Complete**	ENSC agrees with this recommendation. The internet survey is not being used in 2014.	**N/A**	Complete
86	**Conduct a calibration analysis of the models used in previous years:** As in previous years, the 2013 evaluation of energy and demand savings claimed does not comply with the best practices for performance measurement and verification (M&V) in new construction, such as those defined in the International Performance Measurement and Verification Protocol (IPMVP). This situation is mainly due to the limited timeframe allocated to perform the evaluation of this program component. In fact, the best M&V approach would be to collect actual energy consumption and demand data of the new buildings, in order to compare them with the base case energy consumption and demand figures simulated before project implementation. Such a comparison enables verifying whether the building simulation reflected the actual energy profile of the new building. However, at least one year of data would be required to conduct such an analysis. Moreover, the monthly energy consumption and demand data of the first months after the completion of a building construction do not necessarily reflect accurately its energy profile, due to the low occupancy situation and building commissioning that typically happens during this period. Therefore, the Evaluator recommends that ENSC collects historical energy consumption and demand data of a number of previous years' projects and compare them with the simulation results, in a view to inform the need for calibrating or independently reviewing the simulations currently being used as part of Custom NC.	**NC-R2.**	**In Progress**	ENSC agrees with this recommendation and is currently in the process of obtaining this information.	**Q4**	Complete
87	**Adopt the NECB 2011 as a baseline for all new projects in 2014:** The literature review conducted as part of 2013 evaluation revealed that more stringent baseline construction designs are currently being used in similar new construction programs in other Canadian jurisdictions. Moreover, the NECB will be enforced in large buildings at the end of 2014 in Nova Scotia. Since a regulation usually sets the minimum efficiency level acceptable, the Evaluator believes ENSC should be proactive and start using the NECB 2011 as the minimal baseline design to calculate savings under Custom NC in 2014. However, only the new projects whose participation in Custom NC has not already been approved should have NECB 2011 as their baseline construction design. Noteworthy is that Custom NC's eligibility criteria should also be modified in accordance with this change of baseline construction design.	**NC-R3.**	**In Progress**	ENSC agrees with this recommendation. ENSC has advised consultants on what measures will and will not be applicable to the program in 2015. New projects are being advised of the updated baseline.	**Q4**	Complete

	B	C	F	G	I	M
1	Recommendation Text	Source	As Shared with DSM Advisory Group November 2015			Updated February 2015
2			Status	Comments	Expected Period of Completion	
88	**Increase the number of simulation external reviews to be conducted:** This year, the Evaluator and the external reviewers interviewed noticed a significant decrease in the number of simulations verified by a third party. While the cost implications of this measure are important, the Evaluator strongly believes that a greater proportion of simulations should be reviewed externally. This could be part of the quality assurance plan that ENSC is going to put forward in 2014. Other tools could be used to better target simulations requiring specific attention and to slightly reduce the number of external reviews to be conducted. Indeed, the LEED Core Performance values, which estimate the savings per unit of floor area to be expected from specific energy efficiency measures, could be used to identify savings values that differ widely from the norm.	**NC-R4.**	**Not Recommended for Action**	ENSC appreciates this recommendation. As a more cost effective approach, a review and analysis of past projects will be conducted for the 2014 evaluation.	**Not recommended for action**	Not Recommended for Action
89	**Ensure documentation completeness and accuracy in both the DSMDS and other tracking tools:** The Evaluator found significant discrepancies between the documentation requirements for each project. Some projects had multiple files available (i.e., energy models, calculations, equipment specifications, etc.) while others contained only a single summary document or FS. Each type of Custom NC project should have a standardized submission requirement checklist. Additionally, the DSMDS and the tracking sheet did not contain the same types of information. ENSC should ensure that both tracking tools are updated on a regular basis in order to ensure consistency. For instance, data on the number of projects to be claimed per year and the project status should be identical in both tracking tools. Moreover, key information already included in the DSMDS, such as the peak demand savings for each project, should also be included in the tracking sheet.	**NC-R5.**	**Complete**	ENSC agrees with this recommendation, which was implemented.	**N/A**	Complete
90	**Eliminate the barrier "illustrating benefits to all parties involved":** The third barrier identified in the logic model, "illustrating benefits to all parties involved", could be eliminated because it is redundant. By overcoming the first two barriers, which are related to the difference between the incentive and the building cost and the lack of awareness about potential savings, all parties involved in these projects will automatically be aware of all the benefits related to this type of program, overcoming the third barrier as well.	**NC-R6.**	**Complete**	ENSC agrees with this recommendation, which was implemented.	**N/A**	Complete
91	**Record the incentives paid to participants by type of building ownership:** For the performance indicators linked to Activities four and five, the incentive paid should be recorded by type of ownership (occupant, operator, etc.) to help the Evaluator when surveying participants. The survey responses could be very different depending on the type of ownership.	**NC-R7.**	**In Progress**	ENSC agrees with this recommendation. Database development work is currently underway.	**Q4**	Complete
92	**Clearly identify the performance indicator of Activity 12:** Finally, the performance indicator linked to Activity 12 should specify that the data on standard practices are meant to increase the net savings targets.	**NC-R8.**	**In Progress**	ENSC agrees with this recommendation, which is currently being implemented.	**Q4**	Complete
93	**Add the feasibility study incentive to the participant process flow chart:** The current participant process flow chart shows the participation steps and the incentives received by participants who opt for the NCEM path. However, it does not include the feasibility study incentive that is also possible under Custom NC. Hence, the Evaluator recommends adding this incentive to the participant process flow chart to inform participants of all program possibilities. Furthermore, the flow chart should have a revision date at the bottom.	**NC-R9.**	**Complete**	ENSC agrees with this recommendation, which was implemented.	**N/A**	Complete
94	**Specify the conditions related to the acceptance of a more than 10,000 ft² project in the program manual:** In section 3.6 of the program manual, ENSC should provide the conditions under which the incentive related to the size of the building (more than 10,000 ft²) is most often provided under Custom NC. Adding such information would still allow for flexibility in accepting projects that are under 10,000 ft^2 in the NCEM path if they offer interesting savings.	**NC-R10.**	**Complete**	ENSC agrees with this recommendation, which was implemented.	**N/A**	Complete
95	**Include the fulfillment of lost opportunities as a program justification in the program manual:** In the program manual, the program justification should also include lost opportunities that are saved by Custom NC. Indeed, building new construction offers more opportunities of energy efficiency measures than when conducting a retrofit project, providing a strong justification for this type of program.	**NC-R11.**	**Complete**	ENSC agrees with this recommendation, which was implemented.	**N/A**	Complete

	B	C	F	G	I	M
1			As Shared with DSM Advisory Group November 2015			
2	**Recommendation Text**	**Source**	**Status**	**Comments**	**Expected Period of Completion**	**Updated February 2015**
96	**Add customer and on-site personnel contact details in the tracking sheet:** The Evaluator recommends adding both the customer and on-site personnel contact details (phone number, email, etc.) in the tracking sheet. Waiting for this information after the release of the tracking sheet slows the evaluation process as the site visits cannot be booked. The customer contact details are needed for scheduling visits and conducting surveys, where applicable. However, in many cases the customer is not directly involved with the project and has no technical knowledge. Therefore, it is recommended that an individual who is familiar with the project be included in order to make the on-site visits more informative for the Evaluator.	**NC-R12.**	**Complete**	ENSC agrees with this recommendation, which was implemented.	**N/A**	Complete
97	**Enter the complete facility address information, in separate columns:** Currently, the location information provided for each customer is limited to the city. Adding additional columns to enter the missing address information (street number and address, postal code) will greatly facilitate the on-site visit planning process.	**NC-R13.**	**Complete**	ENSC agrees with this recommendation, which was implemented.	**N/A**	Complete
98	**Provide additional information on proposed energy efficiency measures:** The 2013 tracking sheet included the estimated energy savings of each project, but contained no information on how these figures were derived (building simulation results, ENSC verification, etc.) or the energy efficiency measures implemented. To facilitate project tracking, the Econoler team recommends that the tracking sheet include a minimum amount of information on the key energy efficiency measures proposed.	**NC-R14.**	**Complete**	ENSC agrees with this recommendation, which was implemented.	**N/A**	Complete
99	**Develop a validation process for savings calculations:** To ensure that the savings recorded in the DSMDS correspond to those calculated using the parameters filled out for each measure (quantity, unitary wattage value, hours of operation, etc.), ENSC should develop a validation process using a formula that would automatically calculate savings using the parameters entered in the DSMDS. This would ensure the consistency of the energy savings recorded for each measure.	**BES-R1.**	**In Progress**	ENSC agrees with this recommendation. The necessary database changes are currently in progress.	**2015**	Complete
100	**Create a method for better identifying implementations with lighting controls and possible adjustments for existing lights that are burned out:** The Evaluator must examine the column called "BES Measure Occupancy Sensor Savings kWh" to validate whether additional savings are taken into account regarding the use of photocells and whether savings are subtracted to take account of burned-out lights (since their existing proposed hours of operation were at of 0 h/day or and higher). If a value was entered into this field, it may not be related to the use of occupancy sensors. The title of this column is misleading. It is therefore recommended that ENSC use another name to identify this column and use an additional column to specify the reason for additional savings or corrections.	**BES-R2.**	**Complete**	ENSC agrees with this recommendation. The Business Energy Solutions Occupancy Sensor field has been removed in the database. Any time there has been an occupancy sensor installed, it is tied to a measure rather than it being assumed based on a difference in operational hours.	**N/A**	Complete
101	**Transcribe unitary wattage values for custom measures into the "Proposed Measure Lamp Wattage" and "Proposed Measure Ballast Factor" fields in the DSMDS:** Custom measures are described in a separate field identified as "Custom Only – Comments," and no unitary wattage values are entered into the "Proposed Measure Lamp Wattage" field and no ballast factor, when applicable, into the "Proposed Measure Ballast Factor" field. These quantities are required to perform energy savings calculations. The Evaluator suggests using those fields to indicate the unitary wattage and ballast factor, when applicable, of the proposed measure in order to allow calculation of proposed measure energy consumption and energy savings. ENSC is working on adding this information in the DSMDS for further evaluations.	**BES-R3.**	**Complete**	ENSC agrees with this recommendation. All Custom measures are now created under the appropriate measure in the database.	**N/A**	Complete
102	**Add vital information to the non-lighting measures tab in the DSMDS:** For the heat pumps installed through BES, the Evaluator recommends including a field for detailed information on the existing cooling systems in the facilities in order to obtain more accurate savings values from the calculations.	**BES-R4.**	**In Progress**	ENSC agrees with this recommendation. Changes are currently being made to the Business Energy Solutions database.	**Q4**	Complete

	B	C	F	G	I	M
1			As Shared with DSM Advisory Group November 2015			
2	**Recommendation Text**	**Source**	**Status**	**Comments**	**Expected Period of Completion**	**Updated February 2015**
103	**Use the "total fixture wattage/nominal lamp wattage" ratio in the gross savings calculation for some BES lighting measures:** For proposed measure categories involving T8 lamps in this year's impact evaluation, the Evaluator revised ENSC's savings calculation, which only considered the ballast factor, by applying the "total fixture wattage (including lamps and ballasts)/nominal lamp wattage" ratio. Therefore, it is recommended that ENSC adjust its savings calculation for T8 measures by applying the "total fixture wattage/nominal lamp wattage" ratio or continue to calculate the lamp wattage with the ballast factor by adding the ballast power consumption. In addition, some inconsistencies were found in the approach used to calculate the unitary wattage values of hardwired CFLs and metal halide fixtures. For these measures, ENSC used the nominal wattage of the lamps as the proposed measure consumption, which is not appropriate since these types of measures include ballasts that consume energy. The Evaluator had already recommended that savings calculation be revised for these types of lamps in the 2012 evaluation, but this recommendation has not yet been implemented by ENSC. Therefore, the Evaluator adjusted the unitary wattage calculation of hardwired CFLs and metal halide fixtures in this year's impact evaluation and recommends that ENSC start applying the typical "fixture consumption/lamp nominal wattage" ratio used by the Evaluator in the DSMDS.	**BES-R5.**	**In Progress**	ENSC agrees with this recommendation. The suggested changes are currently in progress.	**Q4**	Complete
104	**Include a light intensity analysis as part of the on-site energy assessment:** During the DA visits, it was found that neither DA performed an initial light intensity analysis. Only one of the two DAs indicated that he does highlight over-lit areas to the client during his visit and, if appropriate, recommends fewer fixtures. The Evaluator thus recommends that a light intensity analysis be systematically proposed by DAs to participants as part of their on-site energy assessment visit. DAs will thus be able to identify over-lit areas where fewer fixtures can be installed, which would allow participants to make a final decision according to their lighting needs.	**BES-R6.**	**Not Recommended for Action**	Upon further review, ENSC review indicates that contractors already take into account light level standards. Light levels are then reviewed by ENSC staff upon receipt of project data.	**Not recommended for action**	Not Recommended for Action
105	**Ensure all lamps are installed by the DAs and not left on site to be installed afterwards:** The on-site visits conducted after the installation of products revealed that only 86 percent of the CFLs were installed. In most cases, the participant declared that the lamps were left on site by the DA to be installed by the participant once their old lamps burned out. Even if this kind of situation was not observed during the DA visits, the Evaluator recommends that ENSC ensure all lamps are installed by DAs during their visit and not left on site to be installed by the client in the future, even for lamps that are easy to install like CFLs.	**BES-R7.**	**Complete**	ENSC agrees with this recommendation. Instructions were passed on to the Business Energy Solutions Delivery Agents not to leave lights on site to be installed afterwards. In special circumstances, it has been requested by the participants to have the lights left so that the maintenance staff at the facility can install the lamps. In these cases, ENSC asks for confirmation of the install via pictures, or a site visit is conducted to ensure the lamps are installed.	**N/A**	Complete
106	**Consider demand savings only for heat pumps with a minimum outdoor temperature limit lower than the lowest temperature in Nova Scotia:** The equation used by ENSC to calculate demand savings is based on the HSPF value provided by the manufacturer. Specifications of heat pump models presented in the tracking sheet showed that standard heat pumps will exceed their working limits at a temperature significantly higher than the typical minimum temperature encountered in Nova Scotia. The Evaluator recommends that ENSC start considering demand savings only for heat pumps that have outdoor working temperature limits lower than the lowest temperature encountered in Nova Scotia. In order to identify those heat pumps that will have an impact on the demand, the Evaluator recommends adding a field in the tracking sheet to specify the outdoor temperature limits of the heat pump and use this information for demand savings calculation.	**BES-R8.**	**In Progress**	ENSC agrees with this recommendation. ENSC will review and make the required changes to forms and adjust demand savings calculations. These changes will be implemented in 2015.	**2015**	In Progress for implementation in 2015
107	**Collect declared operation hours from participants for MURB Common Area lighting measures:** In 2013, the Evaluator significantly reduced the hours of operation for the lighting measures implemented in MURB common areas, based on a literature review of other jurisdictions' technical reference manuals. However, the Evaluator thinks that it would be beneficial to improve the accuracy of the operation hours used in the calculation of energy savings for lighting measures. Consequently, it is recommended that, in the future, declarations of participants for hours of operation be collected for MURB Common Area lighting measures, similarly to what is done for BES lighting measures, and that a self-declaration ratio (identical to that of BES) be applied to those values.	**BES-R9.**	**Complete**	ENSC agrees with this recommendation, which was implemented.	**N/A**	Complete
108	Unfortunately, the fourth barrier, about major retrofit decisions being made elsewhere, cannot be addressed under the current strategy since it is more of an institutional barrier and notoriously difficult to overcome. In the event ENSC wishes to overcome this fourth barrier, the Evaluator recommends targeting the decision centres of these companies using specific and appropriately oriented marketing tools and activities.	**BES-R10.**	**In Progress**	ENSC agrees with this recommendation. ENSC recognizes that this is a barrier. Delivery Agents continue to target decision centres using marketing and contacts in order to expedite the process.	**Q4**	Complete

	B	C	F	G	I	M
1	**Recommendation Text**	**Source**	**As Shared with DSM Advisory Group November 2015**			**Updated February 2015**
2			**Status**	**Comments**	**Expected Period of Completion**	
109	**Switch focus to associations instead of distributors and manufacturers:** The Evaluator recommends that, for future evaluations, the focus be put on contacting associations to conduct interviews and collect market data. The 2012 and 2013 evaluations have shown that it is extremely difficult to establish the total market size for some products. The association of manufacturers or distributors linked to these products might be able to provide sales data. It is possible that a cost might be incurred to purchase this data, but the Evaluator believes that the increased precision would make this endeavour worthwhile.	**CS-R1.**	**Complete**	ENSC agrees with this recommendation. The 2014 evaluation will take this approach.	**N/A**	Complete
110	**Prepare a list of contact names for new regulations that could provide market information specific to Nova Scotia:** If new regulations are expected to be implemented and evaluated in 2014, ENSC should prepare a list of contact names that could be interviewed. The objective of these interviews is to collect market information on each product targeted by the new regulations and to validate the information that is normally provided by NRCan. The list of contact names should be prepared for each product targeted by including manufacturers, distributors and any associations which might be able to provide information specific to the Nova Scotia market. Since the information available from NRCan is quite often at the national level, province-specific information or data cannot be easily derived or generated. Therefore, it is important to develop such a list specific to Nova Scotia.	**CS-R2.**	**Complete**	ENSC agrees with this recommendation and has completed this list. This will be an ongoing activity to ensure that the list reflects the contacts affected by the most recent updates of the Energy-efficient Appliances Act.	**N/A**	Complete
111	**Develop documents to improve understanding of the organization:** ENSC should develop documents that not only show links between the metrics at the departmental level and those at the individual level, but also show corporate-level metrics reflecting the objectives of strategic and business plans. These documents should also involve strategic mapping by showing the causal links implied in the business plan.	**2013 TPE-R1.**	**Complete**	ENSC agrees with this recommendation, which was implemented.	**N/A**	Complete
112	**Consider developing an annual marketing plan to set clearly-defined goals:** This will allow the ENSC brand a clear positioning and facilitate effective integrated marketing communication campaigns for the coming year.	**2013 TPE-R2.**	**Complete**	ENSC agrees with this recommendation, which was implemented.	**N/A**	Complete
113	**Evaluate the benefits/costs in acquiring a Customer Relations Management (CRM):** This type of system could be a key tool for ensuring effective data collection (customer, loyalty, segmentation, benchmarking/competitive, etc.) and evidence-based decision-making.	**2013 TPE-R3.**	**Deferred**	ENSC agrees with this recommendation. ENSC intends to implement a CRM in 2015.	**2015**	Deferred for implementation in 2015
114	**Investigate the organization's costs of HR hiring:** These costs should be evaluated to identify ways to reduce them.	**2013 TPE-R4.**	**Not Recommended for Action**	ENSC disagrees with this recommendation. ENSC's expenditures on recruitment are a very small part of the Human Resources budget. Expending resources to potentially reduce a small expenditure is not considered to be a prudent investment.	**Not recommended for action**	Not Recommended for Action
115	**Increase the level of interdepartmental cooperation and communication:** ENSC exhibited effective interdepartmental cooperation and communication in 2013. Going forward, ENSC should increase this cooperation to ensure that employees well understand the importance of interdepartmental collaboration and its causal link to the corporate plan. The SharePoint communications site, if well developed and effectively used, will facilitate interdepartmental cooperation and communication.	**2013 TPE-R5.**	**In Progress**	ENSC agrees with this recommendation. Development of the SharePoint Communications site is complete. Furthermore, ENSC has developed a central location for departmental key performance indicators for critical processes. Predictive index training for most employees is expected to be complete in Q4.	**Q4**	Complete
116	**Track basic key performance metrics for procurement:** There is no central file management system for procurements for the business units. There may be reference fields in the financial accounting system (Financial Edge), but currently, there is no procurement reporting required . The procurement specialist maintains a database of procurement contracts and timetables. Currently, it requires manual efforts to locate and retrieve quantitative data, such as the number of procurements for a specific level, particular processes or key performance metrics. In the future, basic key performance measuring data should be tracked to monitor progress against the objectives set.	**2013 TPE-R6.**	**Complete**	ENSC agrees with this recommendation, which was implemented.	**N/A**	Complete
117	**Develop a policy statement on acceptable trade-offs regarding the procurement policy:** ENSC has four clear principles regarding its procurement policy. The awarding of a procurement contract or business deal is expected to provide certain implicit trade-offs with respect to these principles. These implicit trade-offs should be made explicit. For example, there is a trade-off between best value and economic development. A clear policy statement about this trade-off could not only help ensure that there is consistency across the departments, but also that corporate principles are being applied fairly. Nova Scotia's offshore oil and gas agreements may serve as good examples for operationalizing these principles.	**2013 TPE-R7.**	**Not Recommended for Action**	ENSC does not agree with this recommendation. ENSC's procurement policy, November of 2013, does provide guidance on this issue. Beyond this level of detail, the specific tradeoffs to be made in each procurement are laid out in the RFP scoring criteria.	**Not recommended for action**	Not Recommended for Action

	B	C	F	G	I	M
1	**Recommendation Text**	**Source**	**As Shared with DSM Advisory Group November 2015**			**Updated February 2015**
2			**Status**	**Comments**	**Expected Period of Completion**	
118	**Continue with development and adoption of a standardized quality assurance system:** ENSC should continue the development of the QA system for the programs or consider adopting an applicable industry quality assurance certification (e.g., ISO).	**2013 TPE-R8.**	**Complete**	ENSC agrees with this recommendation, which has been completed per the recommendation.	**N/A**	Complete
119	**Improve the accounting and finance process:** Consider making the following improvements on the accounting and finance processes: 1) Establish key metrics for measuring the degree of success in service delivery and supporting ENSC's program business units; 2) Continue performing internal audits; 3) Review and analyze the month-end closing process to shorten the time required (currently 7 business days required).	**2013 TPE-R9.**	**In Progress**	ENSC agrees with this recommendation. Three key performance indicators have been established for the finance function. A three year plan for internal audits has been established with KPMG, and a test of controls is being developed internally. ENSC has agreed to share the results of the 2014 audits with the DSM Advisory Group and file them with the UARB. We will continue to work towards closing the month-end process as soon as possible, while ensuring accurate information.	**2015**	Complete
120	**Improve the IT support processes**: Consider making the following improvements regarding the IT support processes: 1) Make the IT services contract between ENSC and VMG (or future IT service providers) more detailed; 2) Develop a business continuity plan (BCP) or a disaster recovery plan (DRP) for ENSC or for VMG; 3) Ensure that VMG grants access to ENSC's IT network so that proper checks and balances are incorporated into the contractual arrangements; 4) Review the decision on whether to hire an IT support and management service provider, as opposed to using in-house staff.	**2013 TPE-R10.**	**In Progress**	ENSC agrees with this recommendation. A consultant was hired to do an assessment of core IT services, which will guide IT planning and contract terms. An internal IT manager has been hired to replace the management function that was outsourced to VMG. This has resulted in reduced costs and better management of outsourced support. An IT strategic plan will be developed in November 2014, and consolidation of IT services with new agreements and service standards will be completed in 2015.	**2015**	Complete
121	While ENSC uses high-level indicators, such as customer awareness metrics, to demonstrate progress on Enabling Strategies activities as a whole, more specific performance indicators could be developed for each Enabling Strategies activity, where applicable .	**ES-R1**	**In Progress**	ENSC agrees with this recommendation. ENSC has completed evaluating the Green Schools program. Other Enabling Strategies, including the Summer Tour and the Holiday Light Exchange will be evaluated upon completion.	**Q4**	Complete
122	While ENSC uses high-level indicators, such as customer awareness metrics, to demonstrate progress on Enabling Strategies activities as a whole, more specific performance indicators could be developed for each Enabling Strategies activity, where applicable .	**ES-R2**	**Complete**	ENSC agrees with this recommendation. A marketing dashboard has been created, which includes key marketing performance indicators.	**N/A**	Complete

Appendix D

2016-2018 DSM Resource Plan
Rate and Bill Impact Analysis

TABLE OF CONTENTS

1. EXECUTIVE SUMMARY 1
2. INTRODUCTION 1
3. RATE AND BILL IMPACT ANALYSIS REFINEMENTS 2
4. 2016 – 2018 ANALYSIS RESULTS 2
5. 2016-2018 RATE AND BILL IMPACT ASSUMPTION CHANGES.....6
6. ENS'S USE OF THE RESULTS.....10
7. FUTURE CONSIDERATIONS 11
8. CONCLUSION.....11

Attachments

Attachment 1 ENS Responses to Rate and Bill Impact Feedback

Attachment 2 2014 Rate and Bill Impact Assumptions

Attachment 3 2014 Rate and Bill Impact Analysis

1. EXECUTIVE SUMMARY

The rate and bill impact analysis completed by Efficiency Nova Scotia (ENS) provides an overall trend-based picture of the rate and bill impacts of DSM at a rate-class level to help inform stakeholders and the UARB of impacts of the 2016-2018 DSM Resource Plan being proposed. ENS has refined assumptions and revised the analysis model based on feedback provided by stakeholders subsequent to its October 1, 2014 filing of its rate and bill impact analysis.

Overall, the analysis indicates that, for ENS's proposed DSM Resource Plan, rates are only one component of a discussion on affordability. For example, rates increase for every rate class as a result of DSM activities. However, the impact of DSM on customers' bills demonstrates that, in every rate class analyzed, on average, total customers in each rate class save on their bills over the lifetime of the DSM measures. For example, while the Residential rate class has approximately 3.5 percent higher rates as a result of proposed DSM activities, the class, on average, sees an approximately 4 percent reduction in bills.

These results provide important insight for consideration in DSM affordability discussions associated with this Application.

2. INTRODUCTION

Efficiency Nova Scotia's rate and bill impact analysis is intended to be a high-level estimate of the impacts of demand-side management (DSM) activities on rate classes' rates and bills. The analysis model, initially filed on November 14, 2013 along with a detailed methodology report, is based on outputs from a model designed to show high-level, forward-looking estimates, not literal results. The model was developed by ENS and Elenchus Research Associates and built on a sample framework provided by Synapse Energy Economics. Prior to the 2013 filing, it was reviewed several times by Synapse and subsequently revised to ensure it served its required purposes. In addition, assumptions have been reviewed with the DSM Advisory Group prior to each filing, with ENS making revisions based on the Group's input, as well as on feedback from Synapse.

As in prior filings, because the model contains multiple assumptions, the results are not intended to be used as literal interpretations of the impacts of DSM. Rather, they are intended to show the impacts of various options and proposals in relation to DSM decisions.

3. RATE AND BILL IMPACT ANALYSIS REFINEMENTS

For a complete list of feedback provided by stakeholders after the October 1, 2014 filing, as well as ENS's responses and subsequent impacts on the model, please refer to Attachment 1. In addition, ENS has included responses to additional feedback from NS Power on the October 1 version of the model, provided to ENS by NS Power on February 13, 2015. Due to the timing of the feedback, it could not be incorporated within this version of the analysis, but ENS has provided responses as to future iterations.

4. 2016 – 2018 ANALYSIS RESULTS

Rate-class-specific results are provided in the summary sheets in Attachment C. General highlights are provided below.

Deferral and Amortization

At the request of stakeholders, ENS has incorporated functionality into the model to assess the impacts of deferral and amortization on rates and bills. Two scenarios have been provided: DSM being 100 percent expensed, and DSM being amortized for eight years at 50 percent. ENS is not proposing any particular deferral or amortization scenario as cost recovery will be undertaken by NS Power. However, in order to illustrate the impacts of amortization, ENS selected an eight-year amortization period, which aligns with the 2015 DSM Resource Plan cost recovery amortization period. 50 percent amortization was selected as DSM investment is limited by legislation to a $100 million cap, and 50% amortization ensures the cap is not reached, since 2015 investment has been deferred and amortized.

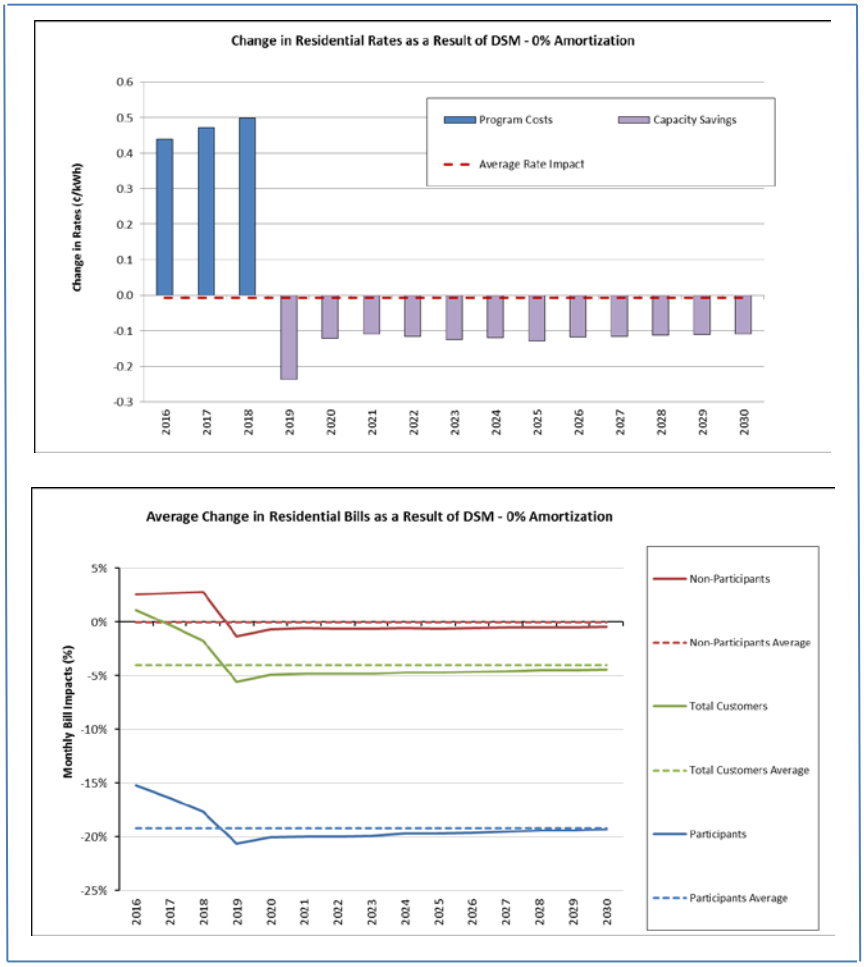
The amortization option has beneficial short-term rate and bill impacts for participants and non-participants. However, in the longer term, there is a slight increase in rates and bills. However, the impact, using the assumptions included, is less than 1 percent and is less than rate savings related to the avoided costs of capacity for the three-year investment proposed in the 2016-2018 DSM Resource Plan.

Rates versus Bills (Affordability)

ENS has taken an in-depth and focused view of affordability in its 2016-2018 DSM Resource Plan Application. This analysis provides information on which to analyze the impacts of DSM, providing additional information for a discussion on affordability. For example, in the 100 percent expensed scenario, short-term rates increase in each year of the DSM Resource Plan for every rate class. This is an intuitive result and an important piece of the affordability discussion. If only the Plan years are analyzed, it would appear that amortizing DSM would be the more affordable option. However, when the remaining years of benefits of DSM are taken into account, amortization increases overall DSM costs, therefore increasing rates. In the 100 percent expensed scenario, DSM reduces rates over the longer term due to avoided capacity costs.

As in ENS's 2014 analysis, when examining the impact of DSM on customers' bills, participants see a decrease in their bills as a result of their participation in DSM programs throughout 2016-2018. This is also an intuitive result. However, due to the high participation rates in DSM programs, the results indicate that, on average, the total customers in each rate class save on their bills. For example, while the Residential rate class has approximately 3.5 percent higher rates as a result of proposed DSM activities, the class, on average, sees an approximately 4 percent reduction in bills. Participants see even more.

Figure 1 – Comparison of rates and bills in the context of affordability



Average bills savings appear to be greater in the 2016-2018 rate and bill impact analysis when compared to prior filings. There are several reasons for this, including the potential for "deeper" energy savings (higher energy savings per participant) in the future. However, in particular, ENS's modifications to the model were completed prior to finalizing DSM Resource Plan numbers. In the final proposed DSM Resource Plan, the average portfolio measure life has increased due to the removal of the Home Energy Report, which was originally included in ENS's initial modelling. This change was not taken into account in the building of the rate and bill impact model. Therefore, decreasing bill savings towards the end of the measures lives are not taken into account. ENS will address this discrepancy in a future version of the model. Nevertheless, annual bill savings throughout the life of the Plan are consistent with prior filings of the model.

Rate and Bill Impact Trends

With NS Power's release of non-confidential annual avoided costs, annual, rather than levelized, avoided costs have been used in the 2016-2018 analysis. This change in inputs has affected the presentation of results, with a greater increase of rate impacts in the near term, and a corresponding greater decrease in the longer term, than has been presented in the past. Over the DSM benefits timeframe, the results would be the same: the only difference in the timing in which the benefits are reflected.

Incorporation of Point-of-Sale Discount Programs

ENS provided the following explanation in its 2014 rate and bill impact analysis report. However, stakeholders may have similar questions regarding participation rates, so the explanation of ENS's point-of-sale discount programs is being provided again for clarity.

Upstream programs such as ENS's Instant Savings (Residential and BNI) programs provide flow-through rebates to retailers, distributers or manufacturers who stock and sell high efficiency equipment. Upstream programs are intended to "accelerate the introduction and sale of more efficiency equipment to the larger downstream market."[1] This definition helps explain why ENS's Cumulative Participation graphs reach a high level of participation for several rate classes: the programs offer standard, easy-to-access measures for a large number of customers.

When ENS inquired as to other jurisdictions' Rate and Bill Analysis assumptions as part of ongoing enhancements to this analysis, the Energy Trust of Oregon indicated that it conducts some analysis of bill savings at a long-term, aggregate level across all rate classes and assume that there are very few people who do not benefit from upstream programs. Some may participate more directly, and others may enjoy the impacts of more

[1] Energy Solutions. (2014). *Energy efficiency program design and implementation.* Retrieved from: http://energy-solution.com/index.php/practice-areas/energy-efficiency-program/

efficient equipment and practices without directly participating. In other words, ENS's analysis is not out of line with other jurisdictions.

It is important to note that although some rate classes appear to be at saturation of participation due to ENS's upstream programs, the results do not indicate that customers in these programs can no longer participate in DSM activities. Rather, it indicates rate classes for which ENS may consider adjusting measures to influence future purchases.

Balanced Portfolio Approach

ENS's Evidence highlights the importance of a balanced portfolio approach. A balanced approach is also supported in Appendix E, which consists of Dunsky Energy Consulting's *Balanced Plan Principles* memo. The bill savings resulting from DSM for all customers on average in each rate class also support this view: the broad base of DSM activities in Nova Scotia, with offerings across rate classes and programs, is providing benefits to Nova Scotians. As highlighted above, these benefits outweigh the related rate impacts resulting from those activities.

5. 2016-2018 RATE AND BILL IMPACT ASSUMPTION CHANGES

ENS has maintained the general structure and assumptions filed in its 2013 and 2014 rate and bill impact analyses. Presented here are assumptions which may require further clarification or that have been changed or added based on feedback from stakeholders after ENS's October 1, 2014 rate and bill impact analysis filing. The feedback and ENS' response is presented in Attachment 1. A complete list of assumptions used in the forward-looking 2016-2018 rate and bill impact analysis are provided in Attachment 2.

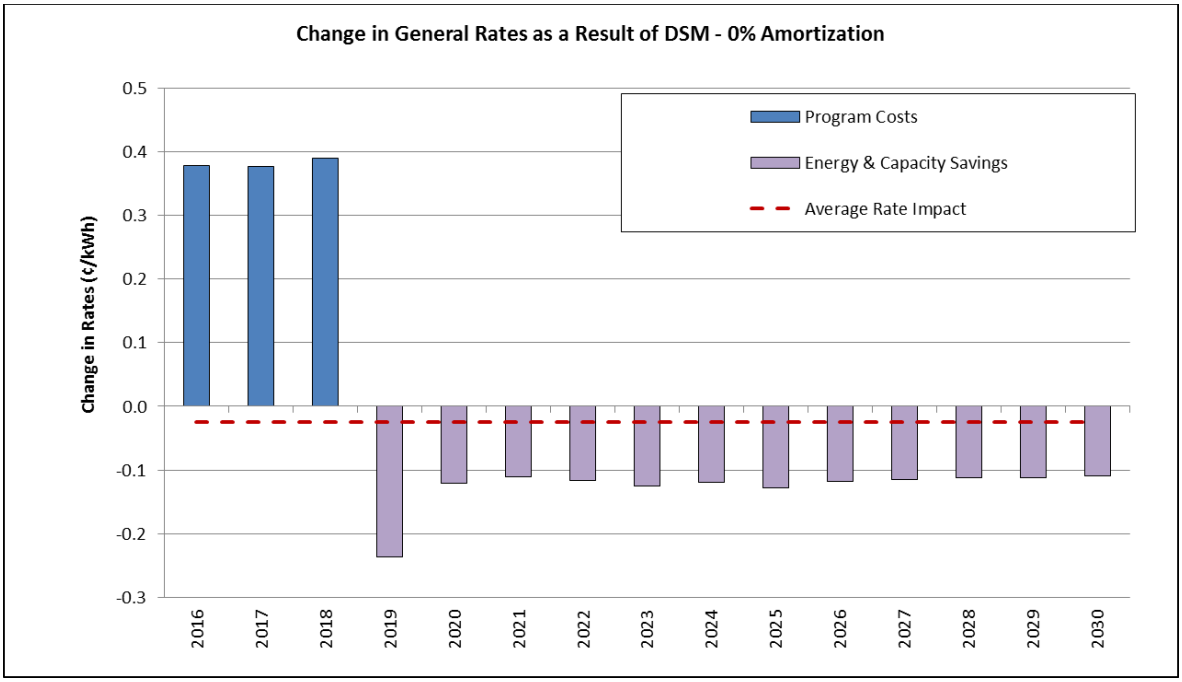
Overall Assumptions

Differing from previous years, this rate and bill impact analysis is forward-looking and does not present historical results from 2011-2014. There are some instances however,

that historical data were utilized; their specific use is listed under the relevant assumptions.

The energy savings and investment levels are based on ENS's proposed 2016-2018 DSM Resource Plan. To develop the proposed plan energy savings and investment levels ENS engaged Navigant Consulting, which used its Electricity Resource Assessment Model (EL-RAM) to assess the cost-effectiveness and potential achievability of the Plan. Figure 2 below is an example of the timeframe being analyzed. While the Plan is for three years, the benefits of those three years of activity are present for approximately 16 years. As highlighted above, end effects are not entirely taken into account within the model, due to an increase in average measure life across the proposed Plan portfolio.

Figure 2 – Specific timeframe being analyzed for rate and bill impact analysis purposes



ENS's 2016-2018 analysis includes DSM measure lives that extend beyond 10 years, and because additional forecast years are available as a result of the 2014 IRP process, ENS has incorporated the energy forecast used in the 2014 IRP in its analysis rather than developing its own assumptions for energy sales beyond 2024. The annual energy sales forecasts out to 2040 were provided by NS Power.

Rate Impact Assumptions

In addition to an illustrative assumption of potential amortization impact on rates and bills, as described in the results section of this report, rate impacts are presented as year-over-year impacts (i.e., how rates change from year to year) rather than compared to rates without DSM. This was based on a recommendation by Synapse, based on the premise that during the 2016-2018 time period a no-DSM Scenario is not being considered.

Participation Assumptions

As part of the rate and bill impact analysis, overall estimated participation rates, rather than participation numbers, for each rate class are presented. This is based on feedback from Synapse Energy Economics. Consistent with previous filings, ENS has used the number of NS Power customer accounts in each rate class as the overall potential market. Because some customers have multiple account numbers, the total number of available accounts may be greater than a standard assessment of that rate class. ENS accounts for these multiple accounts when calculating participation rates.

In past filings, the only exception to using the number of accounts per rate class was for the Municipal Utility rate class. NS Power has six utility customers but eight accounts, because the Antigonish Electric Utility has three accounts. However, since the Large Industrial class has a small number of customers, three of whom have both Firm and Interruptible accounts, ENS has adjusted the number of potential participants to the number of discrete customers, rather than accounts.

ENS used historical 2012 and 2013 data in developing the assumption of rate class participation in ENS programs. The historical data was used to develop percentages to determine the difference in participation between years for both duplicating and non-duplicating participation in rate class by program.

ENS has incorporated its point-of-sale discount programs into the model again for 2016-2018. ENS is using the same method as the 2014 rate and bill impacts analysis; however, market research was conducted to get a more accurate assumption of repeat participation in Residential Instant Savings. It was found that of those who purchased products in 2014, 71 percent had also purchased products in 2013.

An additional assumption change is the number of eligible participants from each rate class. To determine the number of eligible participants, ENS determined percentage of participation of the rate class based on who the program was being marketed to or designed for, rather than every possible potential participant. For example, while customers from any rate class can retire a non-commercial or industrial refrigerator (i.e., one that may be found in a staff room of an industrial facility), ENS's Appliance Retirement service does not market to commercial or industrial customers. These potential, but unlikely customers, have been removed as eligible participants in this version of the analysis. This assumption was made based on feedback from the DSM Advisory Group on February 4, 2015.

Alternative DSM Scenarios

Alternative Scenarios explore the effect of varying levels of DSM investment. DSM Potential Study data ($M and GWh) for the Low, Base, and Mid-DSM Scenarios over 2016-2018 were used to inform the model with respect to the effect that varying investment has on energy savings. These results were used to develop four alternate scenario options to compare with ENS's proposed Plan: Low, Base, Mid, and NS Power's 50% Low IRP Scenario. Results are shown for each alternative scenario except Base, which is similar enough to the proposed Plan that for presentation purposes, it was not included. NS Power's 50% Low Scenario was included, although not vetted or informed by ENS, to demonstrate potential impacts of a lower level of DSM than ENS contemplated in its Potential Study. Since avoided costs were not developed for this Scenario, ENS used the Low-DSM avoided costs, which is conservative, as avoided

capacity costs would be expected to be lower in the 50% Low Scenario than in the Low Scenario.

As in 2014, the model incorporates an assumption that 75 percent of the change in energy savings resulting from a change in investment level is due to the change in number of participants and that 25 percent of the change in energy savings is due to the depth of adoption of energy saving measures by participants. At the rate-class level, the model caps participation at 100% and, when reached, attributes the remaining change in energy savings to the depth of adoption of energy saving measures by participants. Actual energy savings and participation data from 2011, 2012 and 2013 were used to develop the percentage change in new participants for each DSM scenario (from the proposed Plan level) to correspond to the percentage change in investment level (from the proposed Plan level).

Output Potential

Summary sheets for rate, bill, participation and alternative DSM scenario impacts for each applicable rate class are included in Attachment 3. Inclusions on the summary sheet have been selected based on representative outputs from the model.

6. ENS'S USE OF THE RESULTS

There are several ways in which ENS expects to use the results of this analysis:

- ENS expects the analysis to help to inform ongoing discussions with NS Power and stakeholders in regards to the 2016-2018 DSM Resource Plan.
- The analysis indicates that ENS should further examine its participant recruitment efforts in specific rate classes as indicated in Attachment 3. This does not mean that ENS will reduce its efforts in classes in which current or forecast participation rates are expected to be high, as these customers need to continue getting the benefits of DSM for which they are paying. However, ENS can attempt to focus its active business development efforts in other classes.

ENS also welcomes input as to other ways in which its rate and bill impact analysis may be incorporated into other analyses.

7. FUTURE CONSIDERATIONS

During the initial development process of ENS's rate and bill impact analysis, Tim Woolf of Synapse emphasized that this type of analysis is an ongoing, collaborative process. Because it is based on a large number of assumptions, continual refinement and improvement are expected. ENS is committed to doing so and has revised elements of its analysis based on feedback provided after its October 1, 2014 filing.

On February 13, 2015, ENS received feedback from NS Power on its October 1, 2014 rate and bill impact model. This was not enough time for ENS to make potential changes in time for filing. However, ENS has responded to this feedback, in addition to other stakeholders' feedback, in Attachment A and will examine the feasibility of incorporating them in future versions of the analysis.

8. CONCLUSION

ENS's rate and bill impact analysis provides an overview of general trends in relation to a specific snapshot in time of DSM in Nova Scotia. It captures the rate, bill and participation impact trends of particular DSM scenarios; no particular year's actual values will align exactly with that particular year's impacts. The model provides an overall trend-based picture of the impacts of DSM on particular rate classes, which can help to inform the 2016-2018 DSM Resource Plan discussions.

Stakeholder	Stakeholder Comment	ENSC's Response	Inclusion in the model
Consumer Advocate	The data did attempt to model changes in savings resulting from changes in investment levels based on the DSM Potential Study. The study did not, however, model the 50% per of the low case DSM spending that NSPI included in the IRP (which it did on its own volition). Therefore the assumption used that a 50% reduction in spending would result in a 50% reduction in savings from the low case in not supported by modelling. There is probably not much ENSC can do about this at the present time, other than re-run the potential study.	*Modelling of NSP's IRP 50% Low DSM Scenario* The Consumer Advocate is correct in that Nova Scotia Power (NSP)'s IRP input using 50% of ENSC's Low Case from the DSM Potential Study was not modelled by ENSC's consultant Navigant. ENSC agrees that the related assumptions have not been analyzed or tested and recognizes that the results of the 50% Low Scenario in the Rate and Bill Impact Analysis are not supported by modelling. ENSC included the 50% Low Case in its rate and bill impact analysis to allow for comparisons between all the DSM scenarios used in the IRP.	The 2016 – 2018 rate and bill impact model submitted with this application now includes the 50% Low DSM scenario that NSP included in the 2014 IRP process. As no avoided costs were obtained for this purpose, ENS used the Low DSM scenario avoided costs.
Industrial Group	We understand that the assumptions that were used for the Rate and Bill Impact Analysis have been updated in two ways: (1) in response to recommendations from Mr. Woolf at Synapse and (2) to be consistent with the assumptions that have been used in NSPI's current IRP process. We also understand that the Assumptions will be updated and the Impacts Analysis will be re-run to take into account the planning requirements associated with the	*Updating the Assumptions* ENSC's original intent was to re-run its rate and bill impact model to include final results from the IRP. However, considering that the final report of the IRP will not be available until December 3rd, ENSC's current expectation is to file an updated version as part of the 2016-2018 DSM Resource Plan Application to be filed February 27, 2015.	ENS' model is now capable of running all the IRP scenarios. For the 2016-2018 rate and bill impact analysis, ENS is using the 50% Low, Low and Mid.

Stakeholder	Stakeholder Comment	ENSC's Response	Inclusion in the model
	outcome of the IRP. The Industrial Group believes that these are appropriate.		
	Also, the Summary Page for the Large Industrial Rate Class shows "Cumulative Participation as a Percentage of Total Large Industrials Customers" at 100% for all years (2011 to 2018). This highlights the issue of showing participation cumulatively; if a customer participates once (regardless of the scope of participation) in an ENSC program, it appears that they are counted as a participant indefinitely. The fallacy of this, is obvious when one considers the purchase of a lightbulb by a Large Industrial customer would bring them within the "participant" count.	*Rate-Class Analysis:* <u>Cumulative Annual Savings Per Participant</u> The cumulative annual average savings per participant is calculated using the cumulative savings from any given year (total savings achieved across programs and years) and dividing it by the cumulative number of participants (which eliminates duplicates across programs and years). Doing so highlights the average savings experienced by participants over time, which would not be included if an annual calculation was used. ENSC can provide information on average savings per participant for particular years if desired by stakeholders.	The 2016-2018 DSM rate and bill impact analysis now includes both the cumulative annual savings per participant and the incremental average savings per participant for particular years.
	Also, the Summary Page for the Large Industrial Rate Class shows "Cumulative Participation as a Percentage of Total Large Industrials Customers" at 100% for all years (2011 to 2018). This highlights the issue of showing participation cumulatively; if a	*Rate-Class Analysis:* <u>Cumulative Participation</u> Calculating cumulative participation is necessary to calculate and present the bill impacts of DSM over a given period of time. ENSC agrees that the information provided by using cumulative participation	The 2016-2018 DSM rate and bill impact analysis now includes both the cumulative annual participation and incremental annual participation.

Stakeholder	Stakeholder Comment	ENSC's Response	Inclusion in the model
	customer participates once (regardless of the scope of participation) in an ENSC program, it appears that they are counted as a participant indefinitely. The fallacy of this, is obvious when one considers the purchase of a lightbulb by a Large Industrial customer would bring them within the "participant" count.	provides one piece of a potentially larger analysis. Annual participation rates can be presented in addition to cumulative participation rates in future versions of the analysis.	
	The Industrial Group recognizes that ENSC has been challenged by requirement to include "upstream" savings programs in the Analysis. We understand that the current BNI assumptions are based on (1) the rate and bill impact assumptions used in Rhode Island (which uses program-specific data that is not currently available to ENSC) and (2) the results of a 2011 study by ENSC's program manager. The Industrial Group understands that ENSC has "conservatively" estimated that 80% of BNI customers who access the Upstream Business Energy Rebates (UBERs) are already participating in other ENSC DSM programs, for the purposes of calculating the number of unique DSM customers.	*Assumptions Regarding Upstream Programs* ENSC does not currently have a method by which to obtain more information about the number of Upstream Business Energy Rebates customers who are not otherwise accessing DSM programs, particularly at a rate class level. However, ENSC will examine the feasibility of conducting research and evaluation studies to improve its estimates of its upstream programs and continue its attempts to refine the assumptions around the incorporation of these programs into the Rate and Bill Impact Analysis. Future refinements will be brought forward to stakeholders for feedback and input.	No changes have been made to the UBER participation inputs at this time due to the timing between the two filings of the rate and bill impact analyses. ENS will evaluate the assumptions for UBER again during the historical rate and bill analysis released in the fall of 2015.

Stakeholder	Stakeholder Comment	ENSC's Response	Inclusion in the model
	The Industrial Group is unable to comment on whether or not this is an appropriate estimate. However, it appears that it could be possible to obtain more information about the number of UBER customers who are not, otherwise, accessing DSM programs.		
	The Industrial Group appreciates that ENSC will look into incorporating the effects of deferring and amortizing DSM program costs from customers over eight years, starting in 2016, as required by s.79R(3) of the *Public Utilities Act.* In the Analysis, ENSC suggests that the deferral and amortization would make the rate impacts appear more favourable and would reflect the actual rate impacts on customers. The Industrial Group looks forward to receiving this analysis and expects that it will also show the impact of additional costs that may be incurred as a result of the deferral and amortization.	*Costs and Benefits of Deferral and Amortization* ENSC has already initiated a process to determine the feasibility of incorporating both the costs and benefits of deferral and amortization into its model. It will share the modifications with stakeholders prior to filing its next analysis, currently expected to be part of the 2016-2018 DSM Resource Plan Application.	The 2016-2018 rate and bill impacts model includes the deferral and amortization scenarios.
	ENSC has modelled the impact of using a 50% of low DSM scenario that was modelled by NSPI in the IRP process. The Industrial Group	*50% Low Assumptions* ENSC agrees that the 50% Low Case was not modelled as part of the DSM Potential Study and therefore	The 2016-2018 rate and bill impact model submitted with this Application now includes the 50% Low DSM scenario that NSP

Stakeholder	Stakeholder Comment	ENSC's Response	Inclusion in the model
	notes that while the costs and savings associated with the other DSM levels were drawn from the DSM Potential Study, the 50% low was not modelled so there is no independent support for the conclusion that 50% reduction in DSM program spending would result in a 50% reduction in savings. Further, the Industrial Group had recommended that NSPI model in the IRP an "optimized" level of DSM spending and variations with respect to costs and savings. The outcome of this exercise may also influence the ENSC modeling.	has no independent support for the conclusions drawn. ENSC included that level in its analysis in order to provide results for every DSM scenario that was considered in the IRP. Should a variable level of DSM be modelled prior to the next Rate and Bill Impact analysis filing, ENSC could work to incorporate it into the analysis.	included in the 2014 IRP process. As no avoided costs were obtained for this purpose, ENS used the Low DSM scenario avoided costs. No variable plan was modeled so it has not been incorporated into the 2016-2018 rate and bill impact analysis.
Nova Scotia Power	At this time, NS Power is unable to lend its support for the model or its conclusions. NS Power has a number of questions and comments about this model but requires access to the electronic model for further review and understanding. NS Power has requested of ENSC that it make the model available to NS Power and its consultants for a more detailed examination and ENSC has agreed.	*Electronic Version of the Model* As with the prior version of its rate and bill impact model, ENSC has shared the current model with NS Power and the DSM Advisory Group.	ENS will supply the electronic version of the 2016-2018 rate and bill impact model on request.
	NS Power has concerns regarding the use of levelized avoided costs	*Avoided Costs* Rate and bill impact analysis is	ENS is using NSP annual, non-levelized avoided costs provided by

Stakeholder	Stakeholder Comment	ENSC's Response	Inclusion in the model
	over the timeframe of the analysis. NS Power understands ENSC's stated rationale for this but notes that this approach results in a less accurate analysis and an overly simplified statement of benefits. Working with ENSC, NS Power may be able to propose a treatment of avoided costs that improves the analysis while meeting the desire for transparency in the rate and bill impact model without compromising any necessary confidentiality to avoided costs.	intended to show high-level impacts over time, so the use of levelized avoided costs is appropriate. Additionally, since annual avoided costs are considered confidential, levelized avoided costs have been used, at the prior request of NS Power, in order for ENSC to file a non-confidential model and analysis. We are pleased that NSP may be able to propose a treatment of avoided costs that could improve the analysis and we look forward to assessing the appropriateness of a potential new treatment in collaboration with NSP.	NSP for the 2016-2018 rate and bill impact model.
Small Business Advocate	The SBA notes that ENSC states that the model used to calculate rate impact is based on several assumptions that may not be consistent with what is currently under consideration and therefore do lend themselves easily to review and comment at this time.	ENSC would be pleased to accept further comments on an updated version of the rate and bill impact model once complete. ENSC expects to share the updated version and assumptions with stakeholders in advance of filing it with the 2016-2018 DSM Resource Plan Application.	ENS was unable to provide the 2016-2018 rate and bill model for review before the 2016-2018 DSM Resource Plan was filed. ENS will supply an electronic version of the model on request.
Synapse	First, avoided costs are not separately identified by whether they pertain to avoided capacity, transmission, distribution, or environmental compliance costs. "It is assumed that avoided transmission and distribution costs, as well as the	*Rate Impacts: Avoided Costs* ENSC agrees with Synapse that the model would benefit from avoided costs that are broken out by avoided capacity, transmission, distribution and environmental compliance costs. We have requested that NSP's	NSP has provided annual, non-levelized avoided capacity and energy costs for multiple scenarios. Transmission and distribution costs have not been provided or broken out. ENS's rate and bill impact model is also able to incorporate

Stakeholder	Stakeholder Comment	ENSC's Response	Inclusion in the model
	avoided environmental compliance costs, are included in the avoided cost of capacity." (ENSC 2014 Analysis, App. A, p 4). We recommend that these avoided costs be disaggregated and analyzed separately, as this would provide greater transparency regarding the impacts of these avoided costs on customer rates	development of new avoided costs include this breakout. Per ENSC's 2013-2014 DSM Plan Settlement Agreement, approved by the UARB on June 4, 2012, a stakeholder process for the development and documentation of new avoided costs, which was either to be conducted prior to, or as part of, the IRP process, is expected. ENSC expects to contribute, along with other stakeholders, to NSP's development of the assumptions and information surrounding this work. ENSC hopes the result can include updated, non-confidential avoided costs based upon IRP results and incorporate them into the analysis in a way they are not understated. It is ENSC's intent to collaborate with NSP to determine the feasibility of obtaining non-confidential estimates of the reduction in marginal fuel costs from DSM for incorporation within future analyses. Similarly, ENSC intends to collaborate with NSP to determine the feasibility of calculating avoided costs, or incorporating appropriate	transmission and distribution costs once provided by NSP.

Stakeholder	Stakeholder Comment	ENSC's Response	Inclusion in the model
		assumptions, to reflect outcomes of different DSM scenarios.	
	ENSC explains that its DSM costs are treated as an expense in the rate and bill impact model, when in practice they will be amortized over some timeframe in the future (ENSC 2014 Analysis, App. A, p 4). Treating DSM costs as an expense has the effect of overstating actual rates in earlier years, which results in rate impacts that appear artificially high compared to what customers will actually experience during that timeframe. ENSC expects to examine the feasibility and benefits of revising the model to account for amortization (ENSC 2014 Analysis, p 17). Synapse supports ENSC in this effort, and expects that ENSC should be able to build an appropriate amortization method in future Rate and Bill Impact Analyses.	*DSM Program Costs* ENSC has already initiated a process to determine the feasibility of incorporating both the costs and benefits of deferral and amortization into its model. It will share the modifications with stakeholders prior to filing its next analysis, currently expected to be part of the 2016-2018 DSM Resource Plan Application.	The 2016-2018 rate and bill impacts model includes the deferral and amortization scenarios.
	ENSC uses the number of NSPI customer accounts in each rate class as the overall potential market (i.e., eligible customers). Because some customers have multiple account numbers, the total number of available accounts may be greater	*Participants* ENSC does use account numbers as the overall potential market. However, ENSC also incorporates multiple accounts into its calculation of participant numbers: energy savings are split between account	Due to the time constraints between the 2014 rate and bill impact analysis and the 2016-2018 rate and bill impact analysis, ENS was only able to evaluate the residential point-of-sale re-participation rates. ENS will explore the assumptions for

Stakeholder	Stakeholder Comment	ENSC's Response	Inclusion in the model
	than a standard assessment of that rate class (ENSC 2014 Analysis, pp 7-8). This assumption overstates the customers that are eligible to participate in programs, thereby underestimating participation rates. We recommend that ENSC attempt to determine the number of customers that have multiple account numbers so as to better estimate eligible customers. ENSC has indicated participation rates and repeat participation rate assumptions for its different programs. For example, ENSC indicates that it assumes between 6 and 7 percent of the general population participate in the Residential Instant Savings program, and 10 percent of customers re-participate in the program each year. This seems to be the only program for which ENSC intends to commission research to determine the number of re-participation. (ENSC 2014 Analysis, p 9-11). Synapse recommends that ENSC develop such assumptions on all of its programs through additional research and evaluations studies conducted over time, especially the	numbers. Therefore, ENSC does not expect that participation rates are understated. ENSC will assess the feasibility of conducting research and evaluation studies to improve its estimates of its point-of-sale discount programs. ENSC's rate and bill impact analysis currently includes historical data, which includes actual participation numbers in the calculation of participation rates. This historical data is used to forecast future participation. ENSC's tracking of participation accounts for, and eliminates, duplication between programs and over time rather than estimating such information. A simplified example of the tracking is included as Attachment 1. Additional information from NSP will help to enhance assumptions for program eligibility (the denominator in the calculation of participation rates) and some data tracking, but ENSC believes its current tracking provides more accurate results than estimated numbers. ENSC will continue tracking	UBER for the fall 2015 historical analysis.

Stakeholder	Stakeholder Comment	ENSC's Response	Inclusion in the model
	point-of-sale discount programs. Such studies should determine participation levels, repeat participation over multiple years, and participation in multiple programs within years and over time. Synapse also recommends that ENSC, with the help of NSPI, begin collecting customer data immediately that would allow it to better estimate participation rates. Such information is essential for fully understanding how customers participate in programs over time.	historical participation to forecast future participation, even though future rate and bill impact analyses, if filed to highlight impacts of proposed DSM Resource Plans, will only show the future impacts of those Plans. ENSC will continue to examine its program designs to ensure that customers are being adequately served and modify them where feasible and cost-effective.	
	Therefore, we recommend much greater emphasis be placed on comparing alternative DSM scenarios. For example ENSC could identify a "base case" for DSM, such as the Low case or the Mid case used in the 2014 Analysis. Then it could compare the increase in rates from the other cases relative to this base case, as opposed to making a comparison relative to no DSM. Such alternative DSM scenarios would provide much more meaningful and useful data for the purpose of IRP and DSM planning.	*Alternative Scenarios and Presentations* ENSC will work to modify its model to compare various DSM Scenarios against a base scenario rather than a no-DSM scenario.	The 2016-2018 analysis will use ENS's proposed plan levels as the "default" scenario. Alternative scenarios will then be compared against this scenario rather than against a no-DSM case. The specific alternative scenarios include the 50% Low, Low and Mid-DSM scenarios as used in the 2014 IRP.

Stakeholder	Stakeholder Comment	ENSC's Response	Inclusion in the model
	Furthermore, there is another perspective that ENSC could apply to the rate impact analysis. It would be useful to present the extent to which rates are expected to increase from one year to the next. That is, rather than comparing rates from one DSM scenario to another, the expected rates for each year of any one DSM scenario could be compared with the rates of the previous year, to provide "year-to-year" rate impacts. This would provide a different perspective on the rate impacts of the DSM programs, in terms of the rate impacts that customers would experience over time from any one DSM scenario. This is the perspective that is typically used when making rate impact estimates, e.g., in the context of a rate case, and therefore should be familiar and meaningful to those stakeholders that are considering rate and bill impacts of the DSM programs.	*Year-to-Year Rate Impacts* ENSC will incorporate this recommendation into the next version of its analysis.	This has been incorporated into the 2016-2018 rate and bill impact model.
		Coordination with NSP ENSC agrees with Synapse's recommendations about increased coordination regarding the sharing of information for incorporation	ENS incorporated annual avoided costs as requested by NS Power into the 2016-2018 analysis. NS Power provided updated inputs for inclusion into the model and

Stakeholder	Stakeholder Comment	ENSC's Response	Inclusion in the model
		within ENSC's rate and bill impact analysis. ENSC will provide results of its analysis to NSP in future IRP processes and will share results with NSP as part of the 2016-2018 DSM Resource Plan development process. ENSC and NSP have agreed to discuss Synapse's recommendations to assess the availability and use of the requested data and information for incorporation within the rate and bill impact analysis.	provided helpful feedback for future considerations. ENS and NS Power also held discussions regarding transmission and distribution, as well as marginal fuel, avoided costs, but ENS has yet to receive additional information. ENS remains committed to further collaboration that could lead to improved analyses for various requirements of both organizations.
Nova Scotia Power	NSPI is of the view that annual avoided costs, which are now non-confidential, rather than levelized long-term costs can be used going forward.		These have been incorporated. However, the analysis is a long-term one, so annual numbers are not necessarily more accurate than long-term averages.
	Use of avoided capacity cost expressed in $/MWh versus $/kW. a. While it is mathematically possible to calculate a capacity value in $/MWh, this appears to assume that there is avoided capacity value in every hour of DSM energy reduction. b. Capacity is typically only avoided when peak demands are reduced, not by general reductions in energy usage in non-peak hours. That is why avoided capacity costs are		a); b) The intent of rate and bill impact analyses is to capture long-term averages rather than avoided capacity for peak periods each year. Therefore, ENS believes a $/MWh approach is reasonable. c) No avoided capacity costs have been included for the 2016-2018 period. However, the benefits of DSM continue beyond 2018, so the relevant avoided costs are included after that period. d) As fuel costs are flow-through

Stakeholder	Stakeholder Comment	ENSC's Response	Inclusion in the model
	expressed as $/kW, rather than $/MWh. The value of avoided capacity is usually assessed by determining the number of high demand hours during a year (when avoiding those demands will avoid the need for additional capacity), and dividing this into the avoided annual capital cost per kW. c. The $13/MWh figure used in the R&BIM is outdated, however the current avoided costs show that the value of avoided capacity is essentially zero for the 2016-2018 period. This means that there are no system capacity benefits provided from DSM during this period. d. The system benefits which would accrue in the current period are fuel cost reductions which flow through the FAM. NS Power would like a written explanation of how fuel cost benefits of DSM are accounted for in rates and in bills under this model.		costs, avoided costs of energy are not included in the analysis. This is a conservative analysis. ENS has requested discussion with NS Power about marginal fuel avoided costs but, as this is a mature refinement rather than a critical input, it has not been a focus of attention to date. ENS would be pleased to begin refinements in this area.
	Lost Fixed Costs are not accounted for a. The model does not appear to		ENS will examine how lost contribution to fixed costs can be incorporated within future versions

Stakeholder	Stakeholder Comment	ENSC's Response	Inclusion in the model
	recognize that with each kWh avoided by DSM (and which places NSPI's load below that forecast at the time when rates were last set in a GRA) the portion of revenues which are included as part of the energy charge in rates (cents/kWh) that is required to collect NSPI's fixed costs, is lost, and is lost for each and every year thereafter until rates are reset again. b. Fixed costs are a large portion of a utility's costs, and are costs which have been approved for recovery. These should therefore be accounted for in the R&BIM because they could well drive the need for rate increases resulting from DSM.		of the model.

Assumptions used in ENS's 2016-2018 Rate and Bill Impact Analysis

This document is intended to provide an overview of the assumptions used in ENS's rate and bill impact analysis. The assumptions were provided to the DSM Advisory Group in advance of the February 27, 2015 filing of ENS's 2016-2018 DSM Resource Plan during the February 4, 2015 DSM Advisory Group Meeting.

These assumptions are for rate and bill impact analysis purposes only and do not impact ENS's calculation of energy savings.

Category	Item	Assumption
Overall Assumption	General approach	ENS has used the "snapshot" approach recommended by Synapse, in which the impacts of specific program plans are analyzed rather than incorporating an assessment of DSM over the long term. This isolates the impacts of a proposed or approved DSM Plan. The model considers ENS's proposed investments and energy savings over three years (2016-2018) and the benefits over the life of the measures installed during that time period. This is a forward looking analysis and the use of historical information has been limited. Where historical information is used, it is indicated.
Overall Assumption	Energy and demand savings; Participation	The analysis calculates the total energy and demand savings by rate class, average savings by participant in the rate class, and the number of discrete participants. The model outputs include the discrete participant numbers for 2016-2018 and are estimated from previous results and will be updated for each subsequent filing of the analysis.
Overall Assumption	Rate class inclusion/ exclusion	The Generation Replacement and Load Following (GRLF) and the Unmetered rate classes are not included in the analysis. ENS does not offer programs for the GRLF class, and ENS does not have participant-specific data on unmetered accounts in order to calculate impacts. Synapse has indicated that providing results for a few representative rate classes is sufficient to meet the intent of the rate and bill impact analysis. ENS has gone beyond this minimum to provide impacts for each rate class except the two listed here.
Overall Assumption	Inclusion and estimation of energy and demand savings	ENS will be using proposed 2016-2018 DSM Resource Plan numbers to calculate the related rate and bill impacts.

Category	Item	Assumption
Overall Assumption and Municipal Utility Rate Class Assumption	Calculation of participation rates	As part of the rate and bill impact analysis, overall participation and participation rates for each rate class are presented. In order to calculate this result, ENS has used the number of NSPI customer accounts in each rate class as the overall potential market. Because some customers have multiple account numbers, the total number of available accounts may be greater than a standard assessment of that rate class. For 2016-2018 participant assumptions have been made to estimate the number of eligible participants. To determine the number of eligible participants, ENS determined percentage of participation of the rate class based on who the program was being marketed too. This assumption was made based on feedback from the DSM Advisory Group on February 4, 2015. ENS has revised its program tracking in an attempt to capture all relevant accounts impacted by its programs (as feasible) on a go-forward basis as opposed to tracking one account per customer. The only exception to using the number of accounts per rate class is for the Municipal Utility rate class. NSPI currently has six utility customers but eight accounts, because the Antigonish Electric Utility has three accounts. ENS does not track which Antigonish account is being served through particular programs or participants, so the rate and bill impacts include the number of customers rather than the number of accounts for the Municipal Utility rate class only.
Input Assumption	Forecast energy prices	ENS is currently assuming an average 2.7% increase in the price of energy for each year after 2015, per NSPI's 2014 IRP assumptions.
Input Assumption	Energy sales growth and energy/demand charges	Total and rate class, annual sales growth data was provided by NSP. The sales growth data was modelled for the 2014 IRP Base forecast and is without DSM.
Input Assumption	Cost of DSM	With NSP's release of non-confidential annual avoided costs, the analysis will look different than in prior years: annual, rather than levelized, avoided costs will be used. DSM program administrator costs for future years are based on ENS's 25-Year DSM Potential Study.

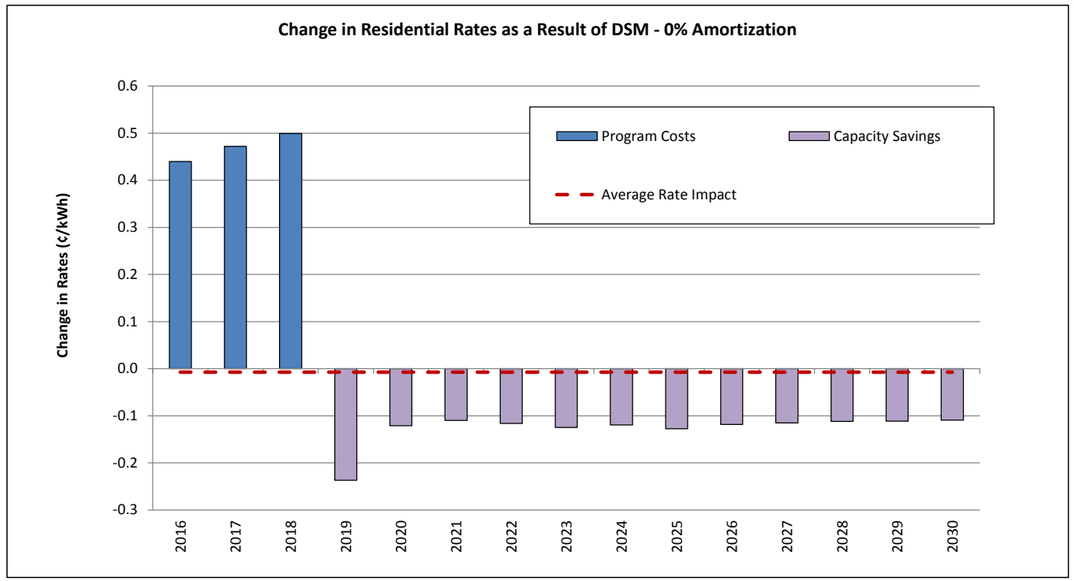
Category	Item	Assumption
"Upstream" savings programs (Point-of-sale discount programs)	Estimation of participation for point-of-sale discount programs	Synapse has recommended that ENS use an estimate for participation numbers and participation rates in these programs. Residential Instant Savings: • Assume that all customers are purchasing items for Residential use (i.e., that all customers are in the Residential rate class). • To determine the number of participants in Instant Savings each year, ENS used information from studies commissioned by ENS. In 2011 and 2012 the study indicated participation levels were 6% of the general population, in 2013 it indicated 7%, and in 2014 it indicated 13%. ENS will assume that 13% of Nova Scotians participate in the Instant Savings Program for 2015. For 2016-2018, ENS is proposing to use a case similar to the Low Scenario outlined in the DSM Potential study. Since the budget for programs will stay approximately the same to 2015, we assume the participation would stay around the same levels of participation in 2014. • Assume that historical re-participation of customers each year is 10%. This assumption is based on an initial proposal from Rhode Island's 2013 rate and bill assumptions, which is, to ENS's knowledge, the only other jurisdiction making these estimations. Note: Rhode Island ended up using program-specific data for which ENS does not have comparable research. ENS will reduce the number of unique participants by 10% in the first year of duplication (2012) and for each subsequent year, ENS will account for 10% duplication in the remaining population for each year for until 2013. In 2014, ENSC engaged Corporate Research Associates to determine the number of re-participants in their quarterly omnibus survey. Of those who purchased products in 2014, 71% also purchased products in 2013. • For the purposes of calculating the overall participation of the Residential rate class in all DSM programs (i.e., taking into account duplication across programs), we apply the number of annual Instant Savings participants as a percentage of the overall Residential rate class program participants. Business, Non-Profit and Institutional Upstream Business Energy Rebates (UBER): • Assume that each transaction made is made up of all measures required for installation in a separate facility (i.e., while one contractor may have 5 transactions in a year, each one is for installation in a facility with a different NSPI account). • Assume that re-participation of customers each year is 10%. This assumption is based on an initial proposal from Rhode Island's 2013 rate and bill assumptions, which is, to ENS's knowledge, the only other jurisdiction making these estimations. Note: Rhode Island ended up using program-specific data for which ENS does not have comparable research. ENS will reduce the number of unique participants by that amount each year for 2011-2018. • For the purposes of calculating average savings per participant, assume that 20% of UBER purchases were made for facilities that have participated in other DSM programs. For the purposes of calculating the overall participation of the BNI rate classes in programs, assume that 20% of UBER customers participated in another DSM program. • Assume that the average rate class allocation of all BNI programs applies to this program component. This assumption allows the benefits of UBER to be allocated to each rate class in proportion to general historical performance.

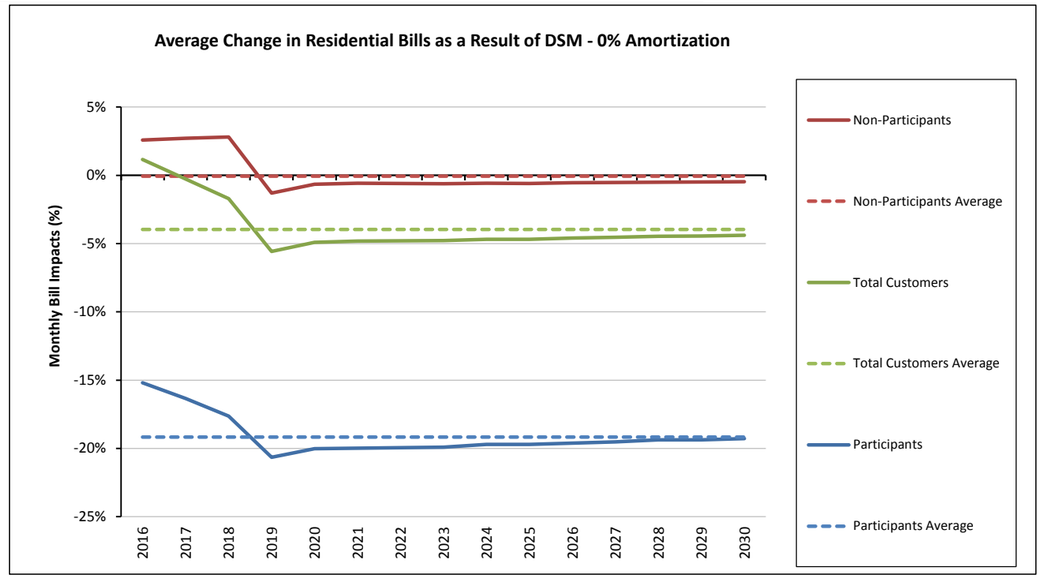
Category	Item	Assumption
Rate Impact Assumption	Calculation of rate impacts	Rate impacts are calculated using historical and forecasted energy and demand sales, consumption, and rates by rate class. The avoided cost of capacity is also used; however, the avoided cost of energy is not included. It is assumed that the avoided cost of energy includes the cost of fuel only and therefore it is a variable cost that would not impact rates. This assumption may be an oversimplification; however, considering the information currently available from NSPI, it is considered appropriate. Synapse's testimony from the 2013-2015 DSM Plan process (page 8, lines 15-16) and Final Comments in response to ENSC's 2014 DCRR application (page 2, paragraph 1) indicates that avoided transmission and distribution costs as well as avoided environmental compliance costs should also be included in the model; however, the avoided costs associated with DSM are currently expressed as avoided energy and capacity costs only. It is assumed that associated transmission and distribution costs, as well as the avoided environmental compliance costs, are included in the avoided cost of capacity. Therefore, to be conservative, the avoided cost of capacity only has been included in the model inputs. In the event NSPI supplies the avoided transmission, distribution and marginal fuel costs, ENS's model has been updated and is now able to include it within the analysis.
Rate Impact Assumption	Avoided costs	ENS has been provided annual, non-levelized avoided costs of energy and capacity for Low, Base and Mid-level DSM from NSPI's 2014 IRP process. Base avoided costs have been used for ENS's proposed Plan analysis, and Low avoided costs have been used for the 50% Low analysis.
Rate Impact Assumption	Amortization vs. expensing	Under the *Electricity Efficiency and Conservation Restructuring (2014) Act*, DSM costs are able to be amortized up to $100 million. This has been included in the model and ENS is able to include different levels of amortization. Included in the analysis is both 0% amortization of costs (100% expensed to rate payers) and 50% amortization.
Rate Impact Assumption	Time period analyzed	The model analyzes the impacts of the proposed 2016-2018 DSM Resource Plan. The future scenarios analyzed are based on ENSC's DSM Potential Study and the 2014 IRP inputs. No rates beyond 2018 have been forecasted; however, the benefits of measures installed from 2011-2018 are included as they are results of the timeframe under consideration. In other words, DSM costs in the analysis end after 2018, but the benefits are extended beyond 2018 to the appropriate average measure life by rate class.

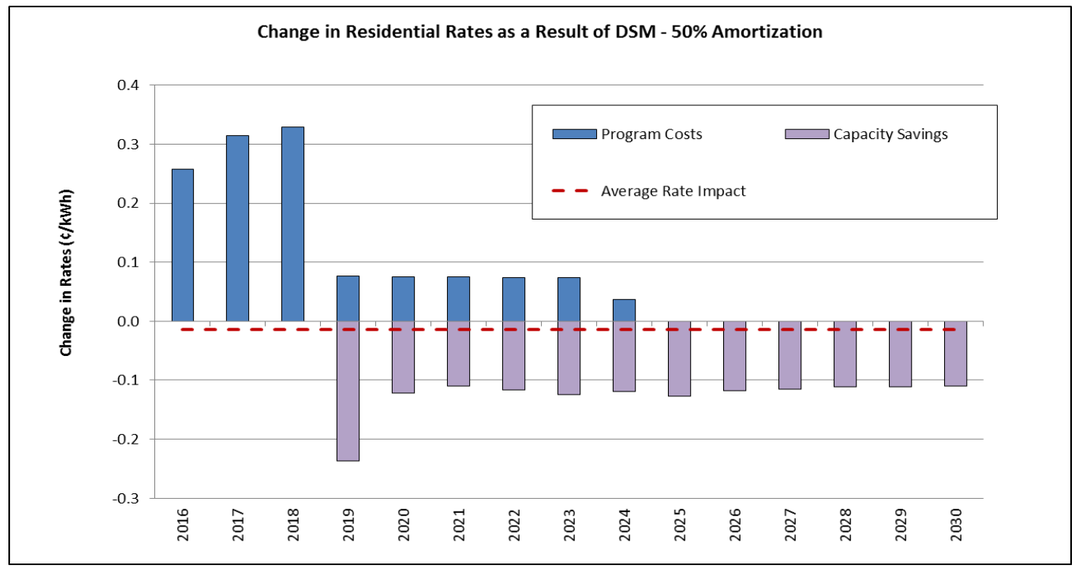
Category	Item	Assumption
Bill Impact Assumption	Calculation of bill impacts	Bill impacts are calculated using forecasted energy and demand sales, rates, consumption and average participant savings by rate class. Average savings by participant have been calculated based on the total energy savings achieved by each participant; for example, if one participant is involved in multiple programs, then the total savings achieved through all program involvement are calculated for that participant.
Bill Impact Assumption	Presentation of bill impacts	Bill impacts are presented as monthly for all rate classes.
Participation Assumption	Calculation of participation impacts	Participation impacts are calculated using historical and forecasted participation rates by rate class. Participants involved in multiple programs have been counted in each program for the purposes of the Participation Rates by Program. Per Synapse's Final Comments in response to ENS's 2014 DCRR application (page 2, paragraph 2), this version of the model will present participation rates rather than participation numbers. To calculate cumulative participation rates by rate class, each participant has been counted only once. Therefore, the individual program participation rates will exceed the cumulative rate-class participation rates. For both impact calculations, only new, incremental participants have been counted, so participants involved in a program or programs in multiple years are only counted as a participant the first year they participate.
Output Assumption	Alternative levels of DSM	The model includes input options to run alternative DSM scenarios to provide an analysis of the impacts of different levels of DSM investment. For this version of the model, ENSC's DSM Potential Study has been used to calculate various alternative levels of DSM (Low, Mid and High). ENS is also including a 50% Low scenario as developed by NSPI for incorporation into the 2014 IRP. The analysis will use ENS's proposed plan levels as the "default" scenario. Alternative scenarios will then be compared against this scenario rather than against a no-DSM case.

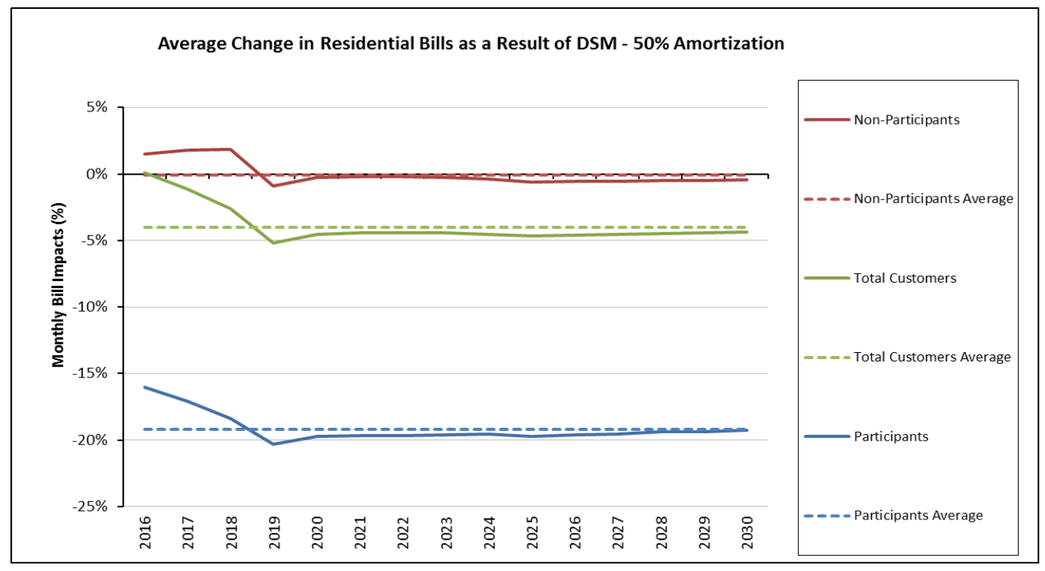
Rate and Bill Impacts of DSM on the Residential Class

Line#	Impacts of DSM on the Residential Rate Class	2016	2017	2018	2019	2020	2021	2022	2023	2024	2025	2026	2027	2028	2029	2030	Units
2	Incremental DSM Savings	69.5	75.2	76.9	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	GWh
3	Cumulative DSM Savings	69.5	144.7	221.6	221.6	221.6	221.6	221.6	221.6	221.6	221.6	221.6	221.6	221.6	221.6	221.6	GWh
4	DSM Costs for the Rate Class	20,211,222	21,872,114	23,427,037	0	0	0	0	0	0	0	0	0	0	0	0	Dollars
5	Cumulative Number of Participants	37317	72765	103872	103872	103872	103872	103872	103872	103872	103872	103872	103872	103872	103872	103872	
6	Annual Average Savings per Participant (Cumulative)	1,862	1,989	2,133	2,133	2,133	2,133	2,133	2,133	2,133	2,133	2,133	2,133	2,133	2,133	2,133	kWh
7	Cumulative Cost per kWh Saved	29.090	19.647	15.033	9.966	7.453	5.953	4.955	4.244	3.711	3.297	2.966	2.696	2.471	2.280	2.117	cents



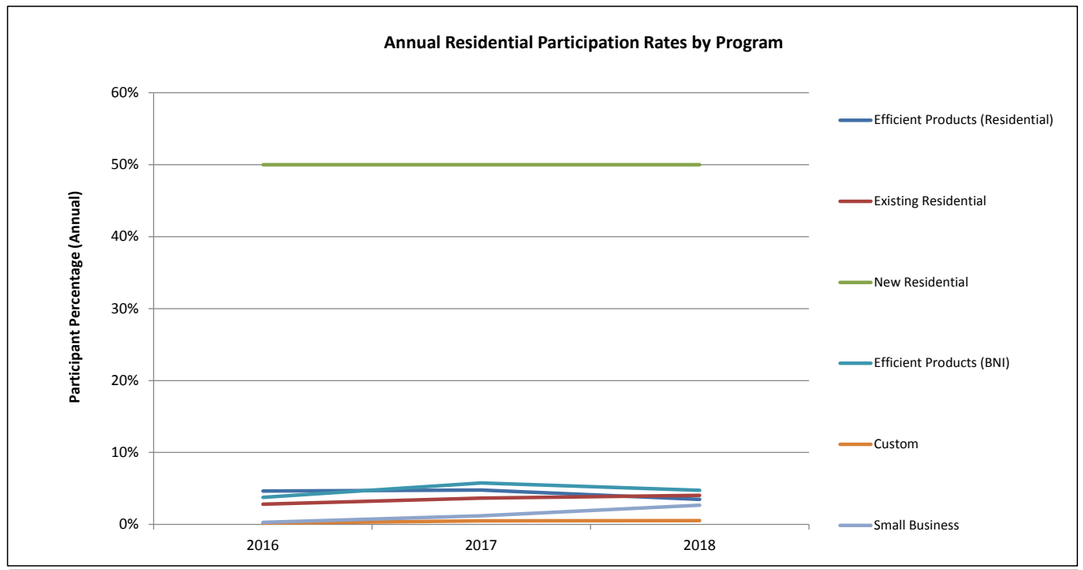


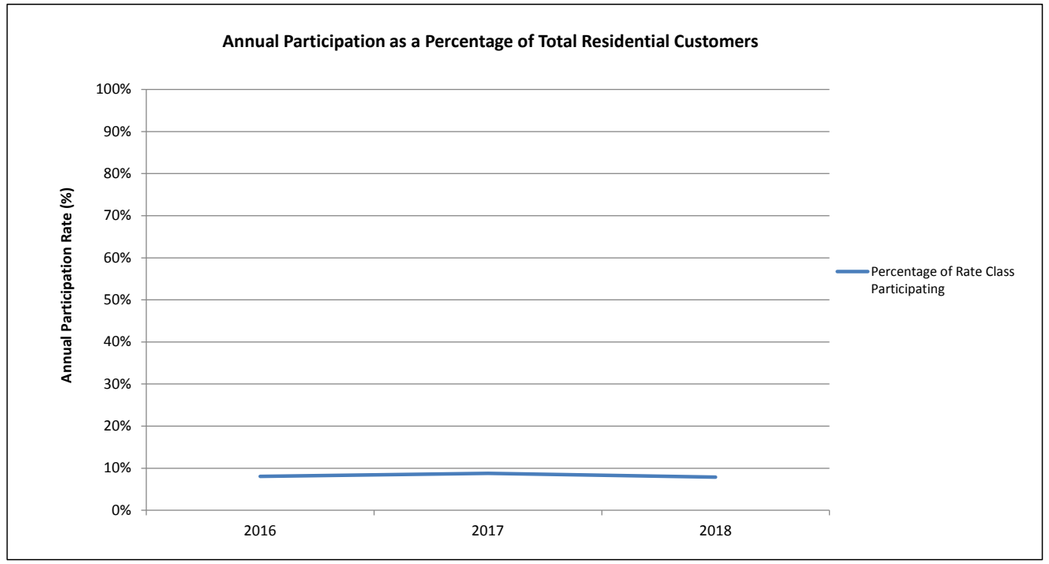


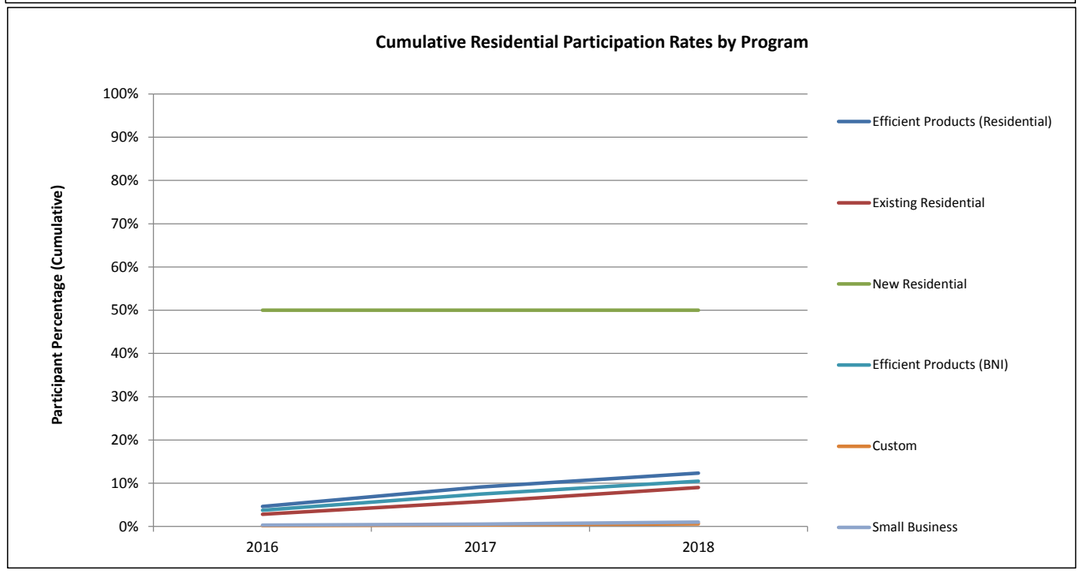


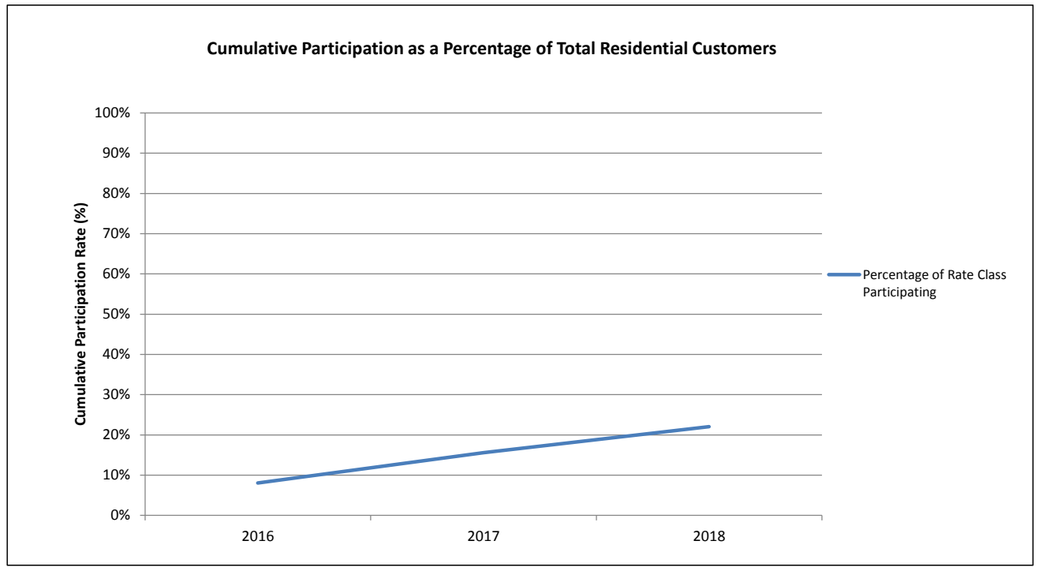
Line#

Rate and Bill Impacts of DSM on the Residential Class



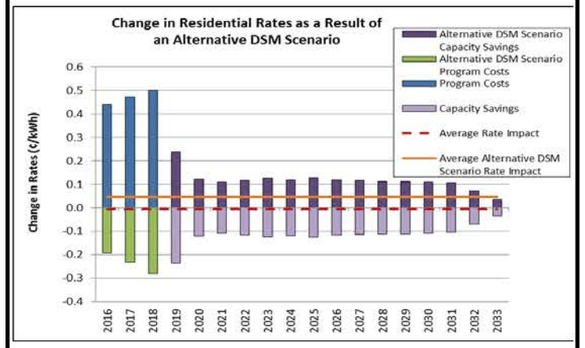


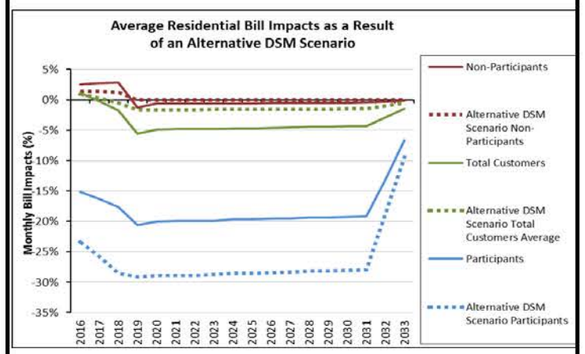


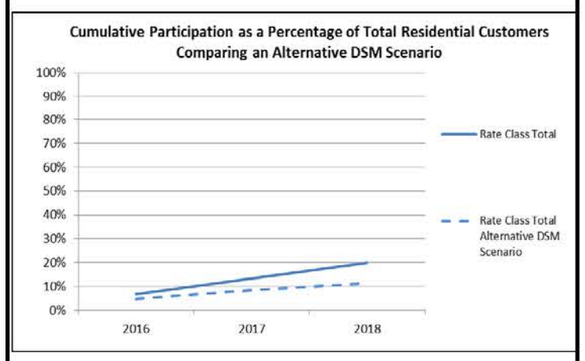


Rate and Bill Impacts of Alternate DSM Scenarios on the Residential Class

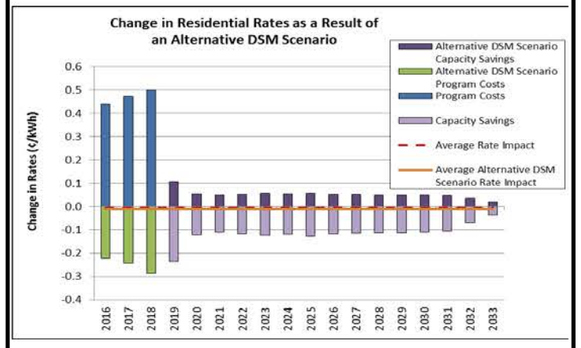
50% Low

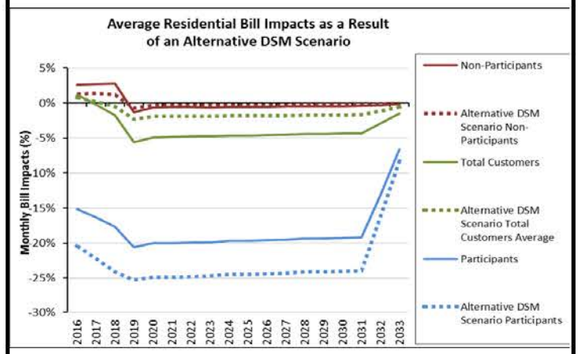


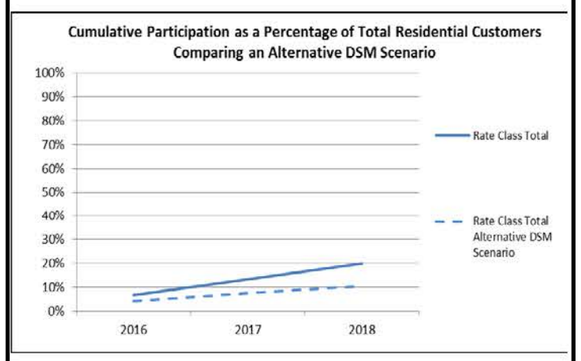




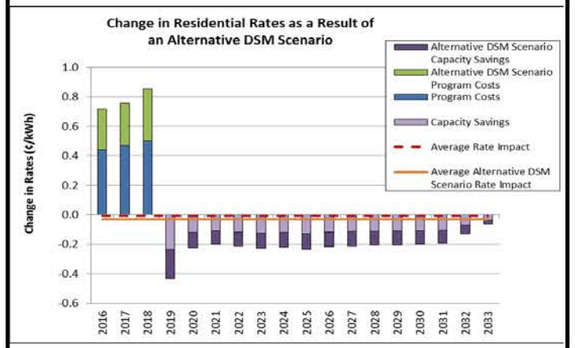
Low

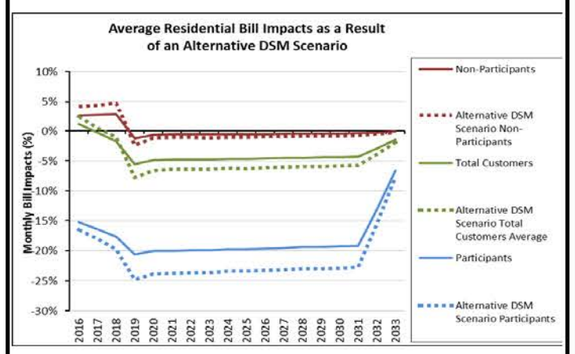


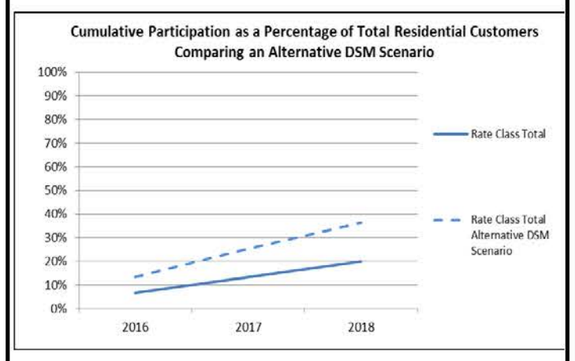




Mid

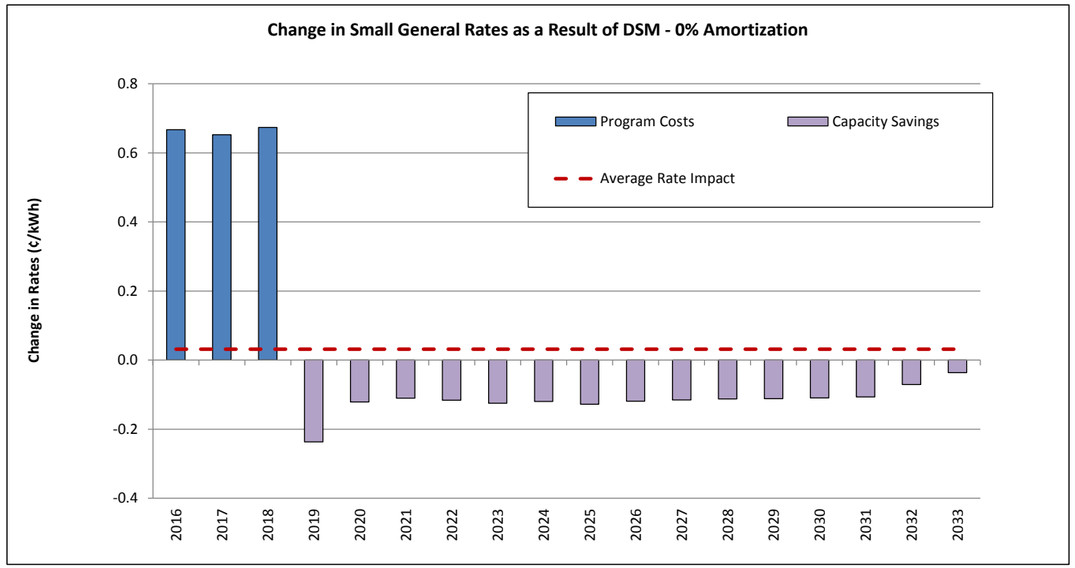


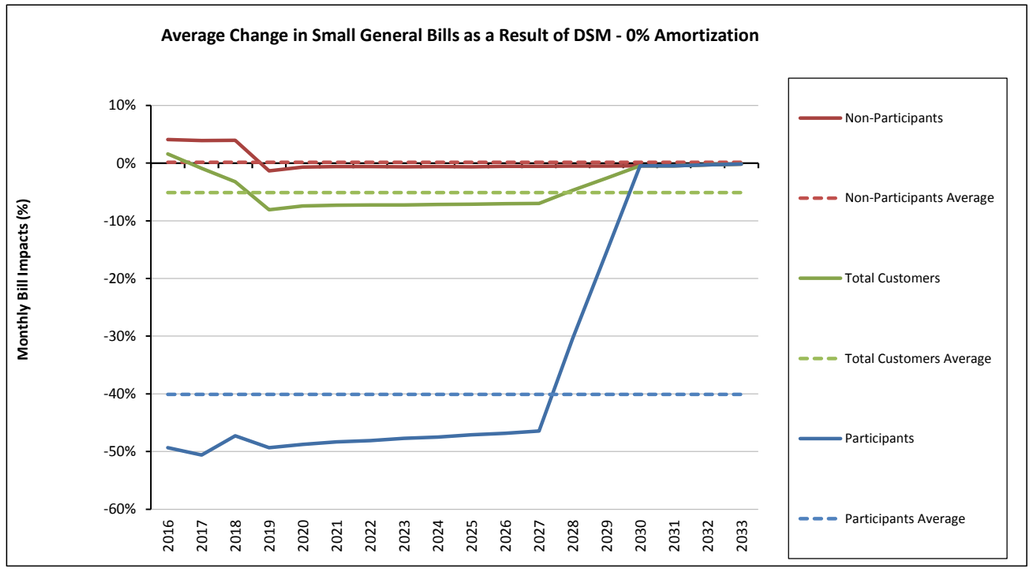


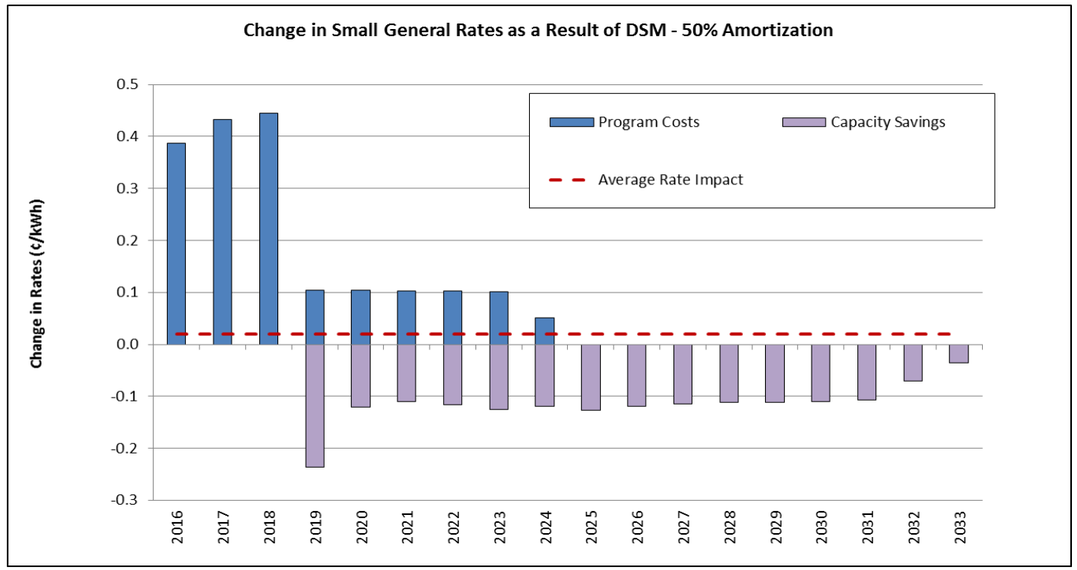


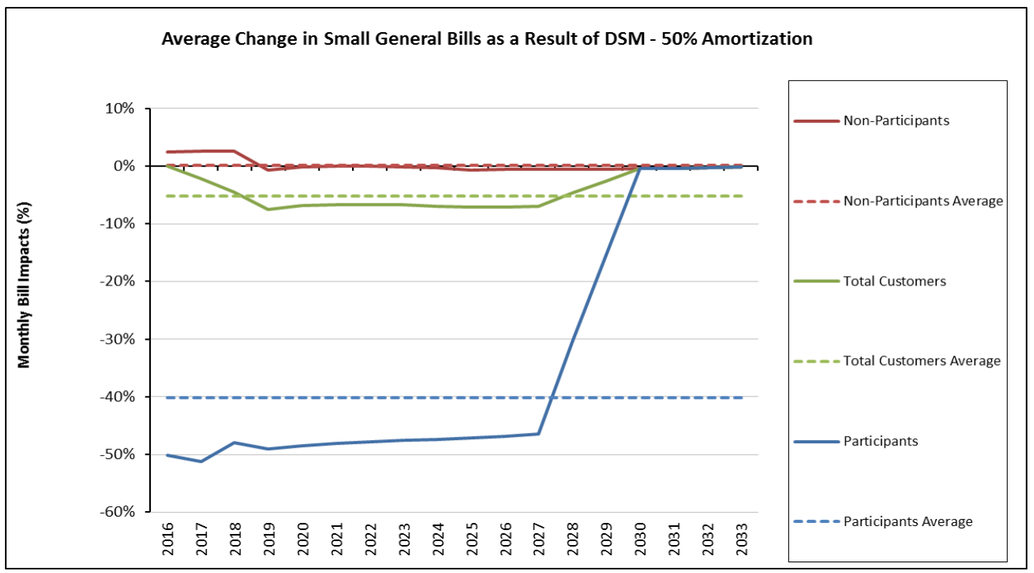
Rate and Bill Impacts of DSM on the Small General Class

Line#	Impacts of DSM on the Small General Rate Class	2016	2017	2018	2019	2020	2021	2022	2023	2024	2025	2026	2027	2028	2029	2030	Units
2	Incremental DSM Savings	6.7	6.4	6.4	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	GWh
3	Cumulative DSM Savings	6.7	13.1	19.5	19.5	19.5	19.5	19.5	19.5	19.5	19.5	19.5	19.5	12.8	6.4	0.0	GWh
4	DSM Costs for the Rate Class	1,702,008	1,684,129	1,752,139	0	0	0	0	0	0	0	0	0	0	0	0	Dollars
5	Cumulative Number of Participants	1131	2157	3426	3426	3426	3426	3426	3426	3426	3426	3426	3426	3426	3426	3426	
6	Annual Average Savings per Participant (Cumulative)	5,920	6,071	5,699	5,699	5,699	5,699	5,699	5,699	5,699	5,699	5,699	5,699	3,743	1,877	0	kWh
7	Cumulative Cost per kWh Saved	25.409	17.109	13.070	8.734	6.558	5.250	4.377	3.753	3.285	2.920	2.629	2.390	2.255	2.193	2.193	cents



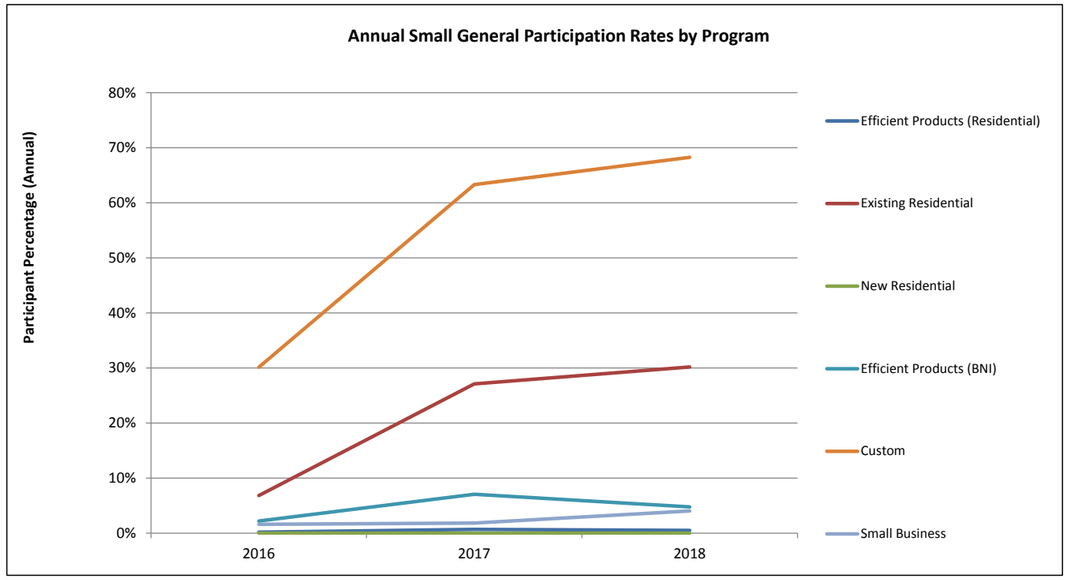


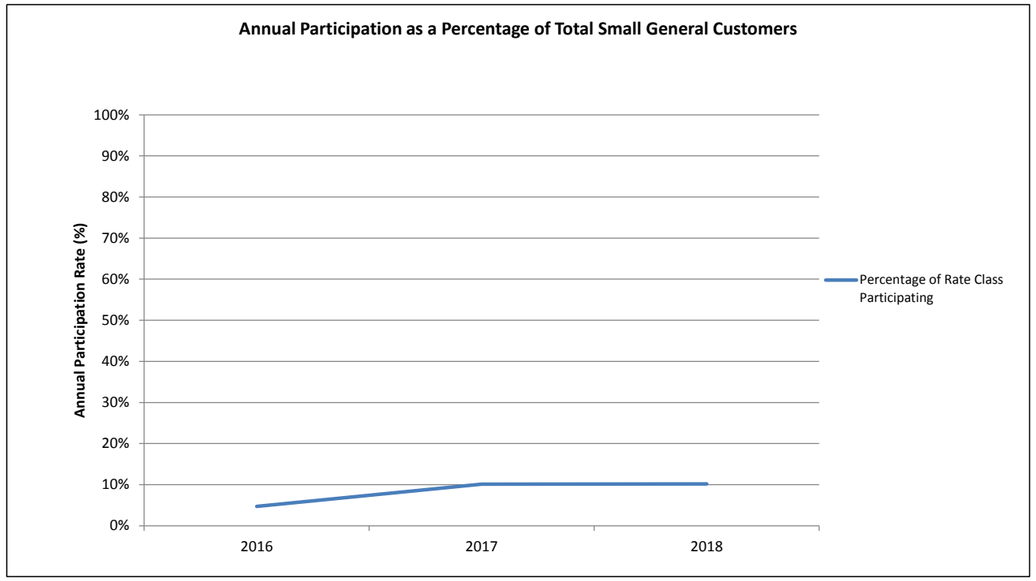


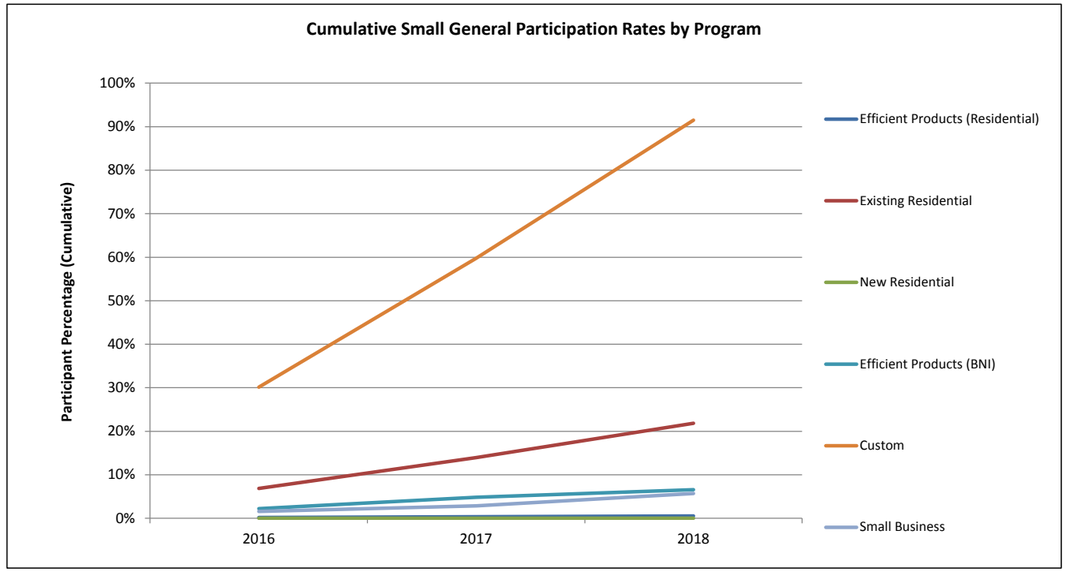


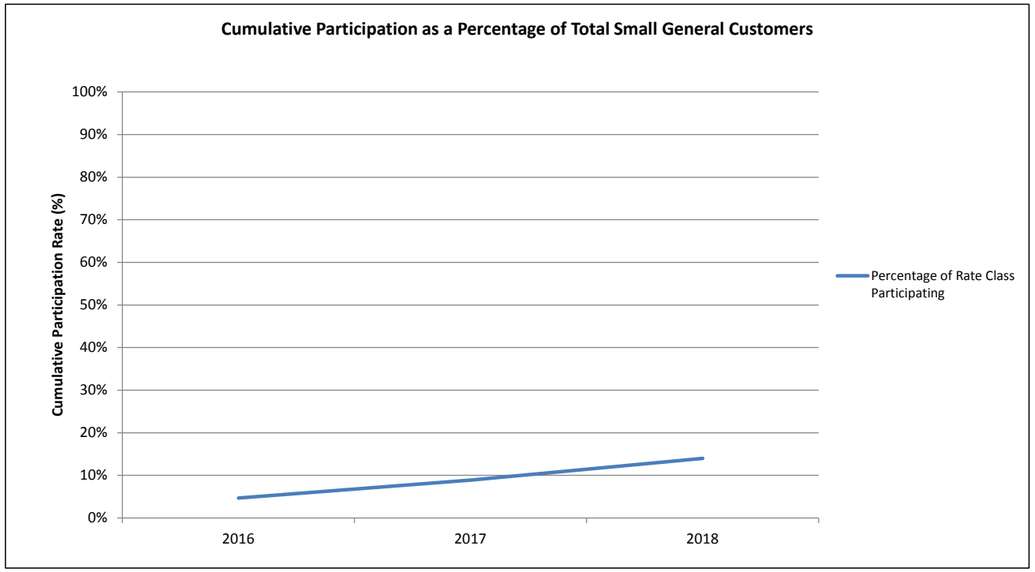
Line#

Rate and Bill Impacts of DSM on the Small General Class





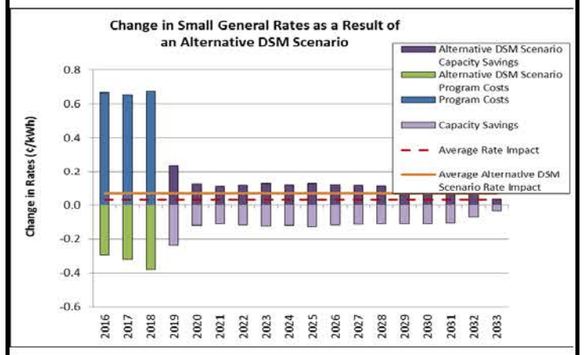


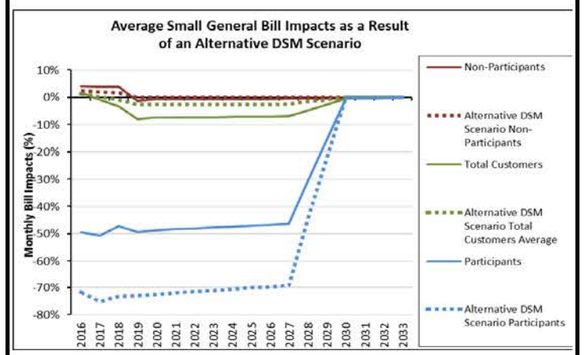


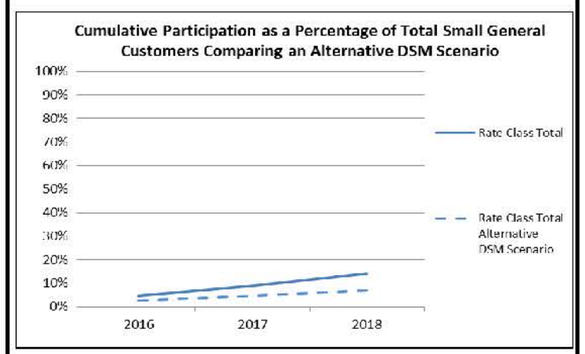
Line#

Rate and Bill Impacts of Alternate DSM Scenarios on the Small General Class

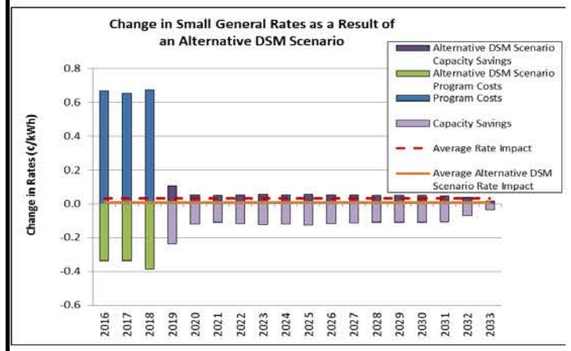
50% Low

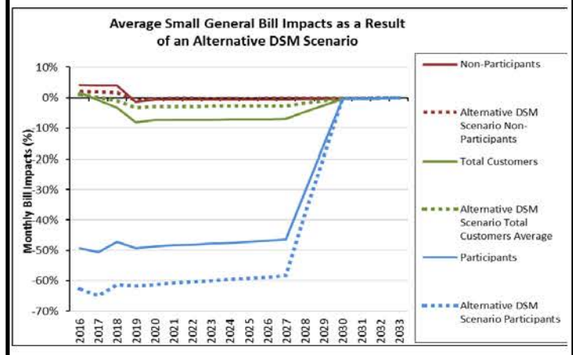


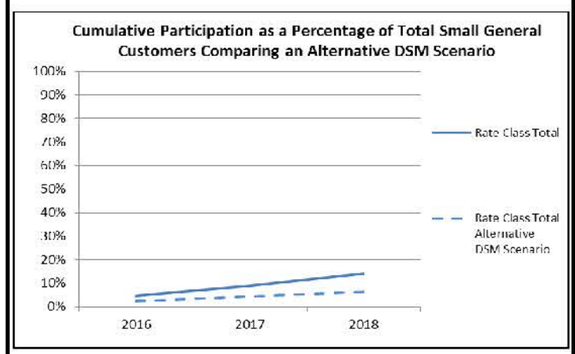




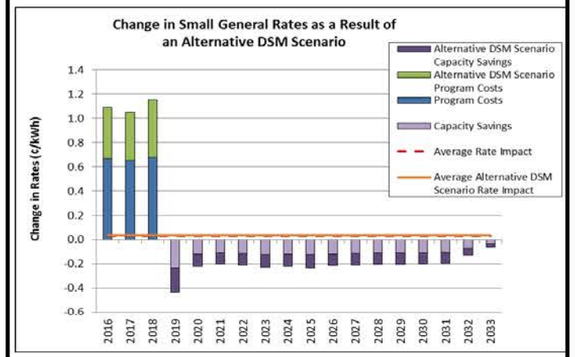
Low

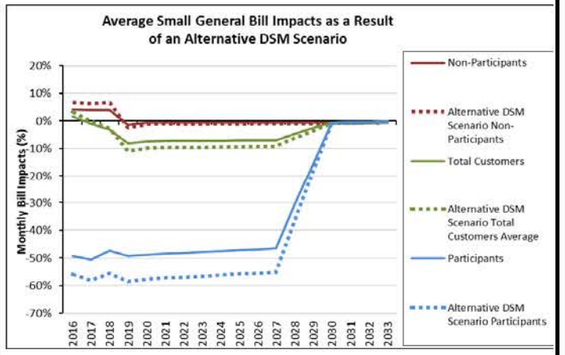


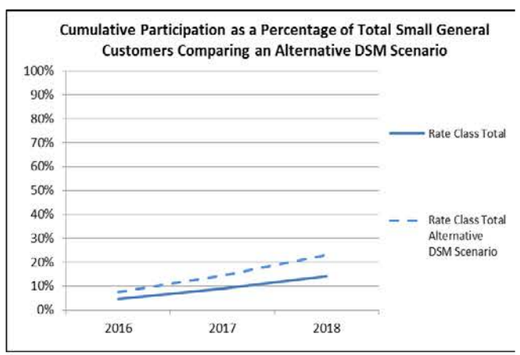




Mid

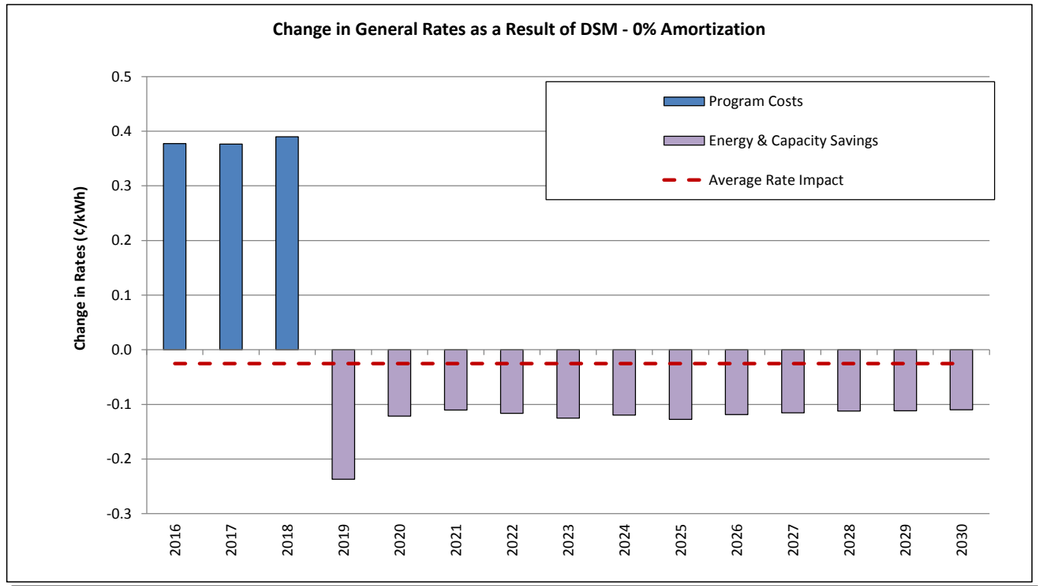


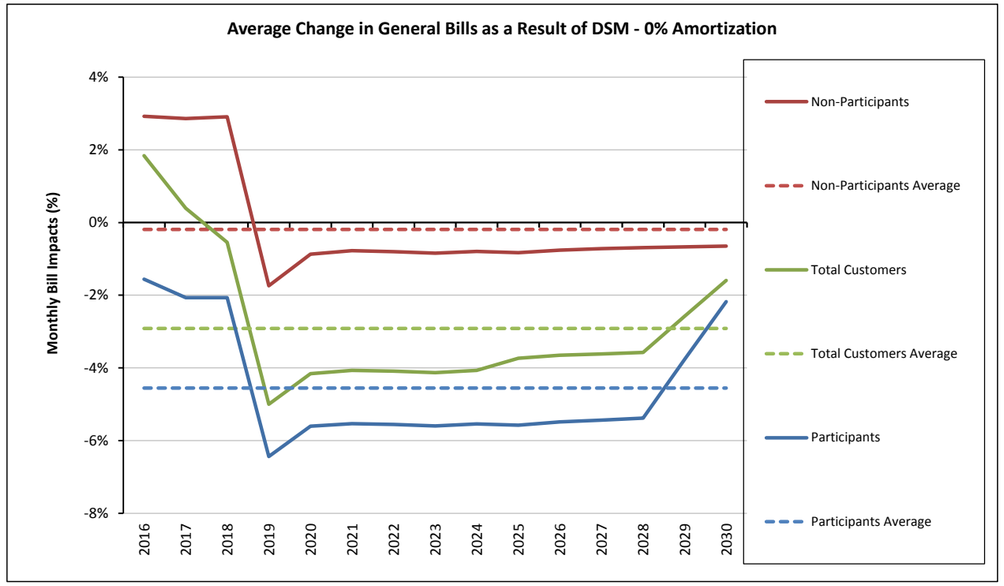


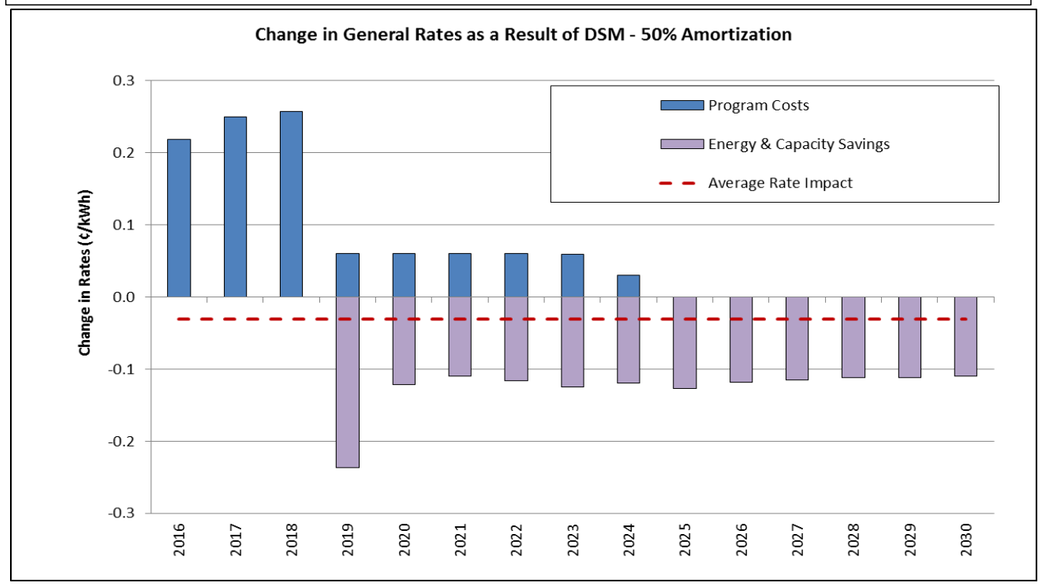


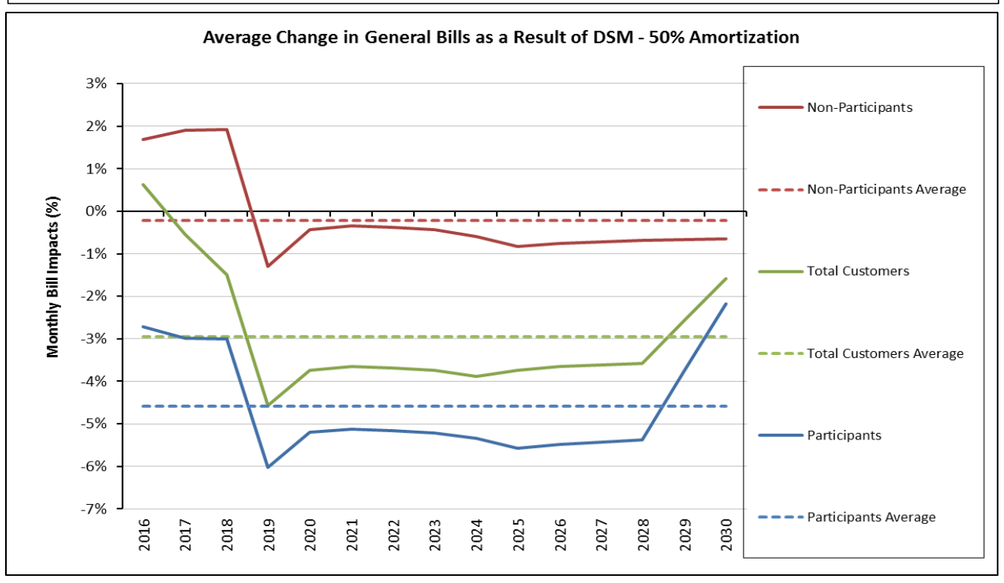
Rate and Bill Impacts of DSM on the General Class

Impacts of DSM on the General Rate Class	2016	2017	2018	2019	2020	2021	2022	2023	2024	2025	2026	2027	2028	2029	2030	Units
Incremental DSM Savings	33.1	32.4	31.9	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	GWh
Cumulative DSM Savings	33.1	65.5	97.3	97.3	97.3	97.3	97.3	97.3	97.3	97.3	97.3	97.3	97.3	64.2	31.9	GWh
DSM Costs for the Rate Class	9,760,495	9,775,664	10,175,896	0	0	0	0	0	0	0	0	0	0	0	0	Dollars
Cumulative Number of Participants	2,653	5,175	7,613	7,613	7,613	7,613	7,613	7,613	7,613	7,613	7,613	7,613	7,613	7,613	7,613	
Annual Average Savings per Participant (Cumulative)	12,474	12,653	12,787	12,787	12,787	12,787	12,787	12,787	12,787	12,787	12,787	12,787	12,787	8,440	4,186	kWh
Cumulative Cost per kWh Saved	29.490	19.818	15.165	10.131	7.606	6.089	5.076	4.352	3.809	3.387	3.048	2.772	2.541	2.408	2.348	cents

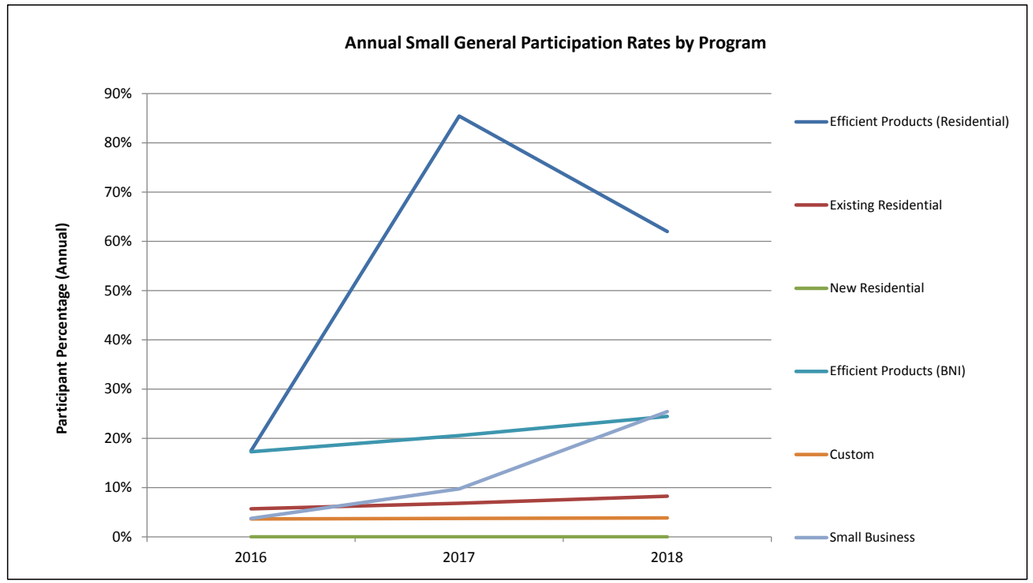


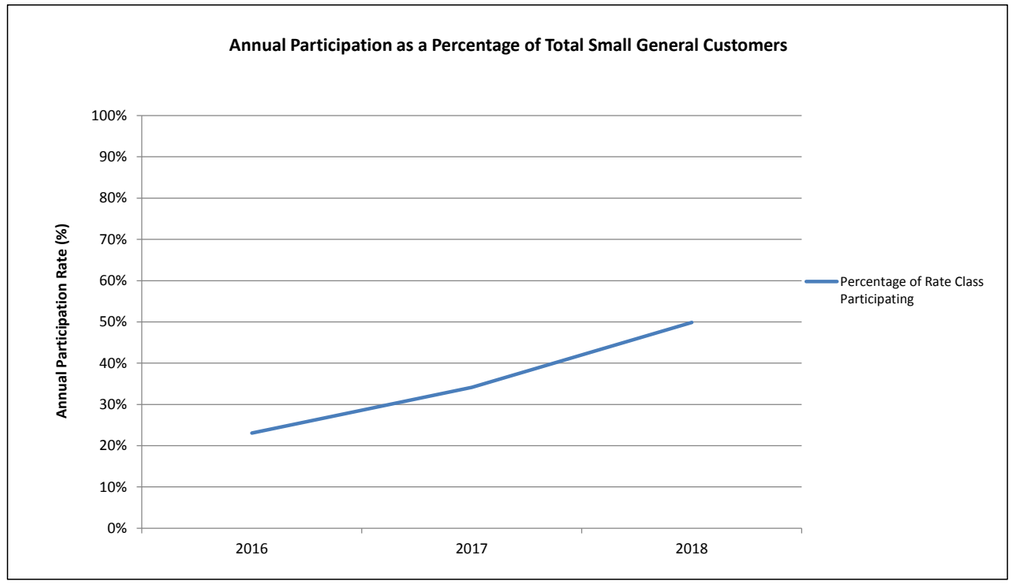


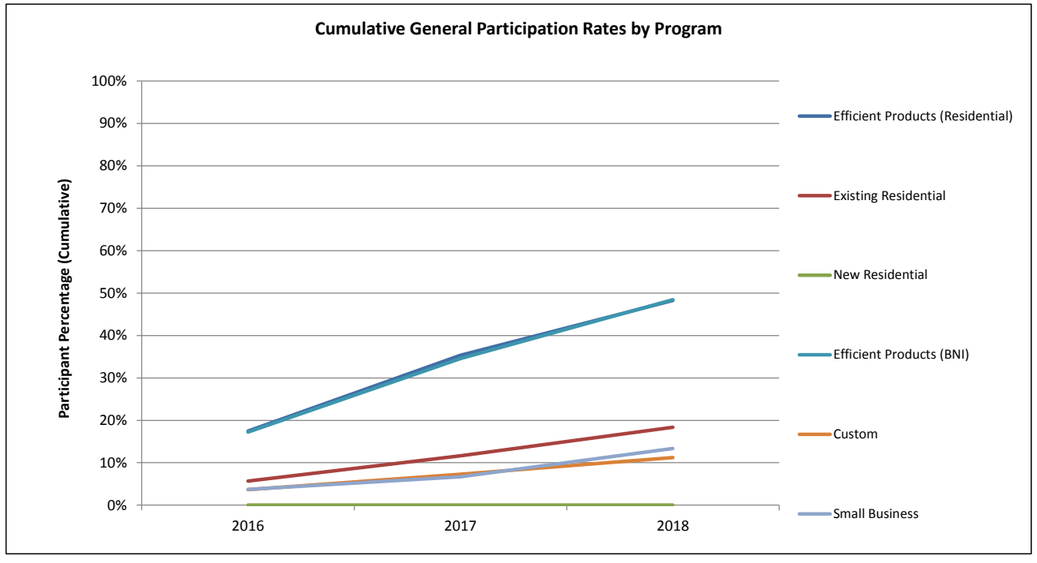


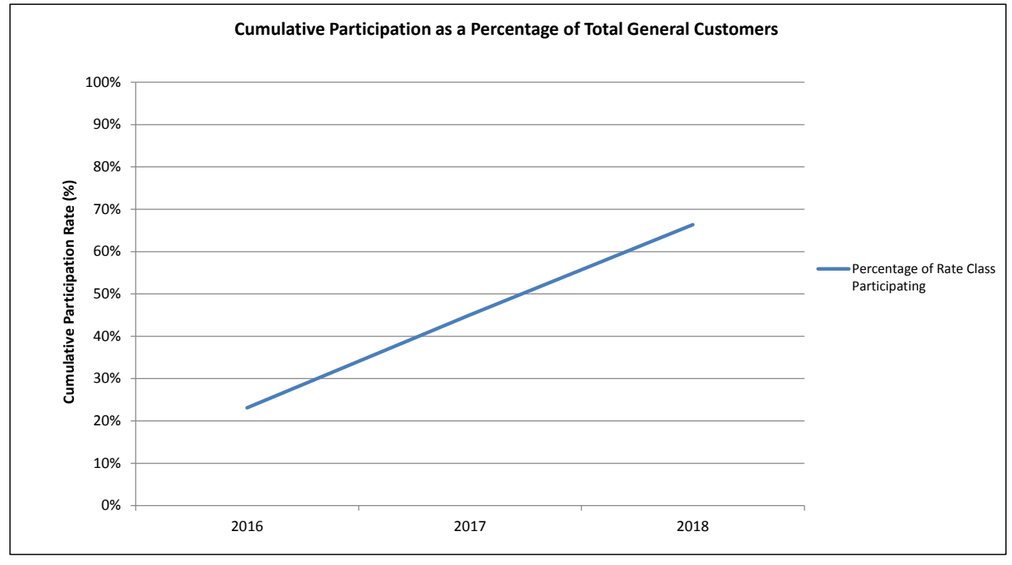


Rate and Bill Impacts of DSM on the General Class





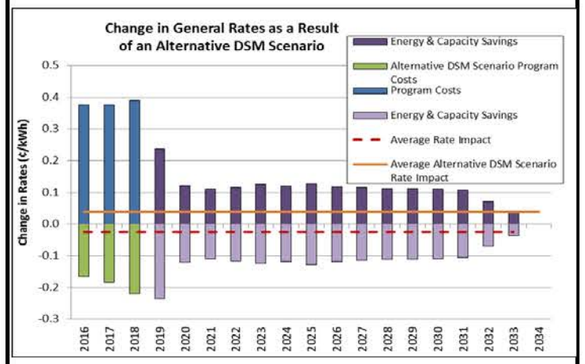


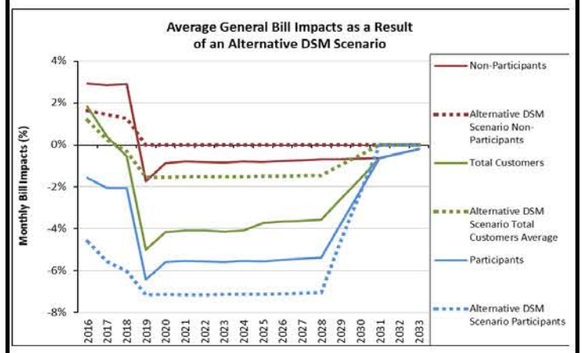


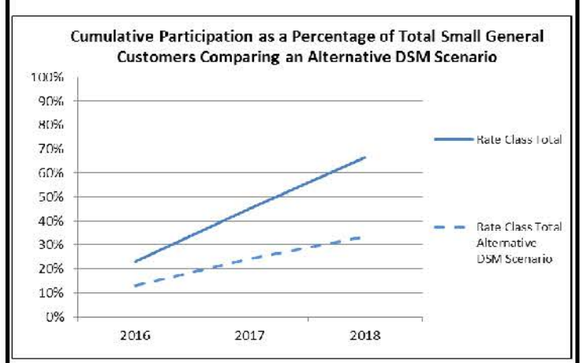
Line#

Rate and Bill Impacts of Alternate DSM Scenarios on the General Class

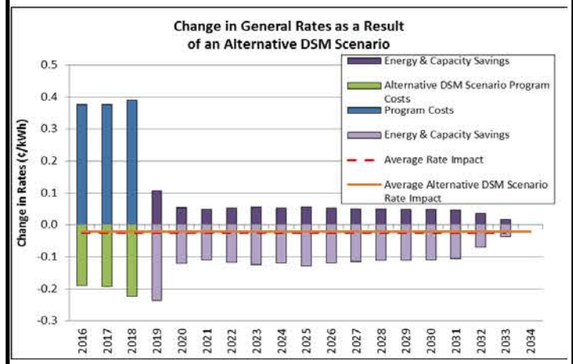
50% Low

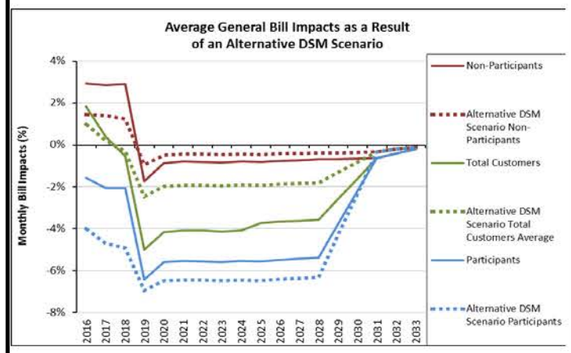


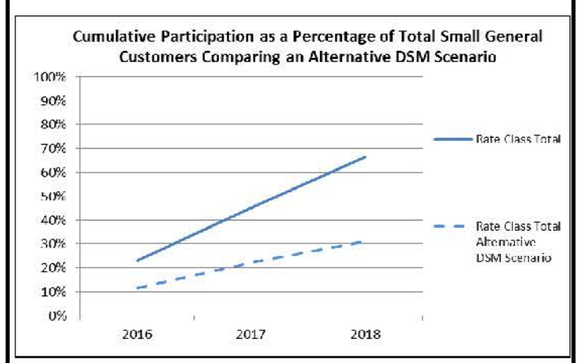




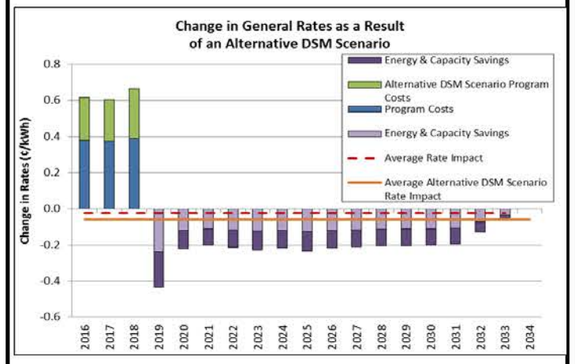
Low

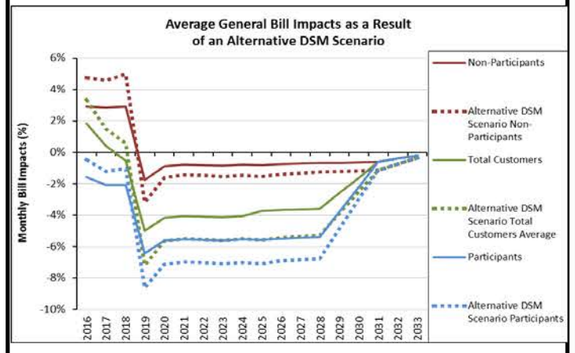


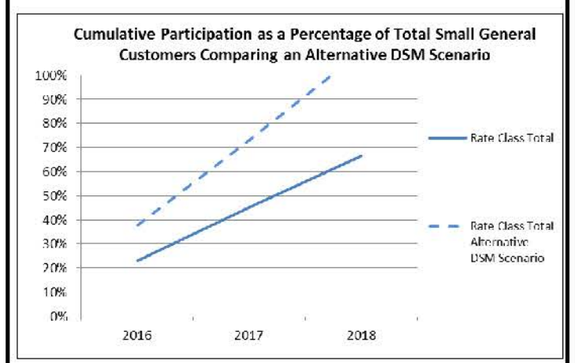




Mid

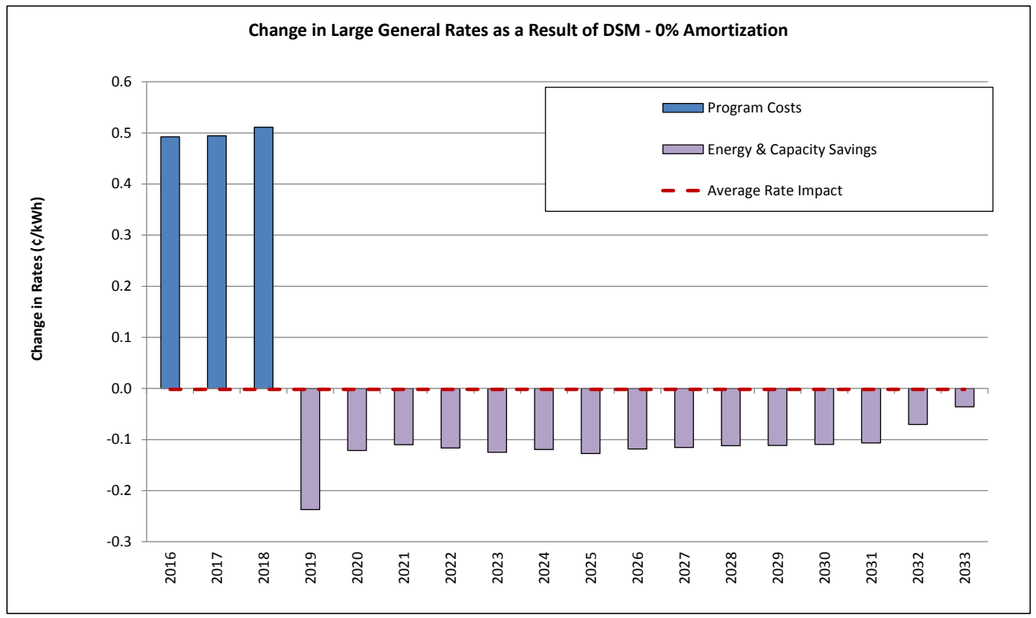


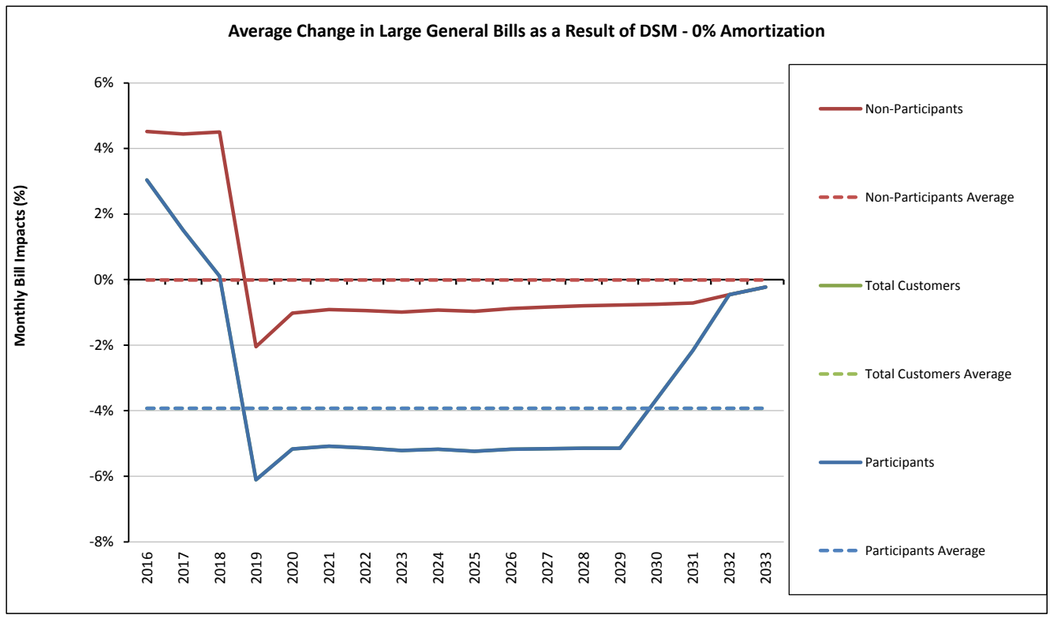


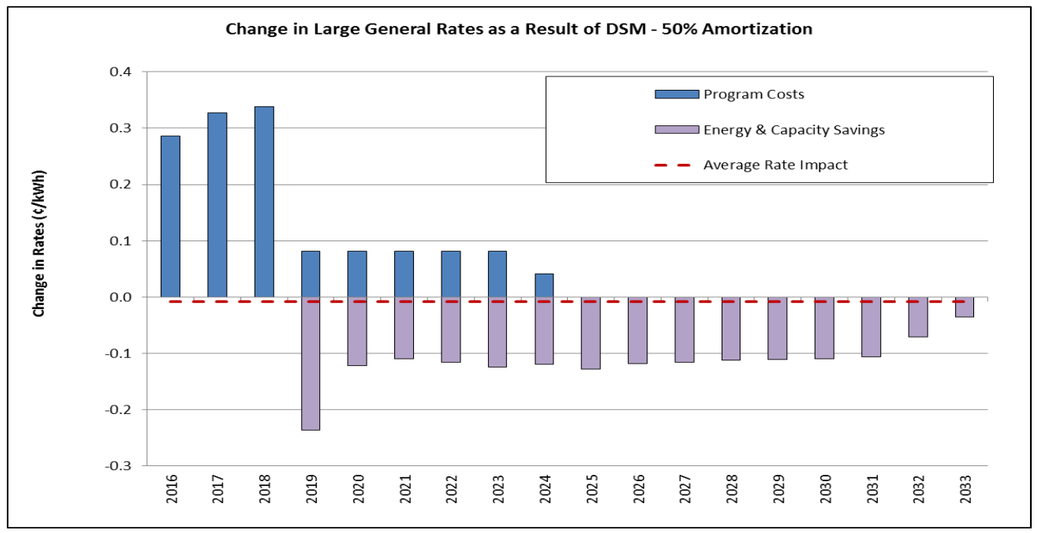


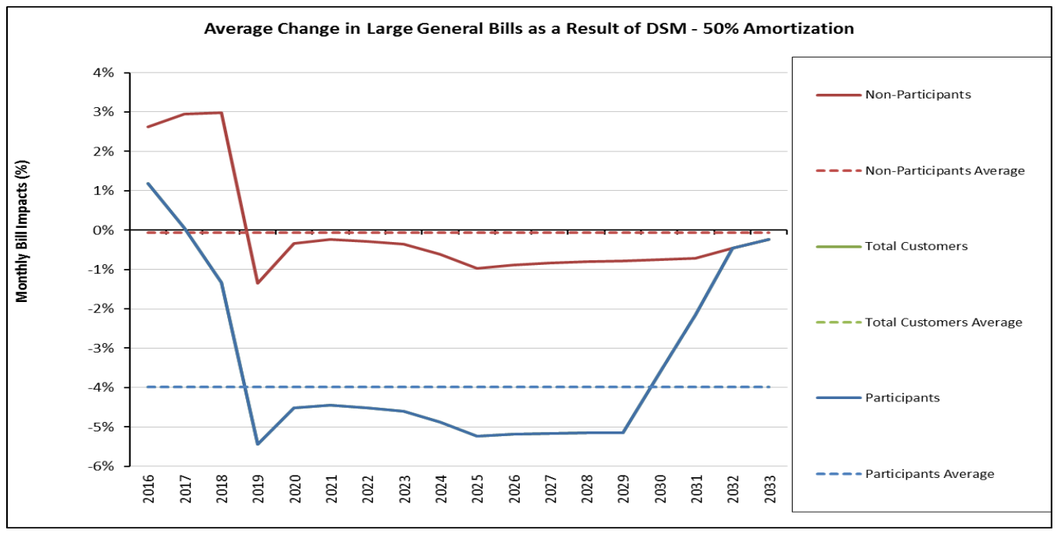
Rate and Bill Impacts of DSM on the Large General Class

Impacts of DSM on the Large General Rate Class	2016	2017	2018	2019	2020	2021	2022	2023	2024	2025	2026	2027	2028	2029	2030	Units
Incremental DSM Savings	7.5	7.3	7.2	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	GWh
Cumulative DSM Savings	7.5	14.8	22.1	22.1	22.1	22.1	22.1	22.1	22.1	22.1	22.1	22.1	22.1	22.1	14.6	GWh
DSM Costs for the Rate Class	2,009,072	2,016,463	2,085,956	0	0	0	0	0	0	0	0	0	0	0	0	Dollars
Cumulative Number of Participants	18	18	18	18	18	18	18	18	18	18	18	18	18	18	18	
Annual Average Savings per Participant (Cumulative)	415,913	824,075	1,226,790	1,226,790	1,226,790	1,226,790	1,226,790	1,226,790	1,226,790	1,226,790	1,226,790	1,226,790	1,226,790	1,226,790	810,877	kWh
Cumulative Cost per kWh Saved	26.836	18.036	13.764	9.192	6.900	5.523	4.604	3.948	3.455	3.071	2.765	2.514	2.304	2.127	2.024	cents

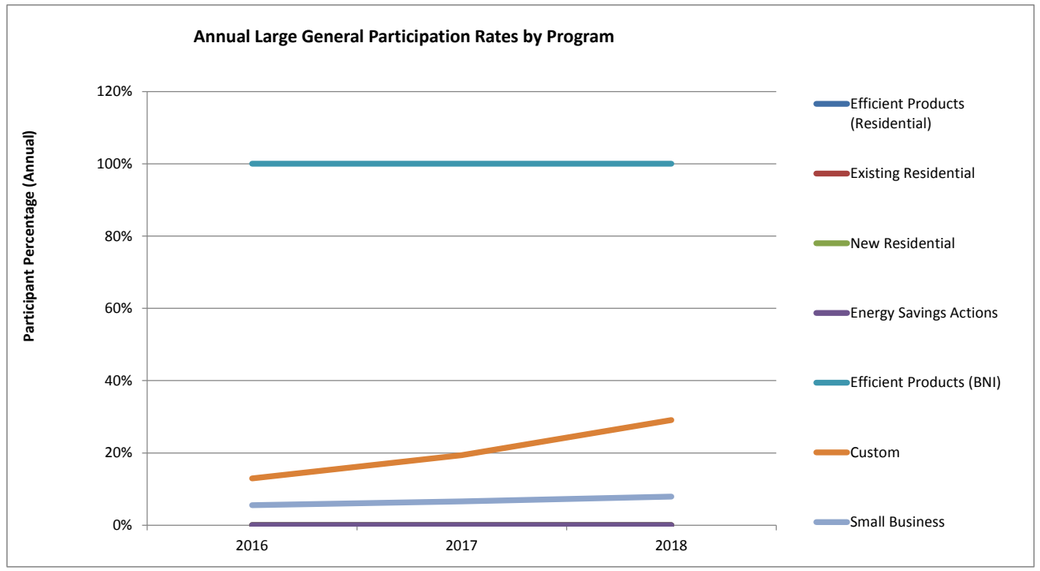


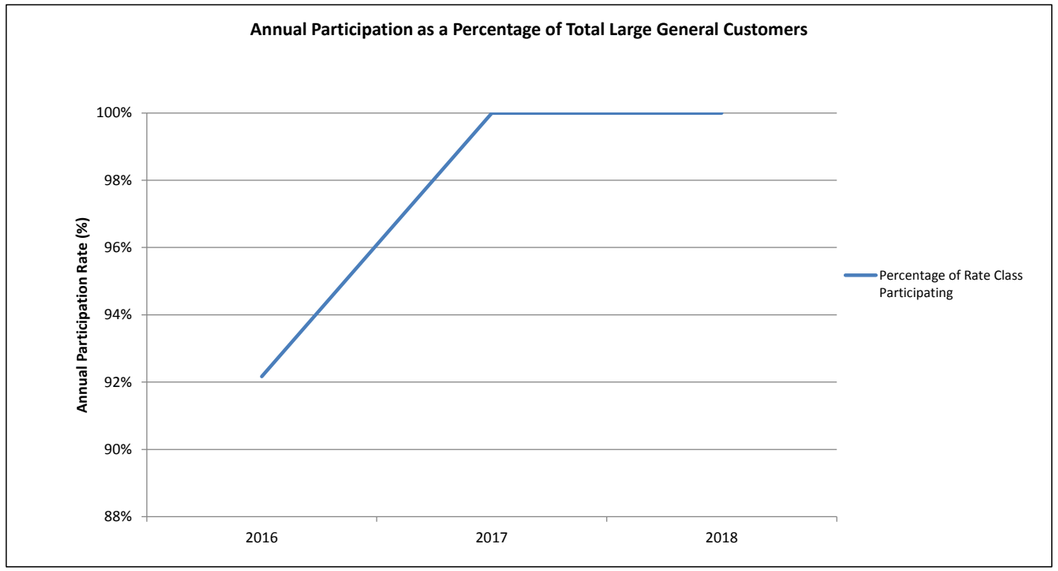


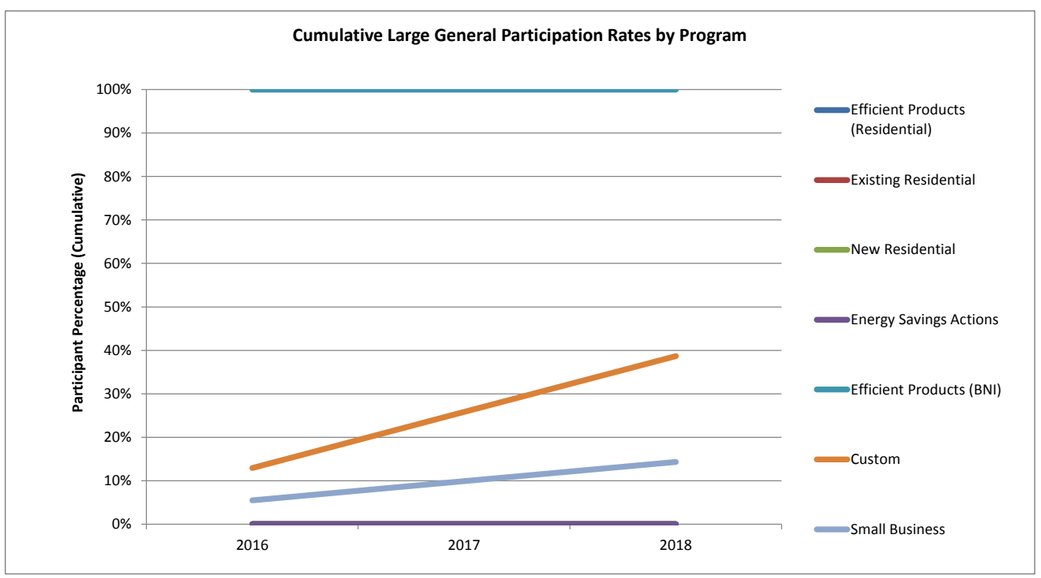


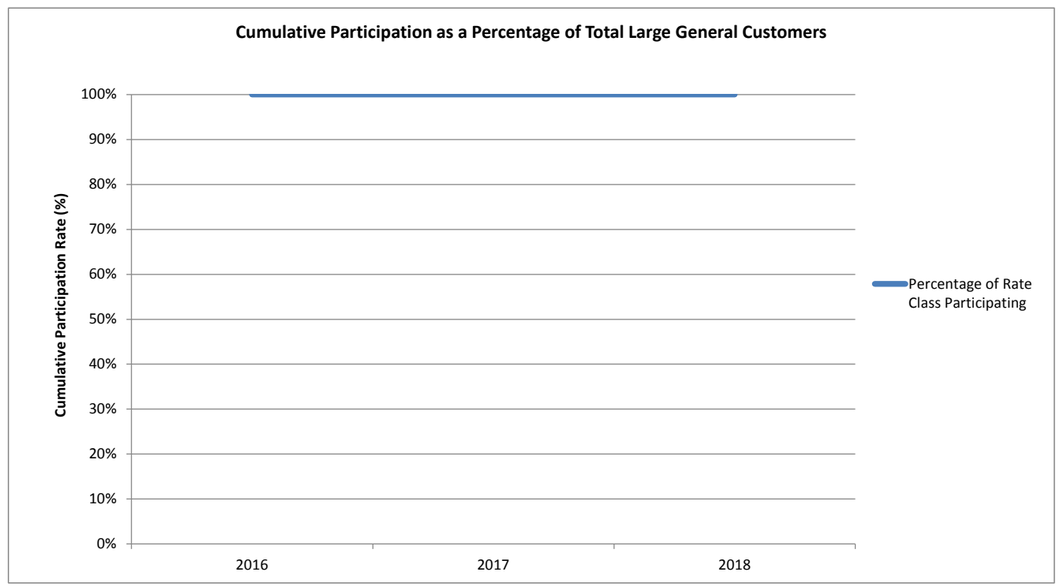


Rate and Bill Impacts of DSM on the Large General Class



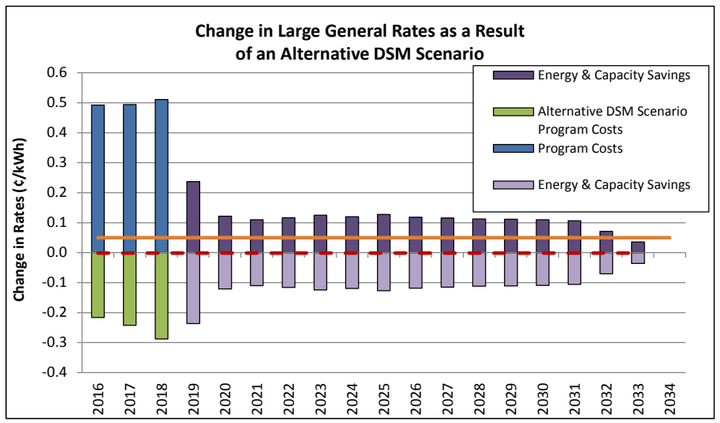


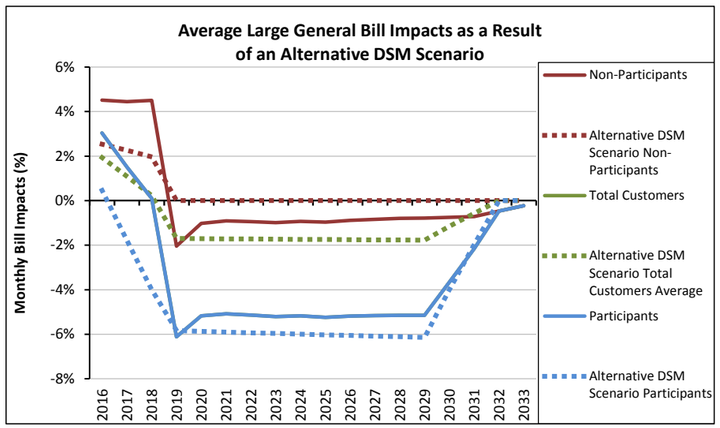


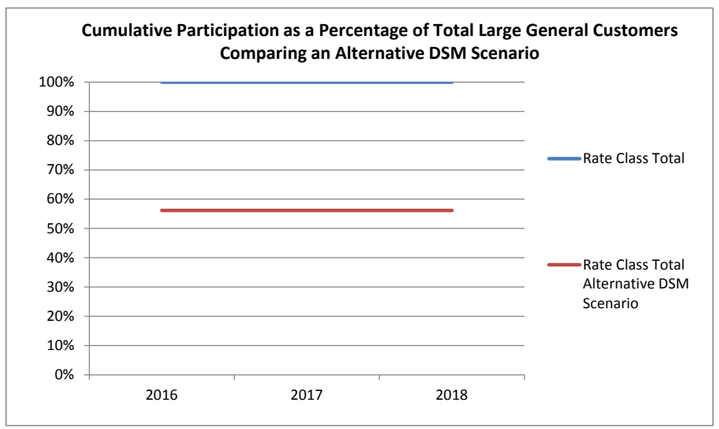


Rate and Bill Impacts of Alternate DSM Scenarios on the Large General Class

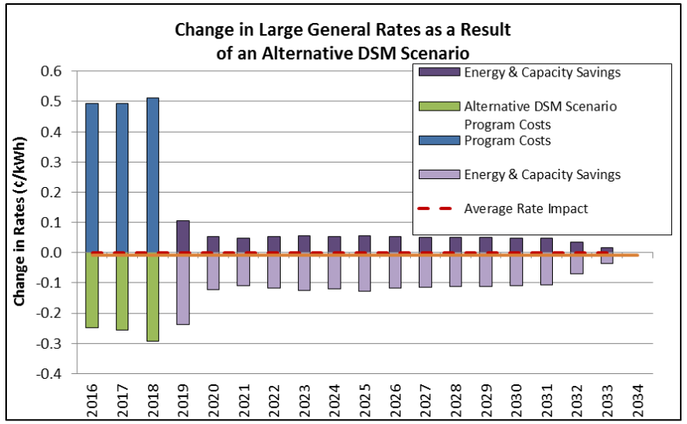
50% Low

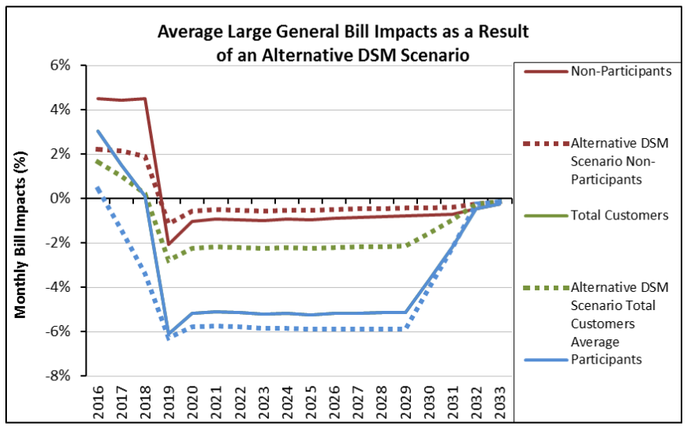


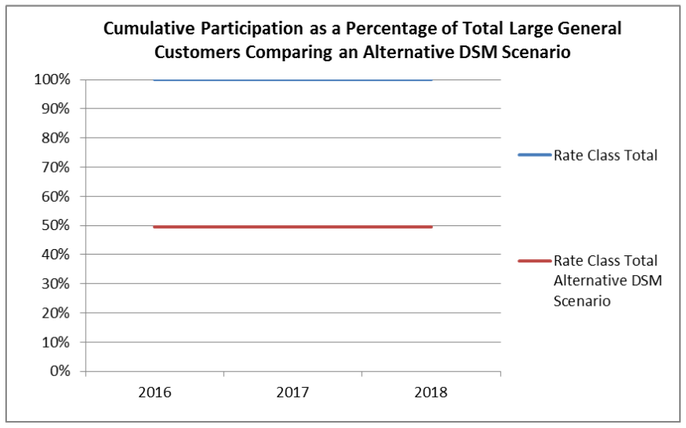




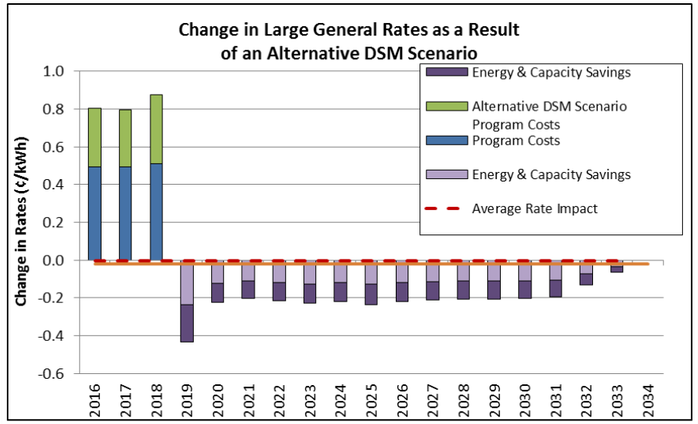
Low

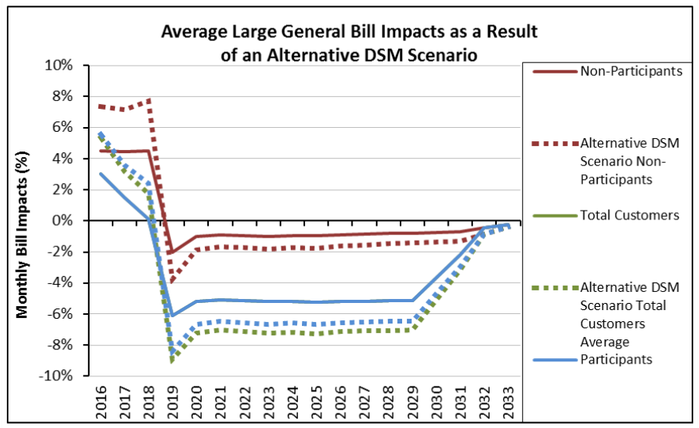


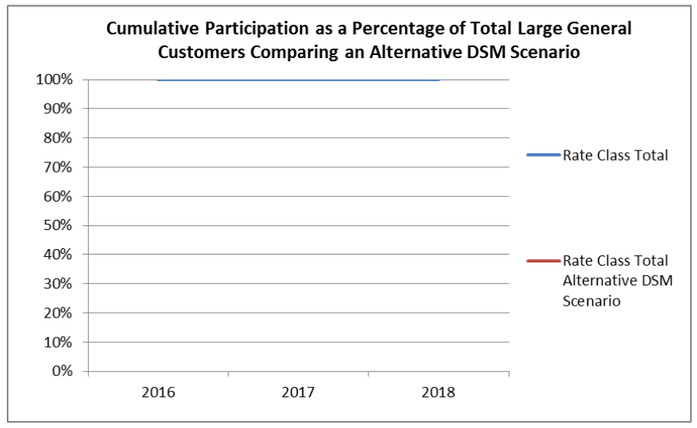




Mid

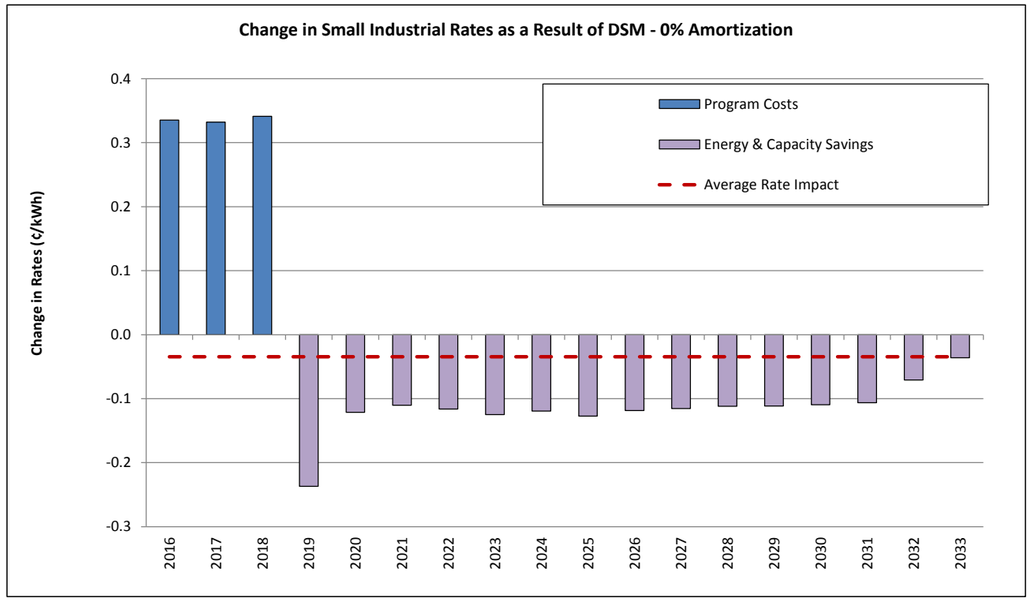


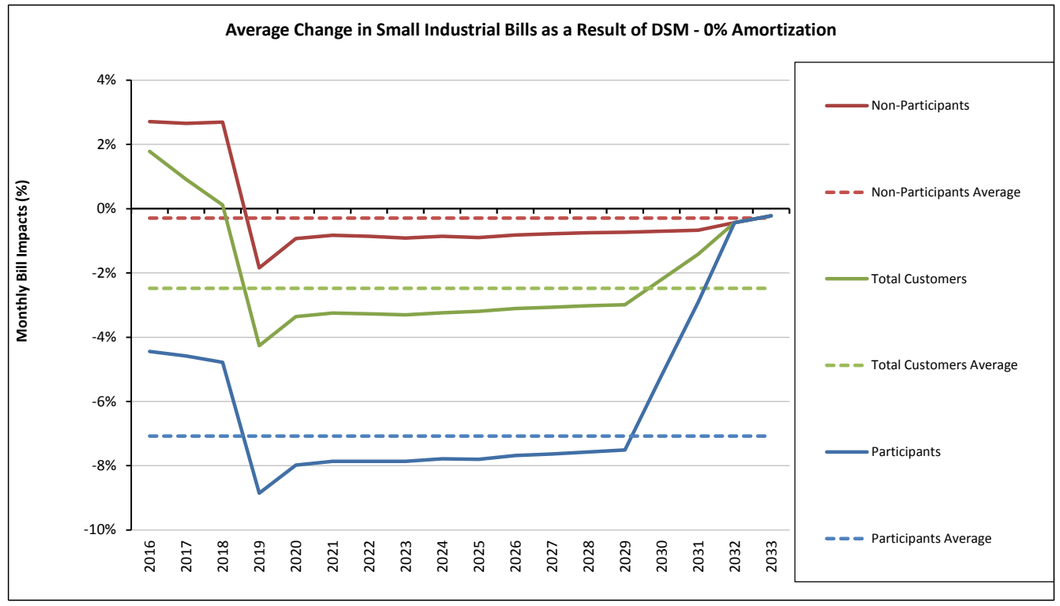


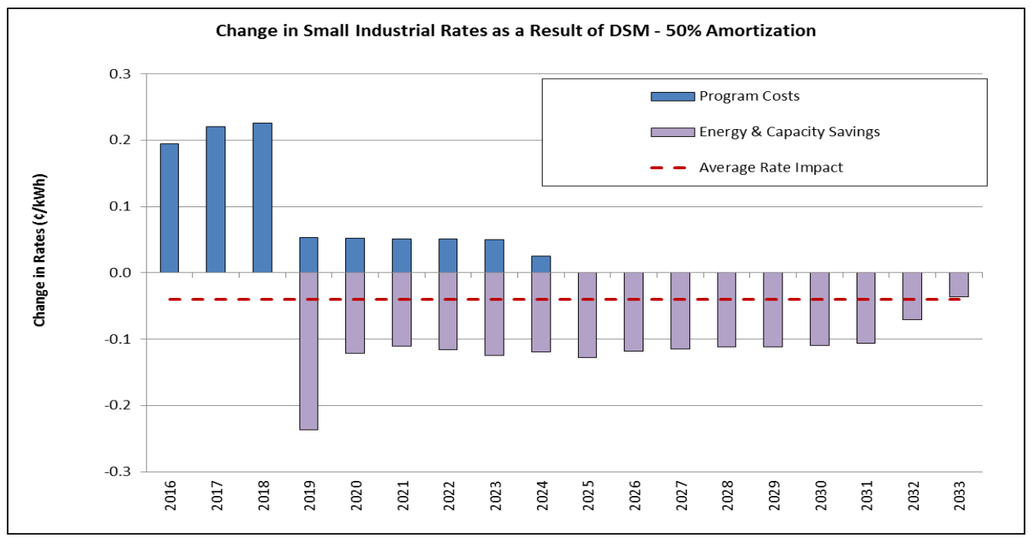


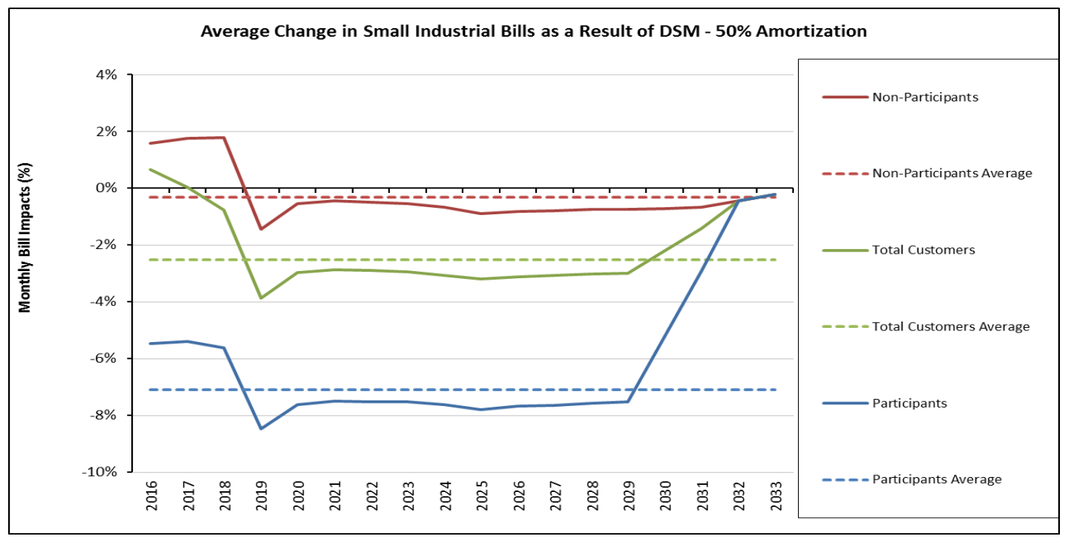
Rate and Bill Impacts of DSM on the Small Industrial Class

Line#	Impacts of DSM on the Small Industrial Rate Class	2016	2017	2018	2019	2020	2021	2022	2023	2024	2025	2026	2027	2028	2029	2030	Units
1																	
2	Incremental DSM Savings	2.8	2.7	2.7	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	GWh
3	Cumulative DSM Savings	2.8	5.5	8.2	8.2	8.2	8.2	8.2	8.2	8.2	8.2	8.2	8.2	8.2	8.2	5.5	GWh
4	DSM Costs for the Rate Class	854,705	860,640	894,039	0	0	0	0	0	0	0	0	0	0	0	0	Dollars
5	Cumulative Number of Participants	258	500	720	720	720	720	720	720	720	720	720	720	720	720	720	
6	Annual Average Savings per Participant (Cumulative)	10,675	10,951	11,405	11,405	11,405	11,405	11,405	11,405	11,405	11,405	11,405	11,405	11,405	11,405	7,576	kWh
7	Cumulative Cost per kWh Saved	30.988	20.824	15.861	10.579	7.936	6.349	5.292	4.536	3.969	3.528	3.176	2.887	2.646	2.443	2.324	cents



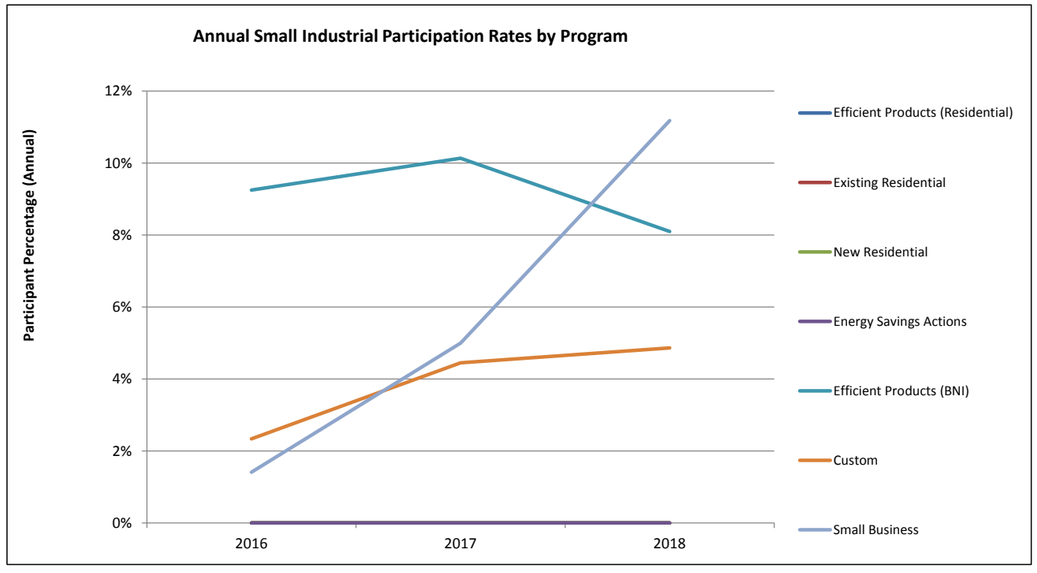


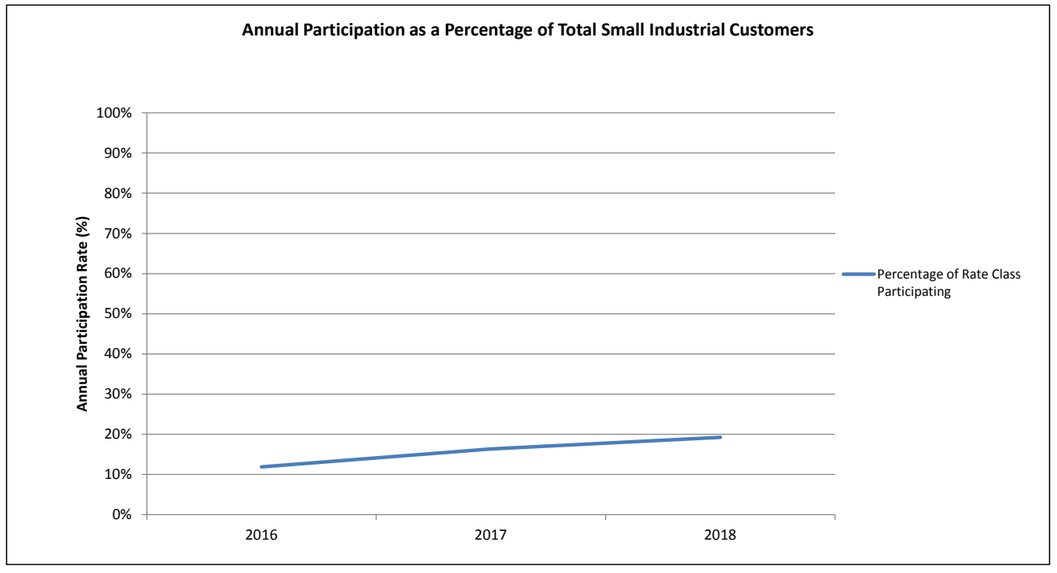


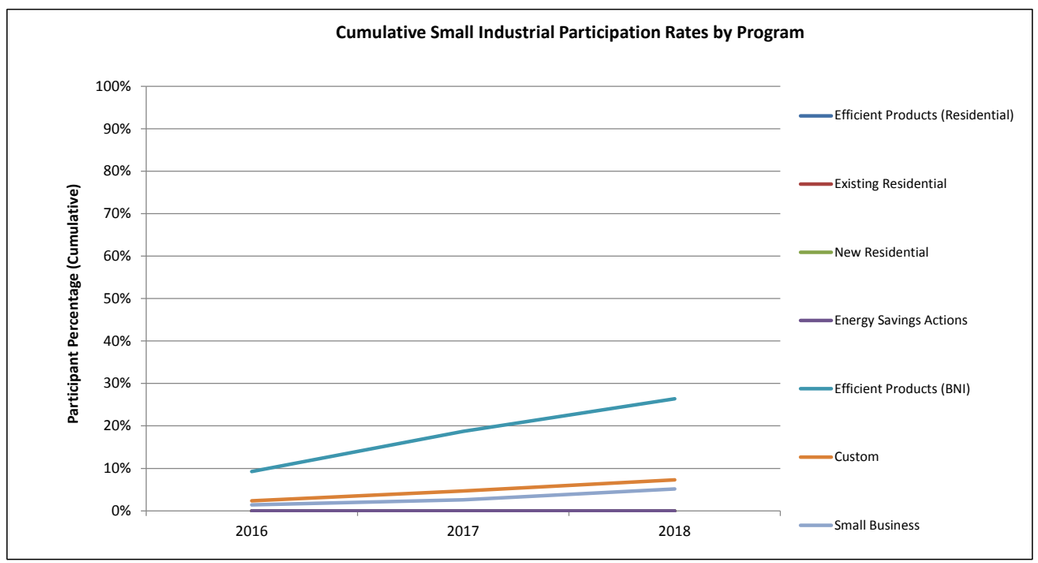


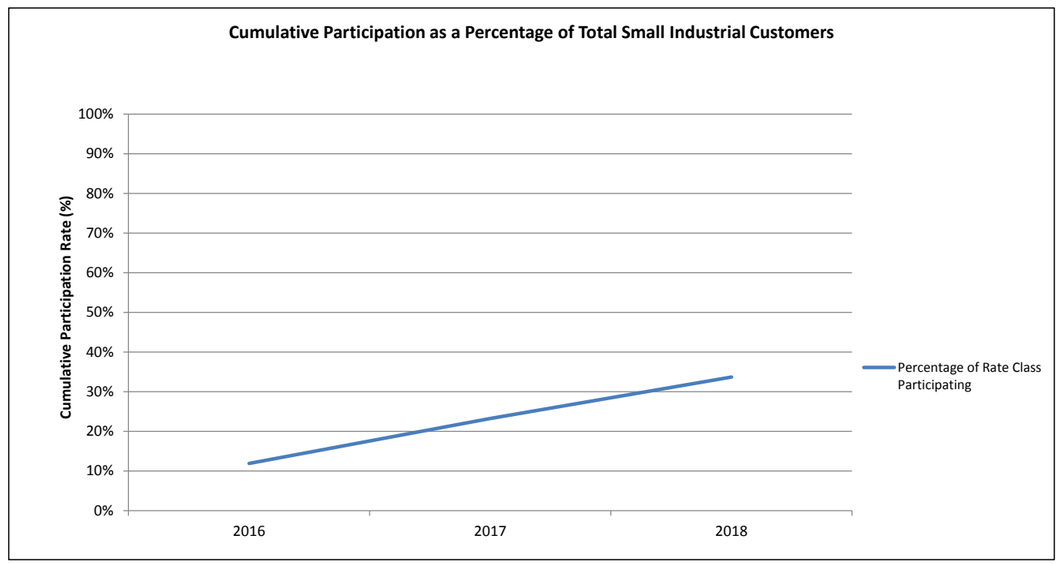
Line#

Rate and Bill Impacts of DSM on the Small Industrial Class



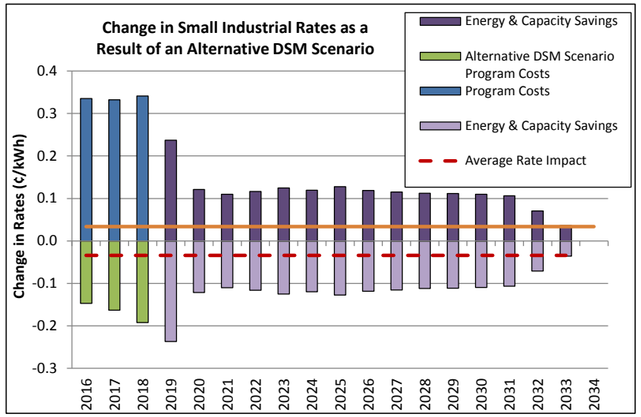


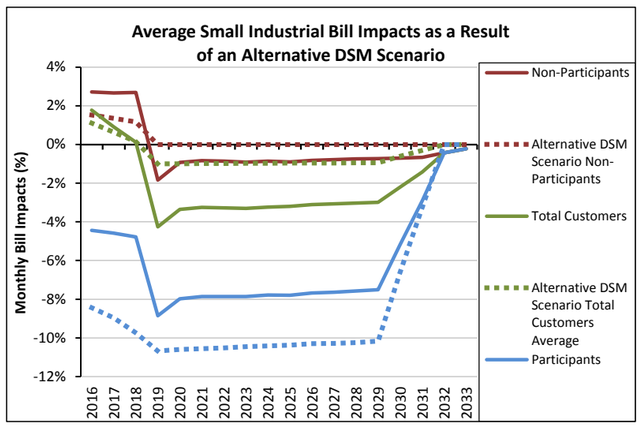


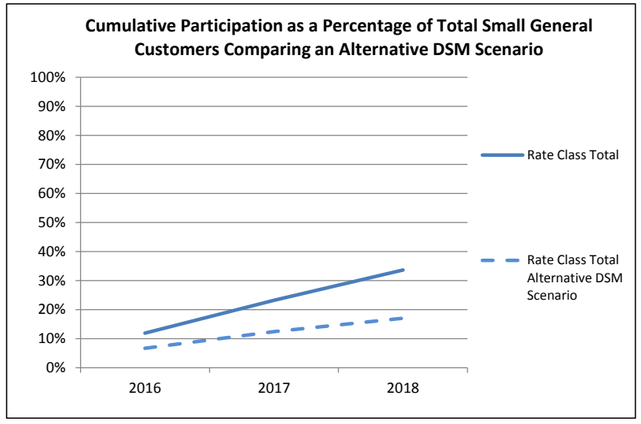


Rate and Bill Impacts of Alternate DSM Scenarios on the Small Industrial Class

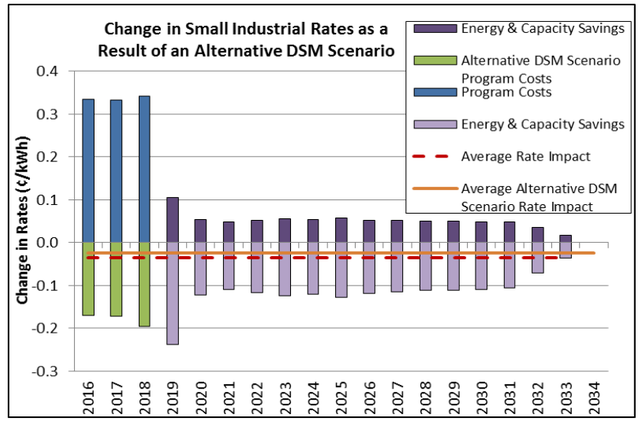
50% Low

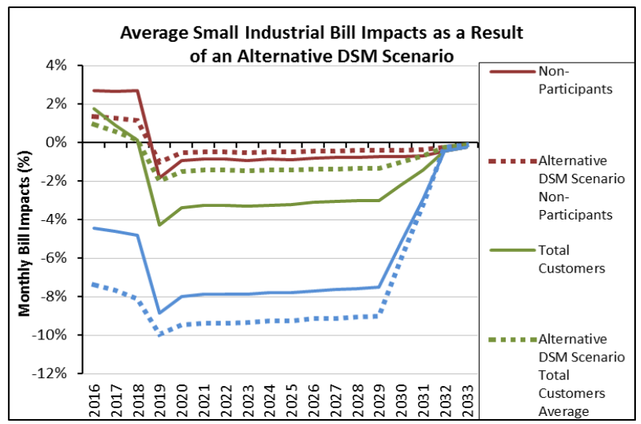


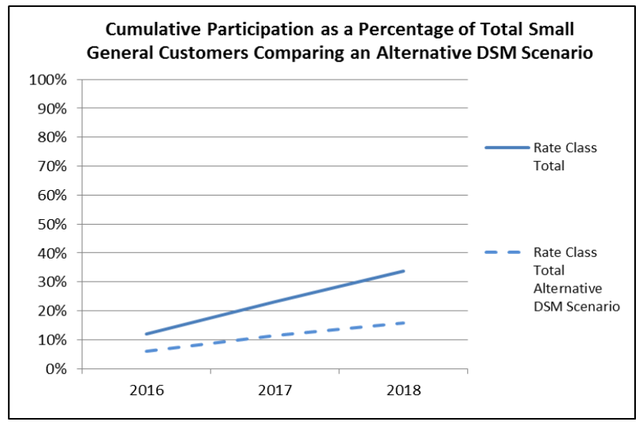




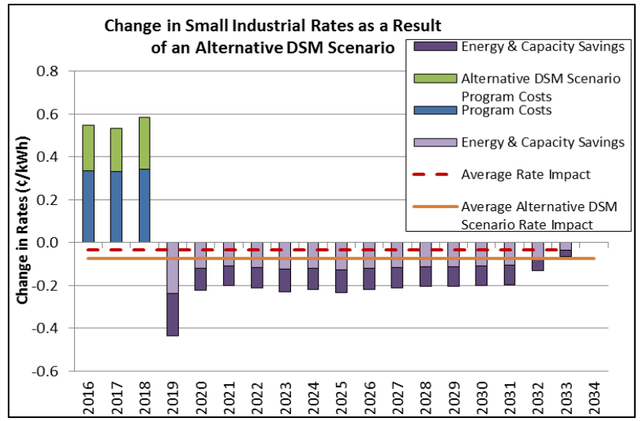
Low

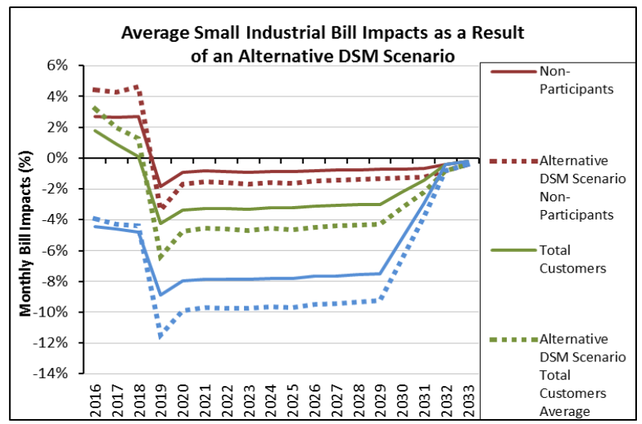


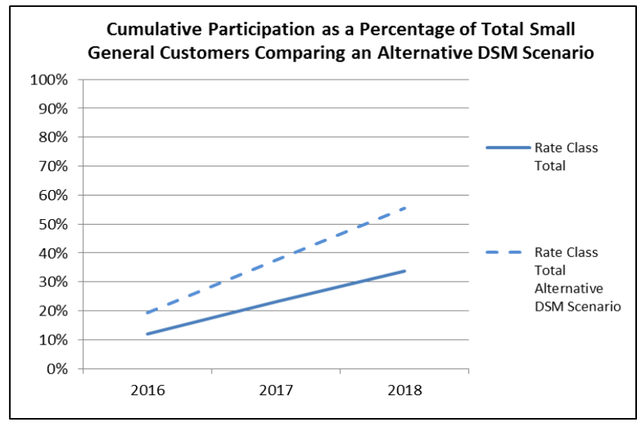




Mid

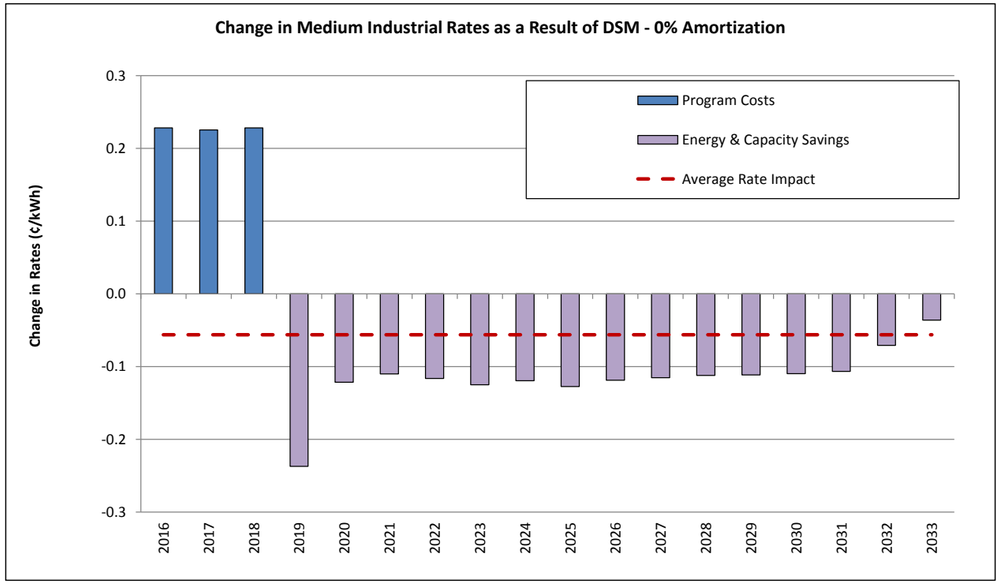


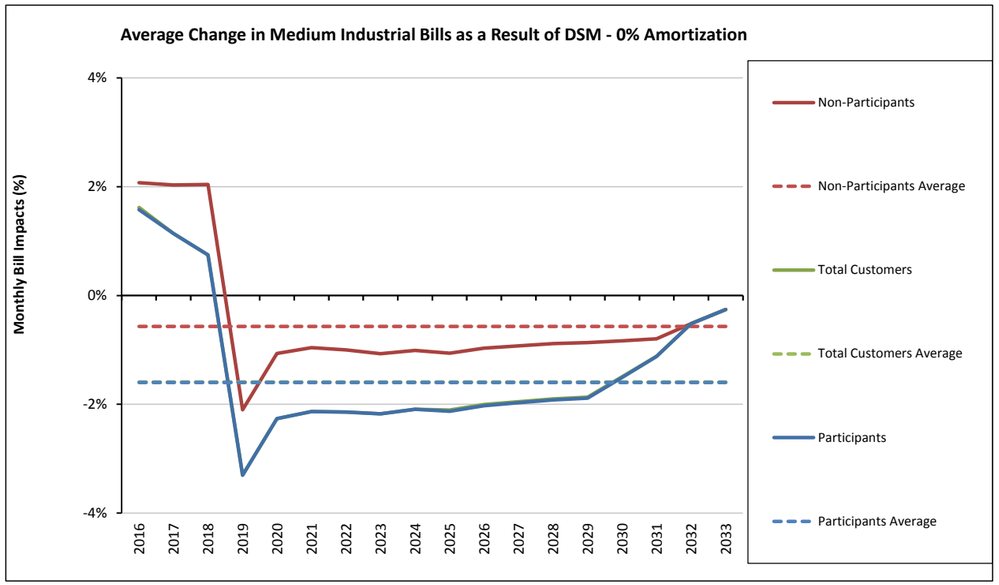


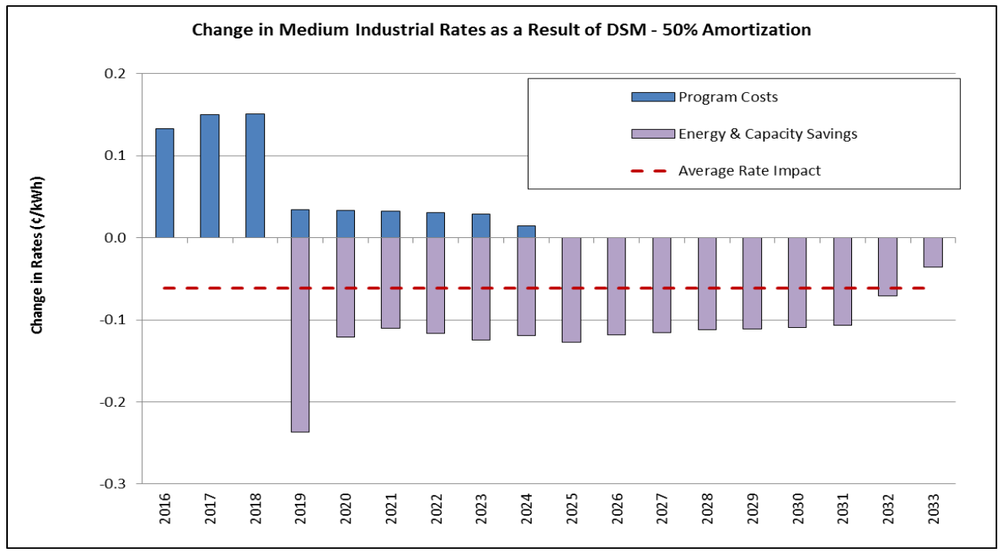


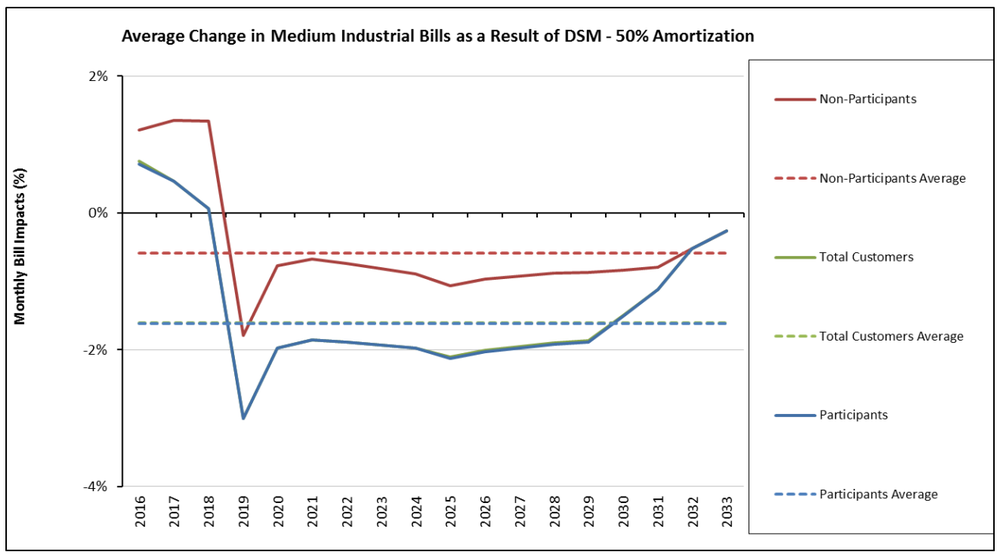
Rate and Bill Impacts of DSM on the Medium Industrial Class

Line#	Impacts of DSM on the Medium Industrial Rate Class	2016	2017	2018	2019	2020	2021	2022	2023	2024	2025	2026	2027	2028	2029	2030	Units
2	Incremental DSM Savings	3.4	3.4	3.3	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	GWh
3	Cumulative DSM Savings	3.4	6.8	10.1	10.1	10.1	10.1	10.1	10.1	10.1	10.1	10.1	10.1	10.1	10.1	6.7	GWh
4	DSM Costs for the Rate Class	1,221,496	1,251,317	1,315,724	0	0	0	0	0	0	0	0	0	0	0	0	Dollars
5	Cumulative Number of Participants	179	197	198	198	198	198	198	198	198	198	198	198	198	198	198	
	Annual Number of Participants	179	179	179													
6	Annual Average Savings per Participant (Cumulative)	19,077	34,600	51,004	51,004	51,004	51,004	51,004	51,004	51,004	51,004	51,004	51,004	51,004	51,004	33,757	kWh
7	Cumulative Cost per kWh Saved	35.770	24.170	18.635	12.451	9.348	7.483	6.239	5.349	4.682	4.162	3.747	3.406	3.123	2.883	2.743	cents



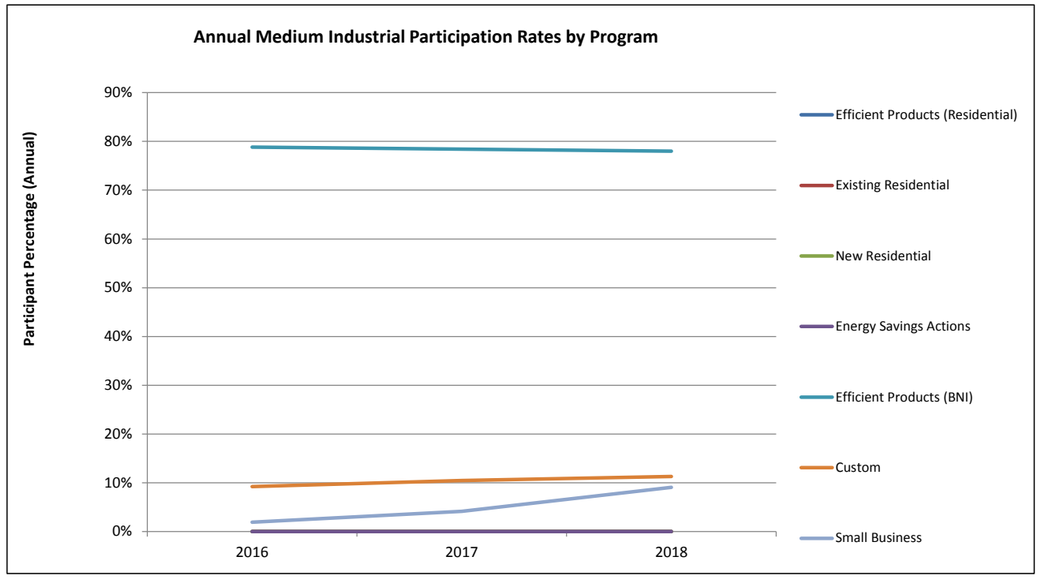


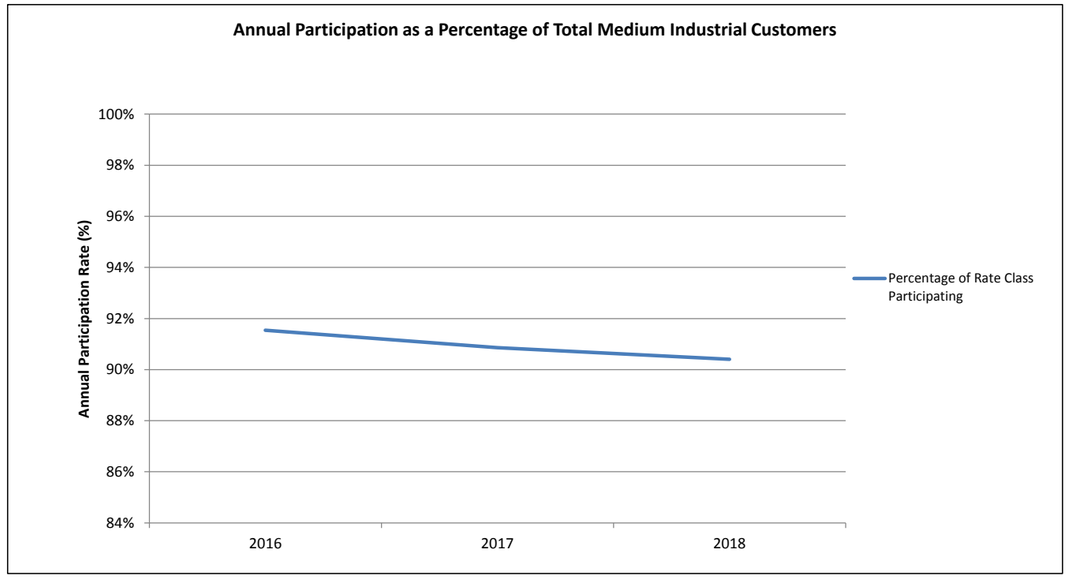


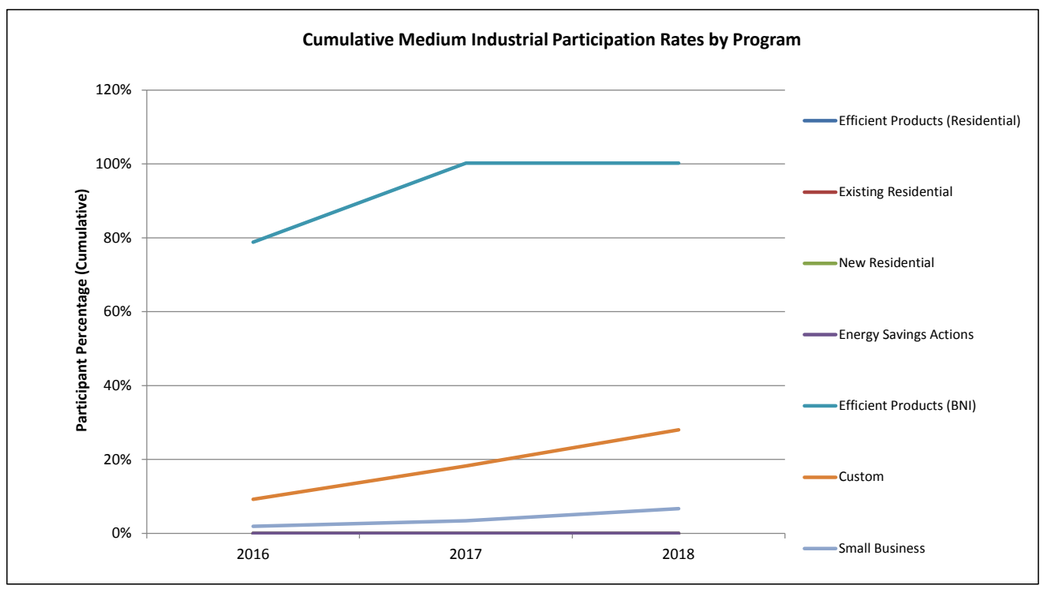


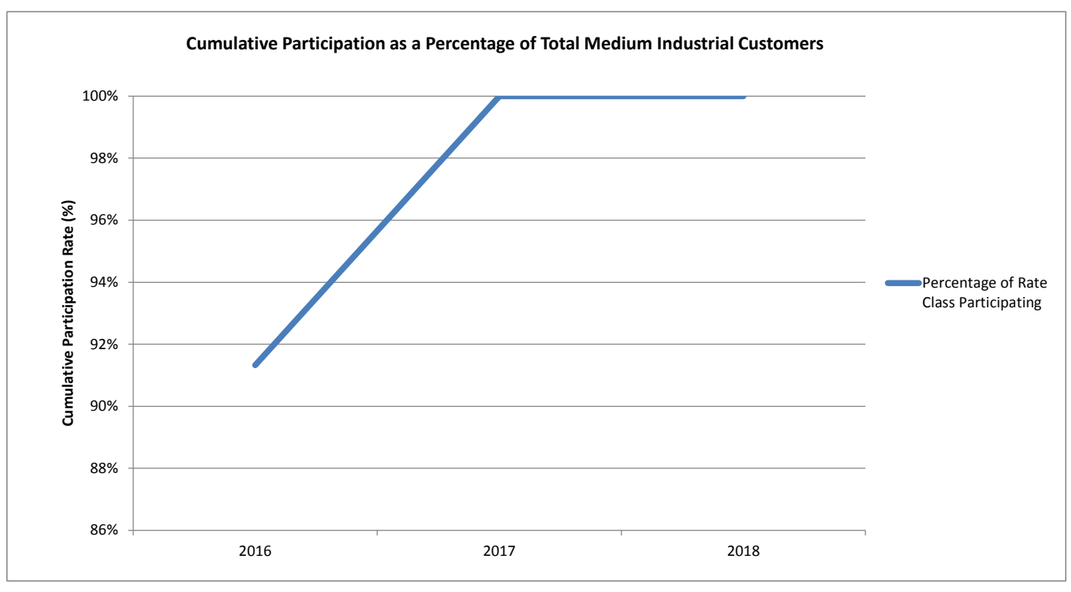
Line#

Rate and Bill Impacts of DSM on the Medium Industrial Class



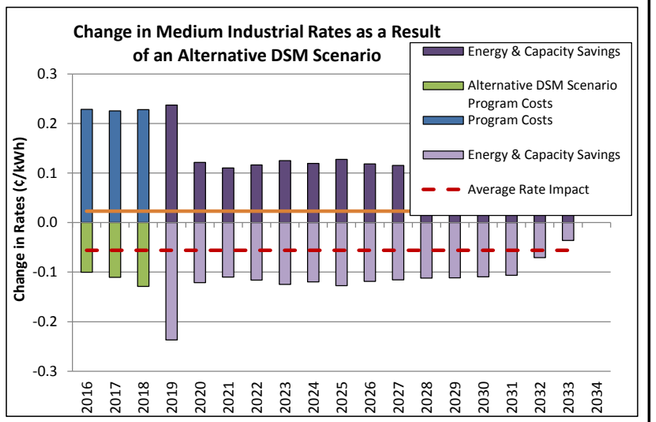


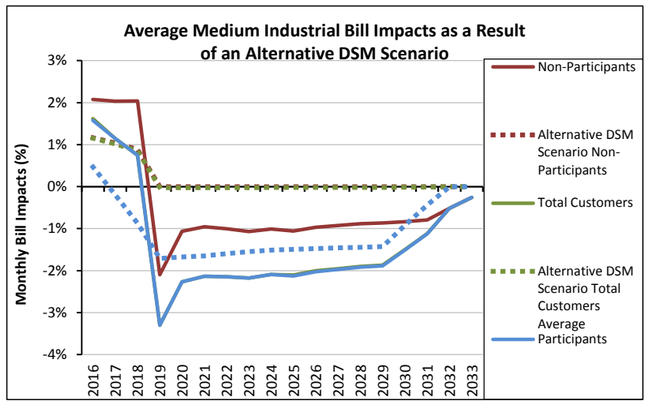


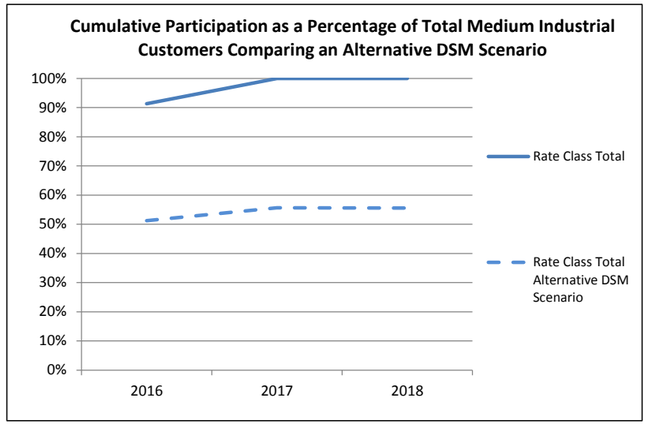


Rate and Bill Impacts of Alternate DSM Scenarios on the Medium Industrial Class

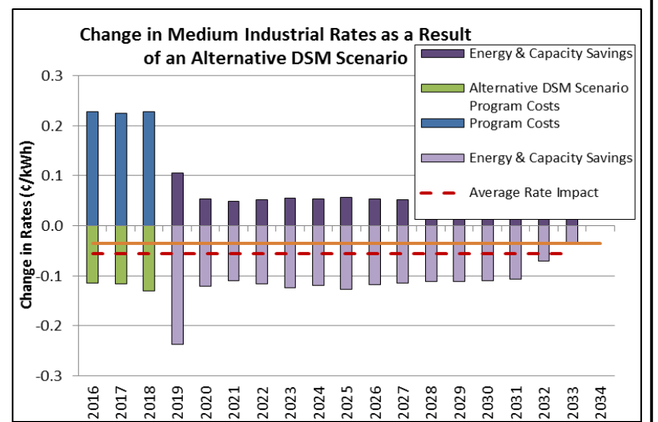
50% Low

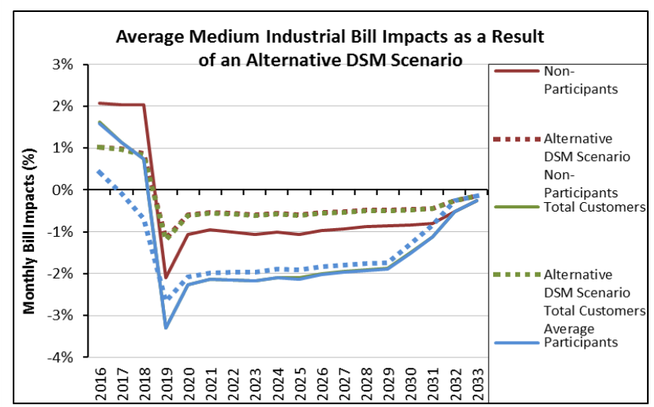


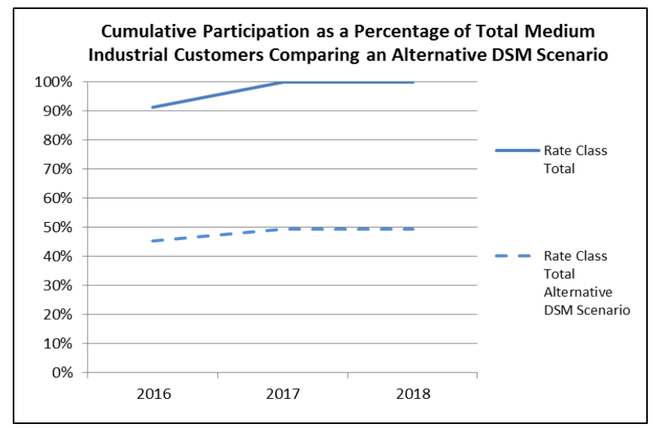




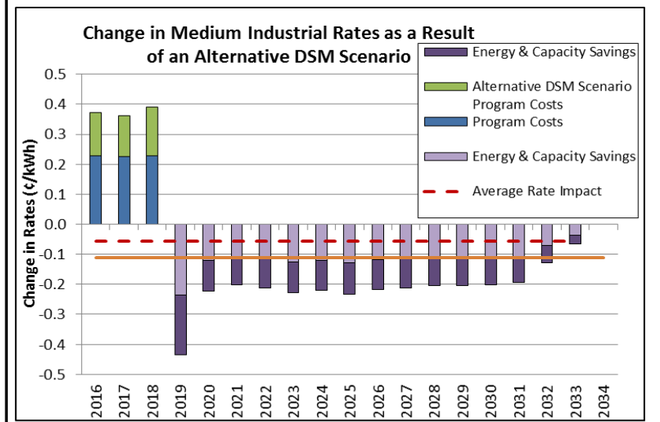
Low

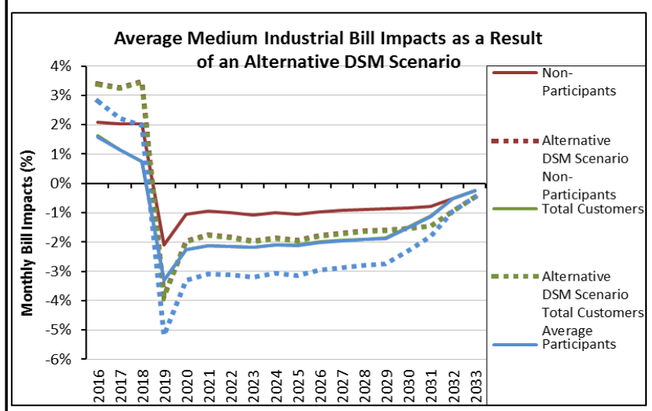


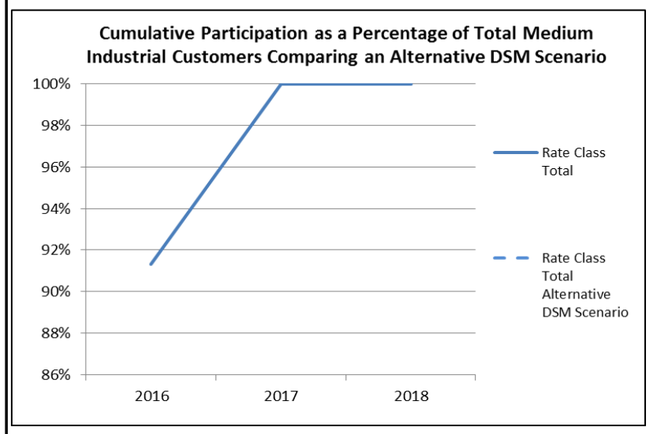




Mid

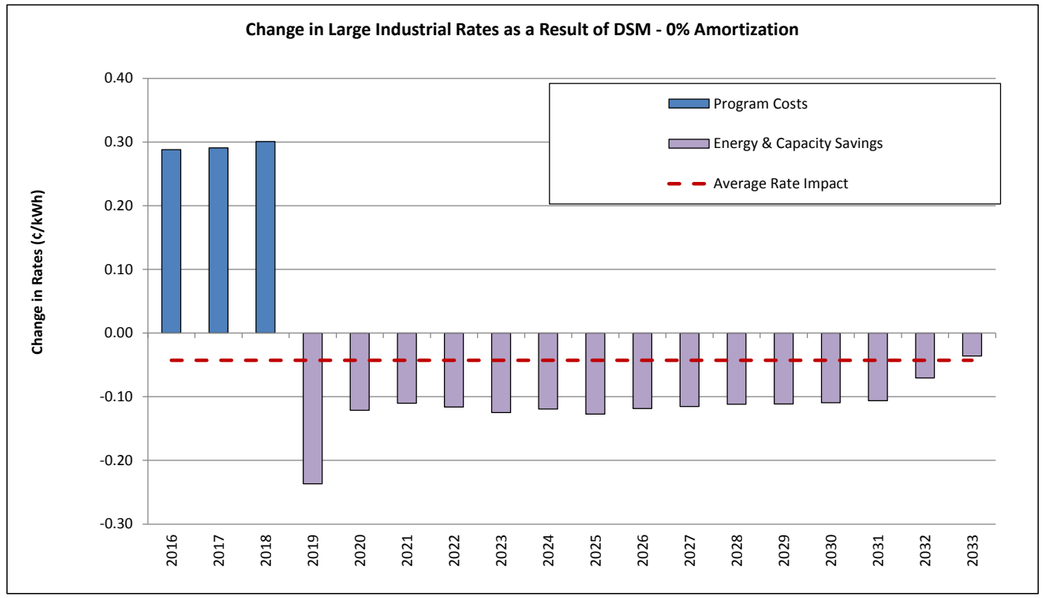


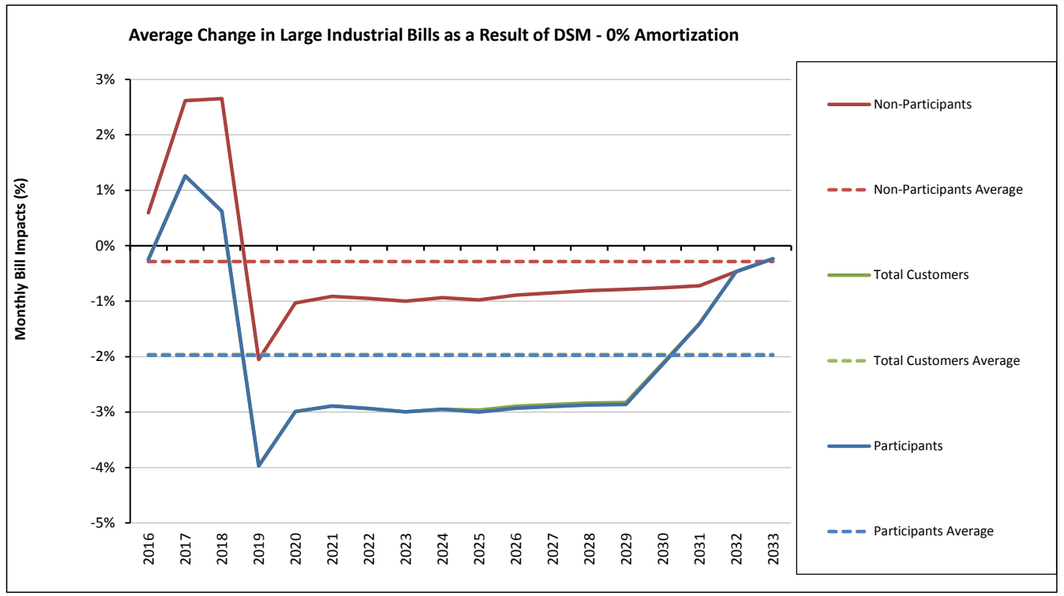


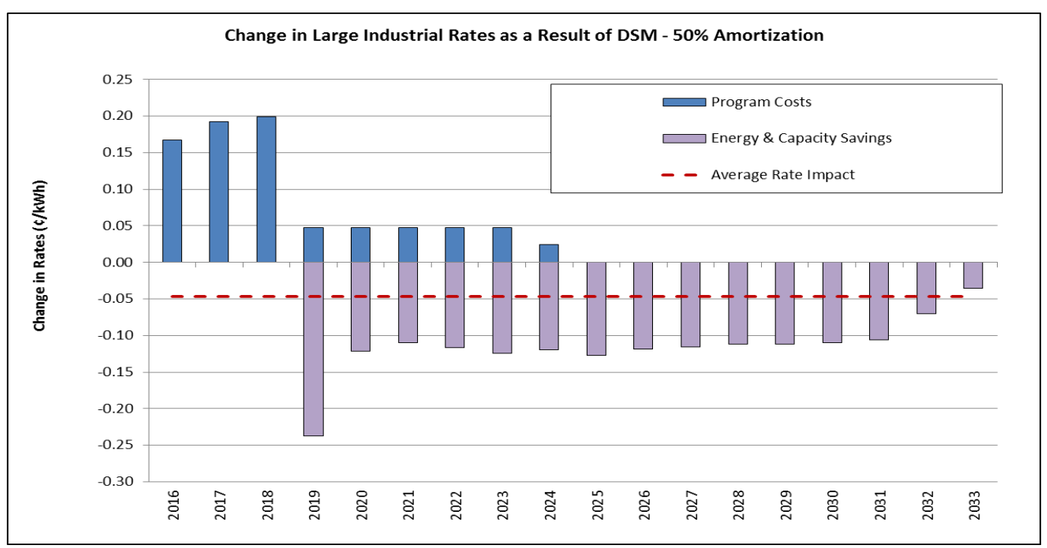


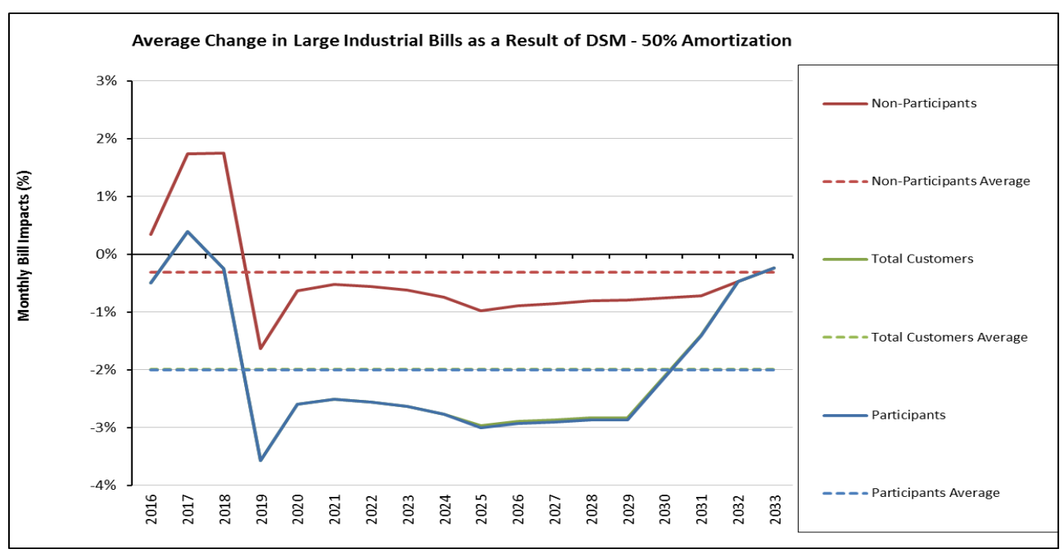
Rate and Bill Impacts of DSM on the Large Industrial Class

Line#	Impacts of DSM on the Large Industrial Rate Class	2016	2017	2018	2019	2020	2021	2022	2023	2024	2025	2026	2027	2028	2029	2030	Units
2	Incremental DSM Savings	6.0	6.0	5.9	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	GWh
3	Cumulative DSM Savings	6.0	12.0	17.9	17.9	17.9	17.9	17.9	17.9	17.9	17.9	17.9	17.9	17.9	17.9	11.9	GWh
4	DSM Costs for the Rate Class	1,957,018	1,977,762	2,045,774	0	0	0	0	0	0	0	0	0	0	0	0	Dollars
5	Cumulative Number of Participants	29	29	29	29	29	29	29	29	29	29	29	29	29	29	29	
	Annual Number of Participants	29	29	29													
6	Annual Average Savings per Participant (Cumulative)	208,334	414,761	617,559	617,559	617,559	617,559	617,559	617,559	617,559	617,559	617,559	617,559	617,559	617,559	409,225	kWh
7	Cumulative Cost per kWh Saved	32.392	21.776	16.622	11.098	8.330	6.667	5.557	4.764	4.170	3.707	3.336	3.033	2.781	2.567	2.443	cents

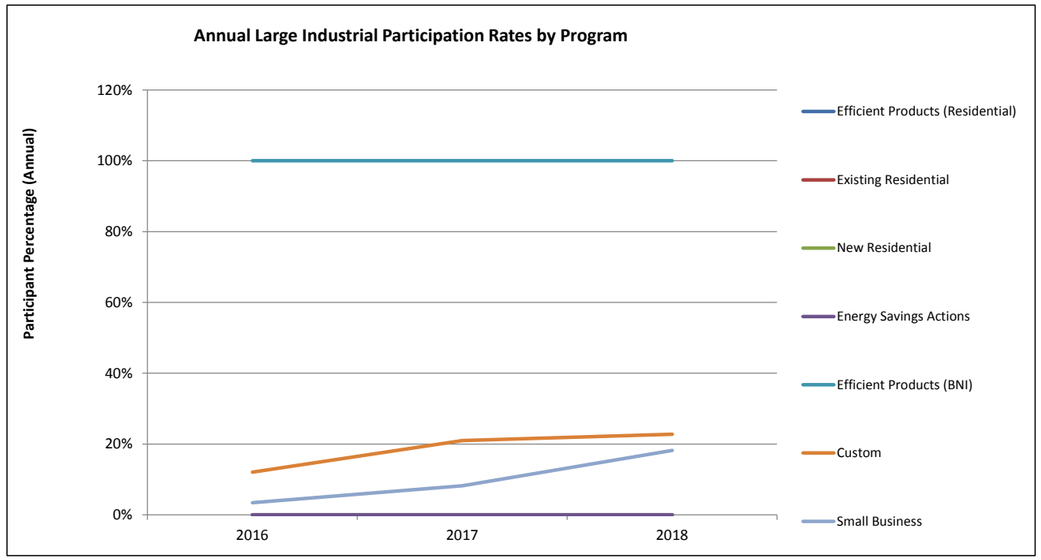


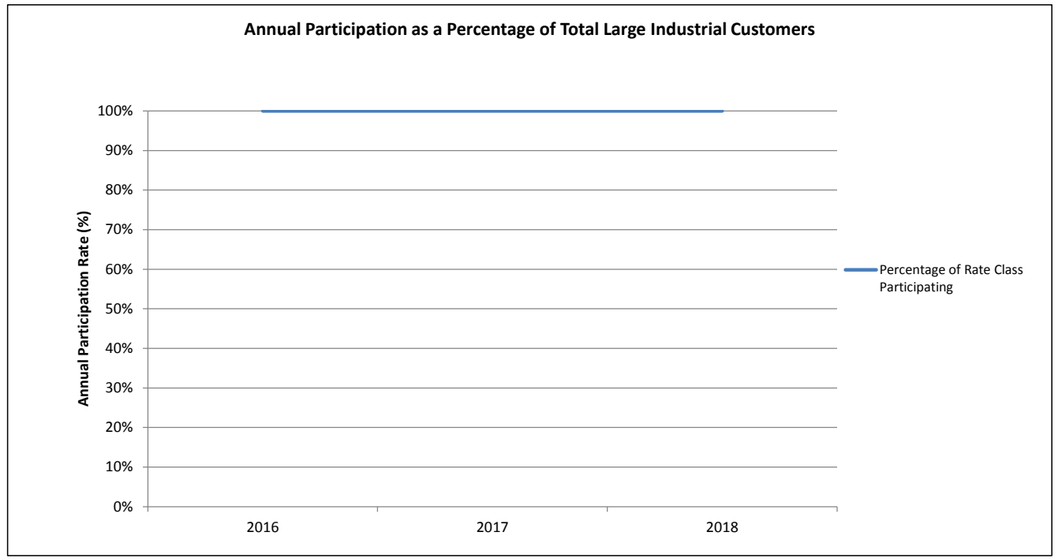


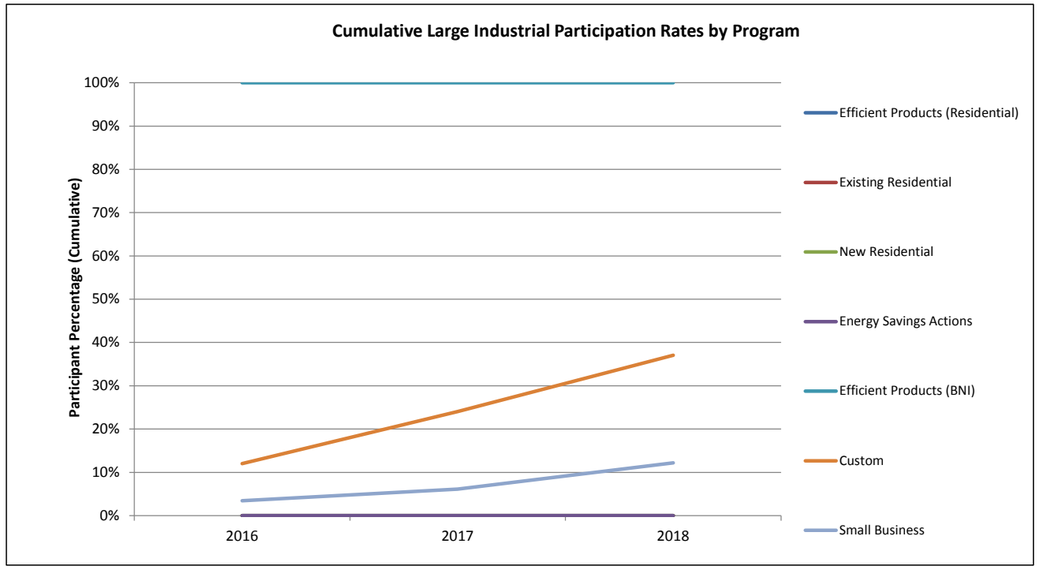


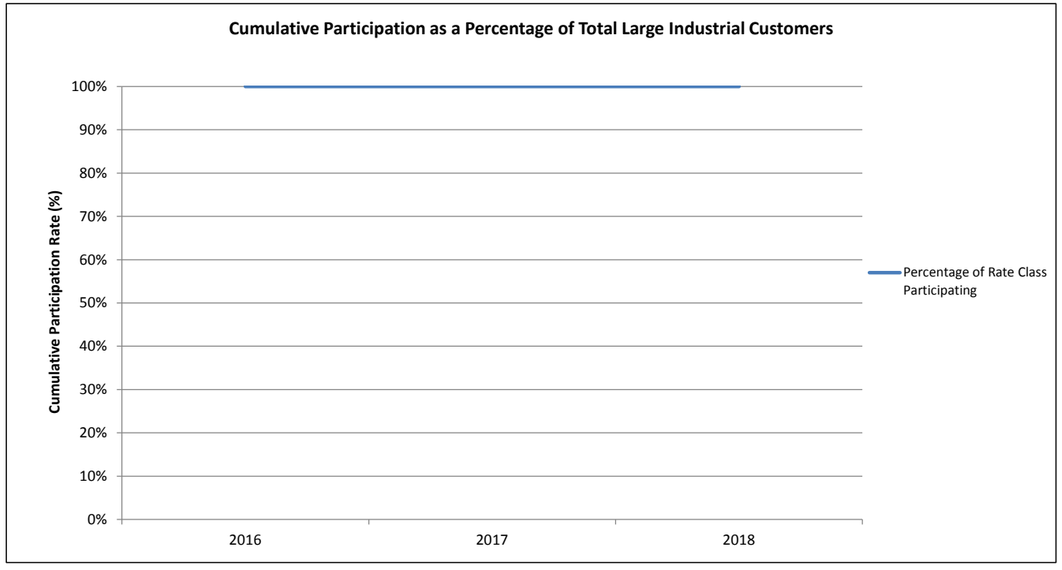


Rate and Bill Impacts of DSM on the Large Industrial Class



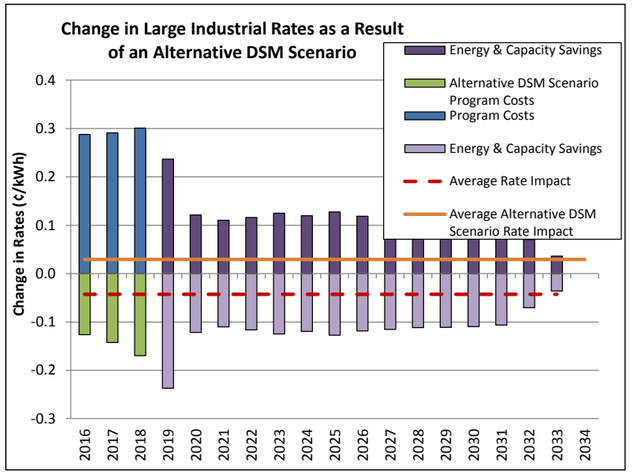


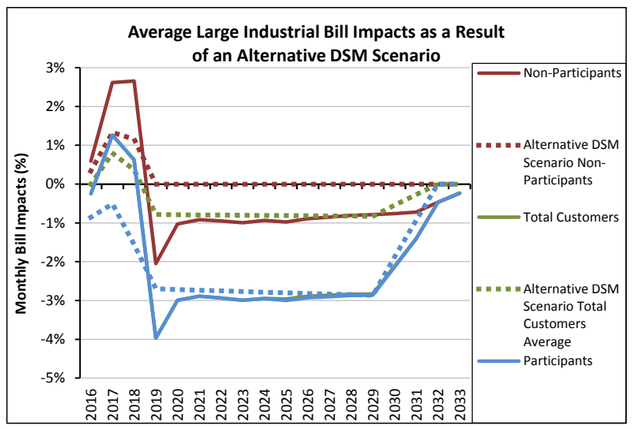


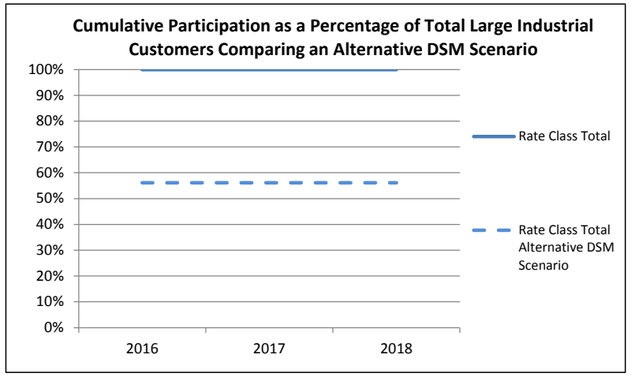


Rate and Bill Impacts of Alternate DSM Scenarios on the Large Industrial Class

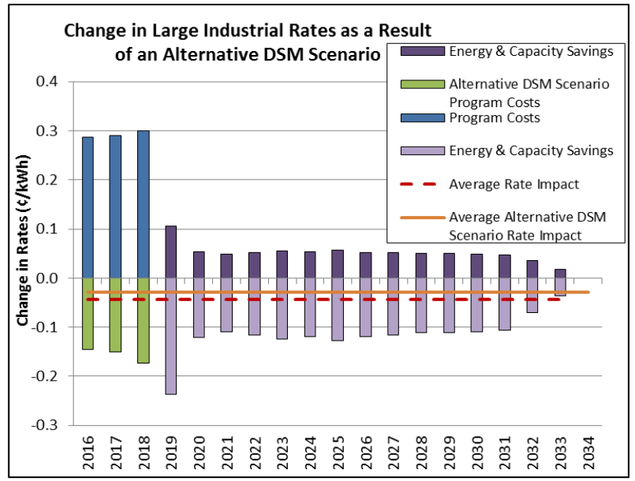
50% Low

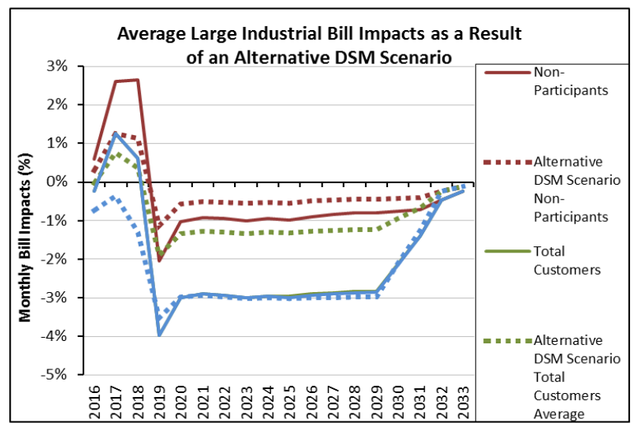


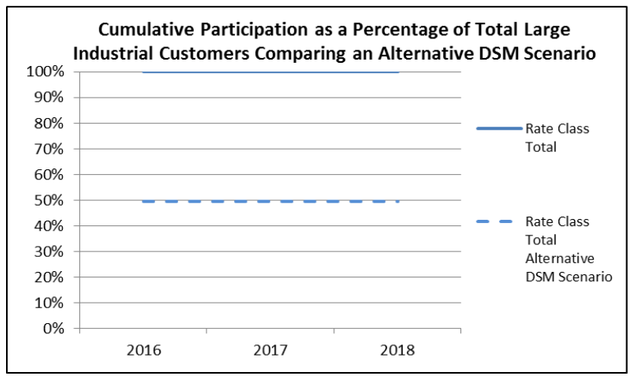




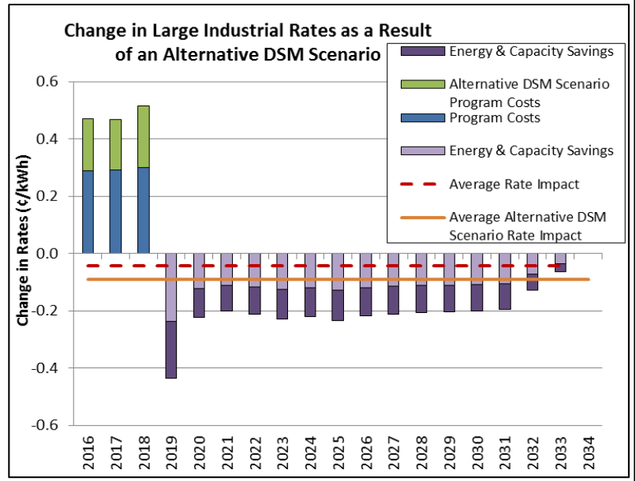
Low

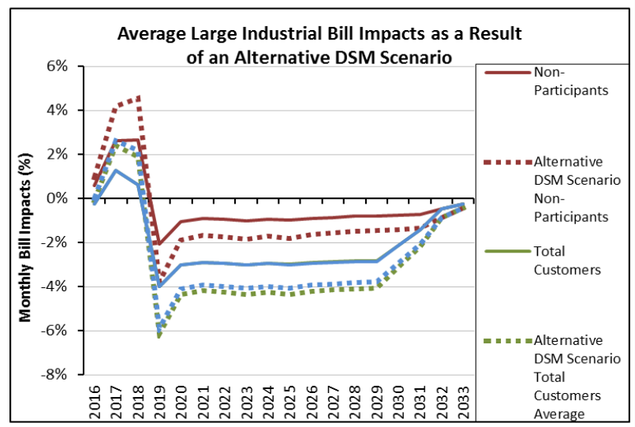


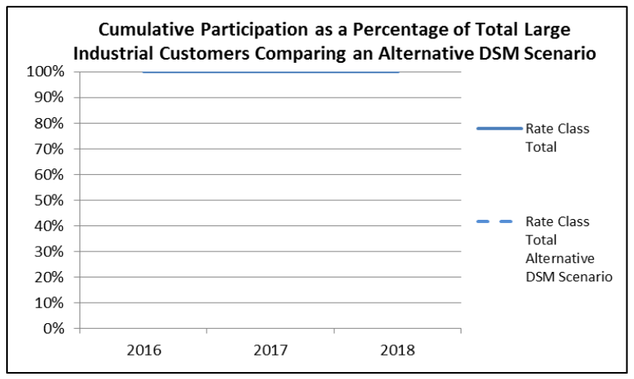




Mid

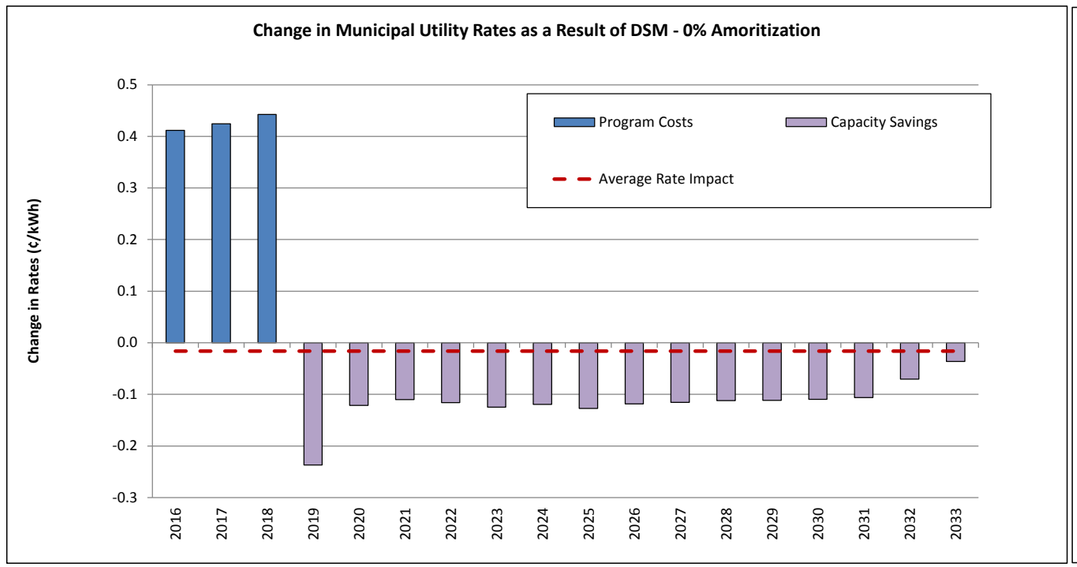


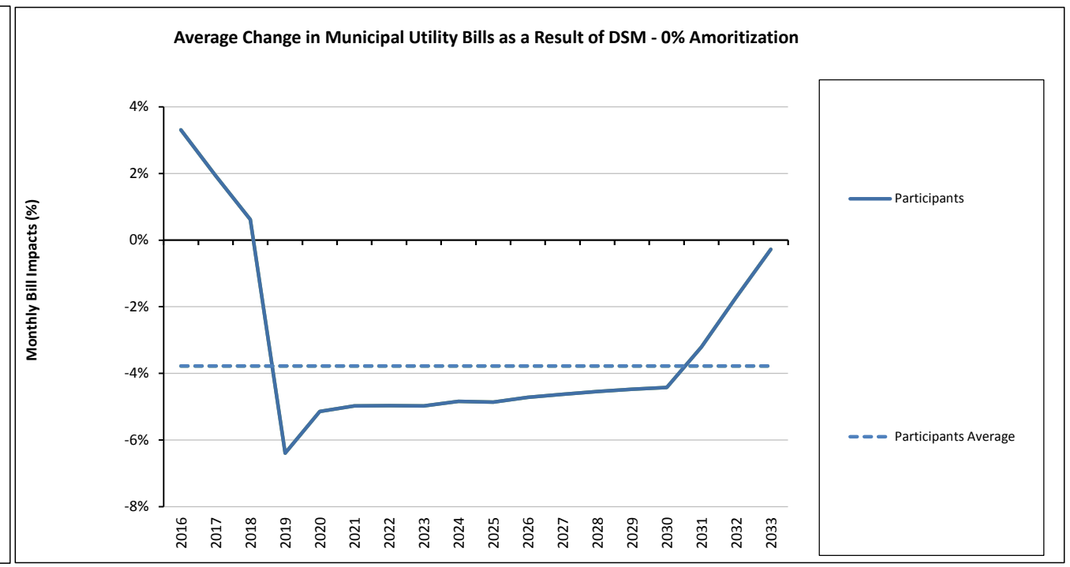


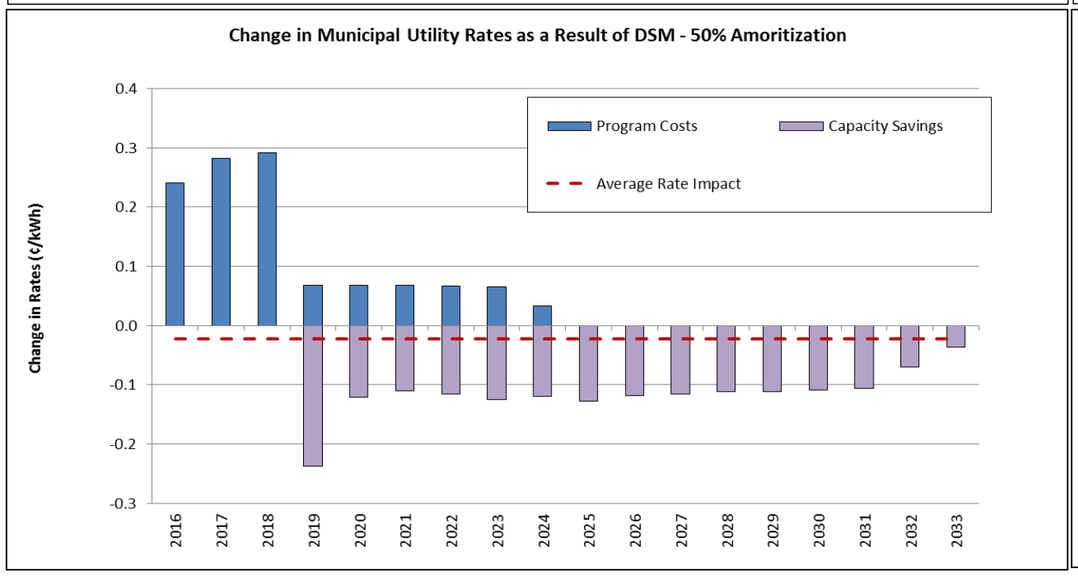


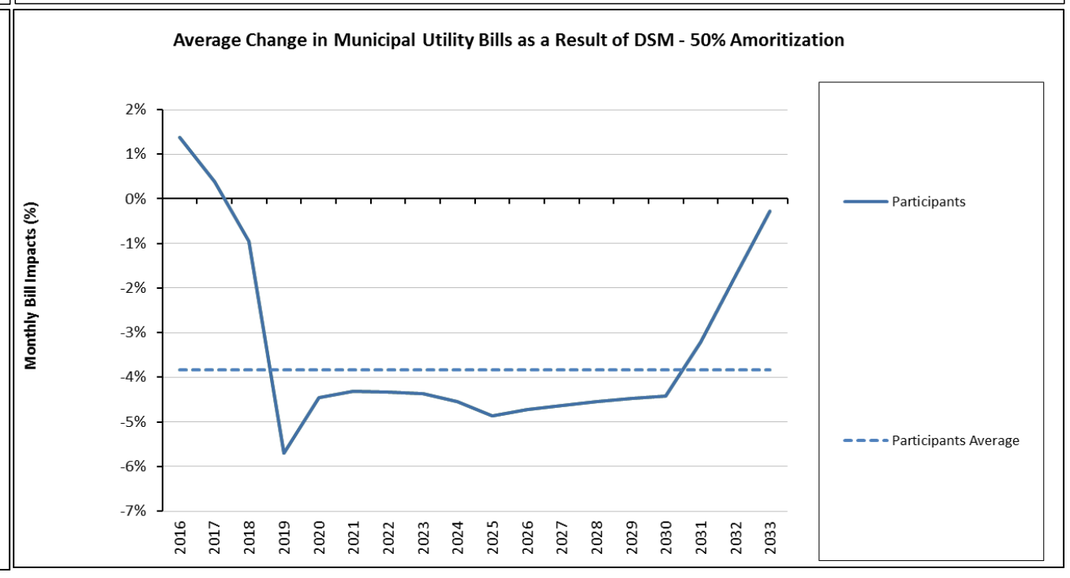
Rate and Bill Impacts of DSM on the Municipal Utility Class

Line#	Impacts of DSM on the Municipal Utility Rate Class	2016	2017	2018	2019	2020	2021	2022	2023	2024	2025	2026	2027	2028	2029	2030	Units
2	Incremental DSM Savings	2.2	2.3	2.3	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	GWh
3	Cumulative DSM Savings	2.2	4.5	6.9	6.9	6.9	6.9	6.9	6.9	6.9	6.9	6.9	6.9	6.9	6.9	6.9	GWh
4	DSM Costs for the Rate Class	687,949	717,568	756,770	0	0	0	0	0	0	0	0	0	0	0	0	Dollars
5	Cumulative Number of Participants	6	6	6	6	6	6	6	6	6	6	6	6	6	6	6	
6	Annual Average Savings per Participant (Cumulative)	372,133	757,619	1,145,137	1,145,137	1,145,137	1,145,137	1,145,137	1,145,137	1,145,137	1,145,137	1,145,137	1,145,137	1,145,137	1,145,137	1,145,137	kWh
7	Cumulative Cost per kWh Saved	30.811	20.735	15.842	10.537	7.894	6.311	5.257	4.504	3.940	3.502	3.151	2.864	2.625	2.423	2.250	cents



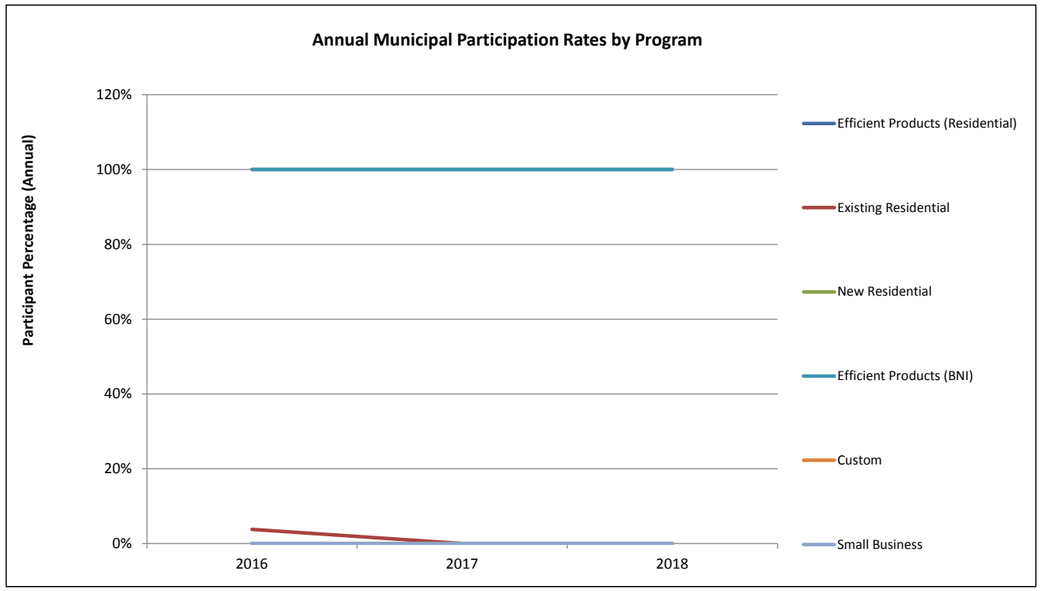


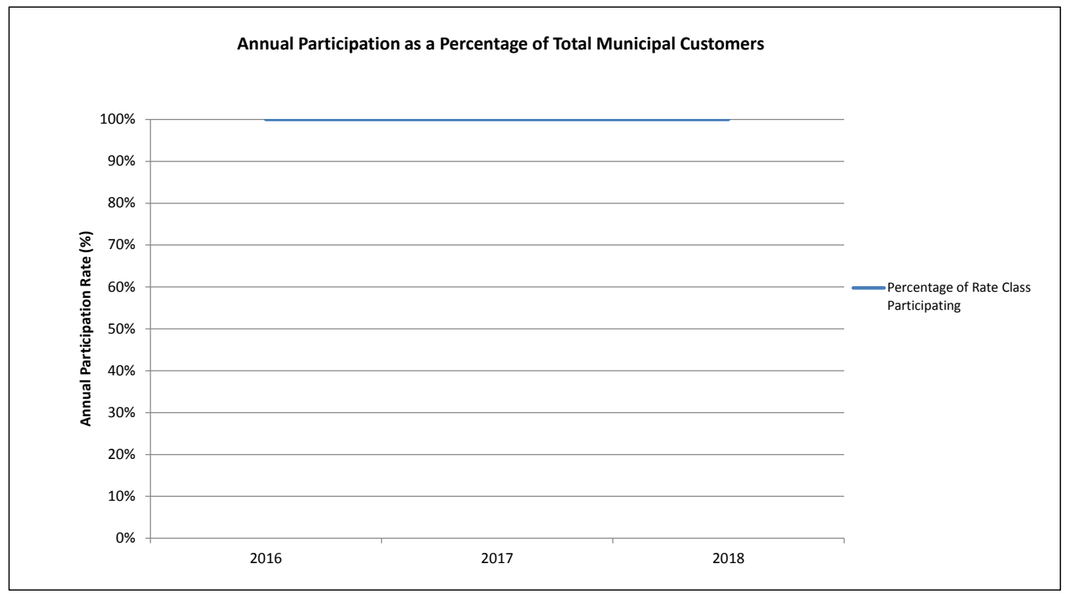


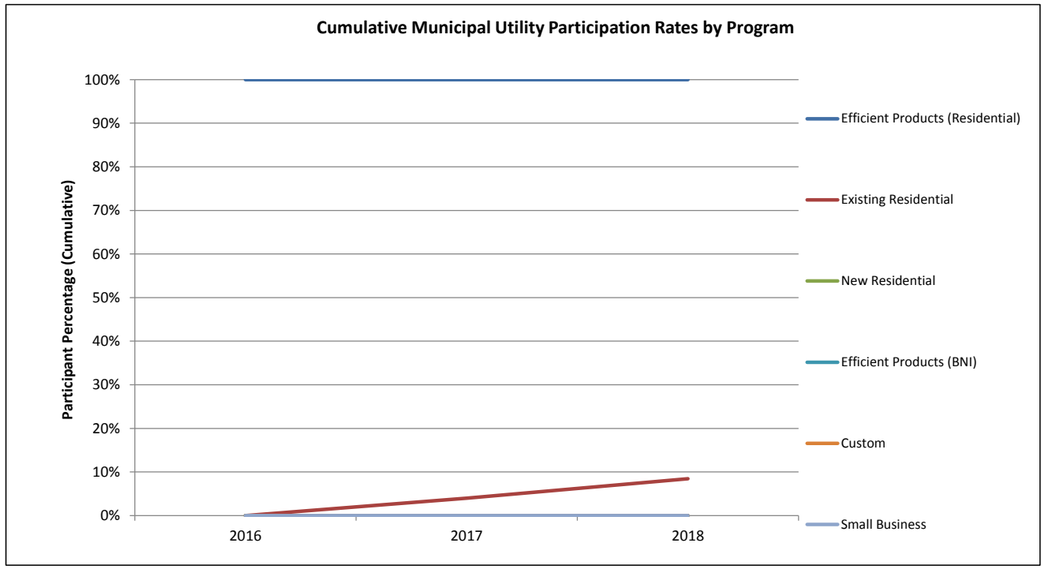


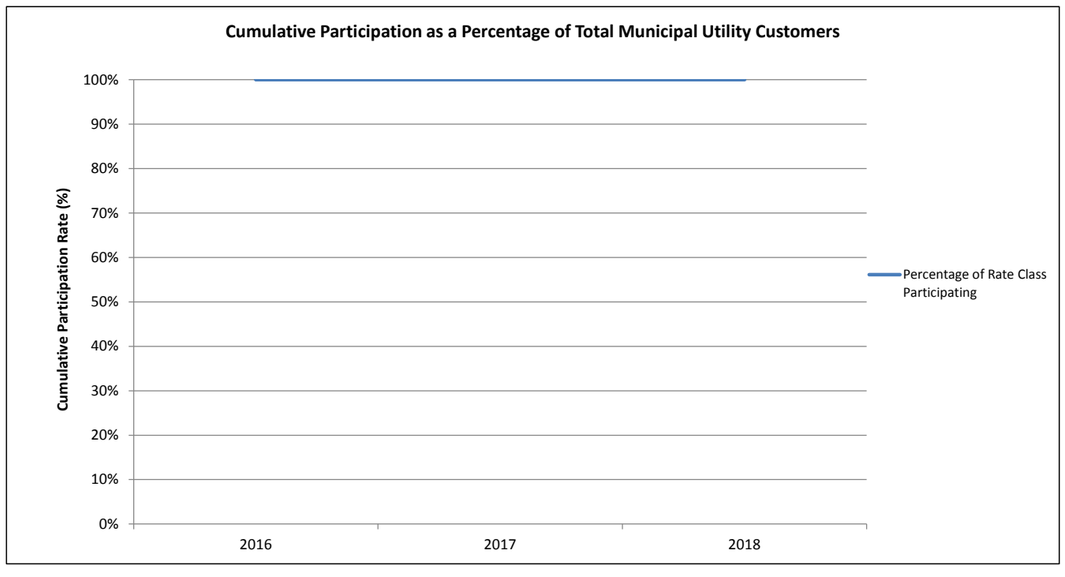
Line#

Rate and Bill Impacts of DSM on the Municipal Utility Class



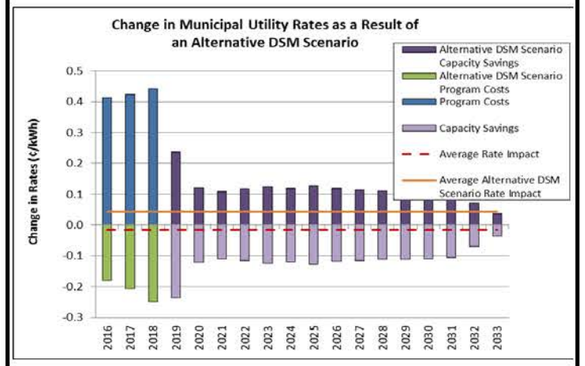


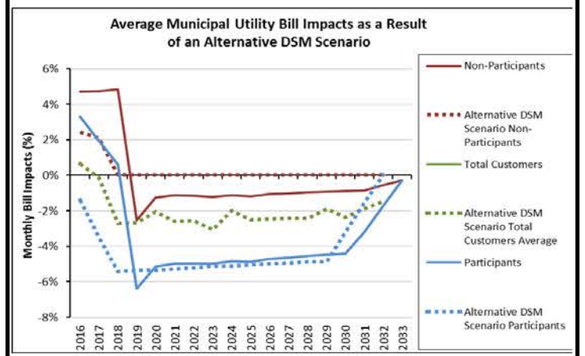


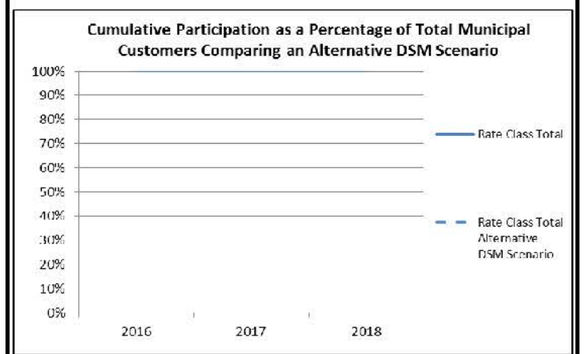


Rate and Bill Impacts of Alternate DSM Scenarios on the Municipal Class

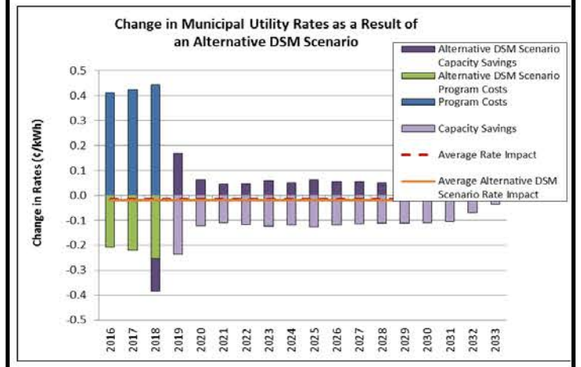
50% Low

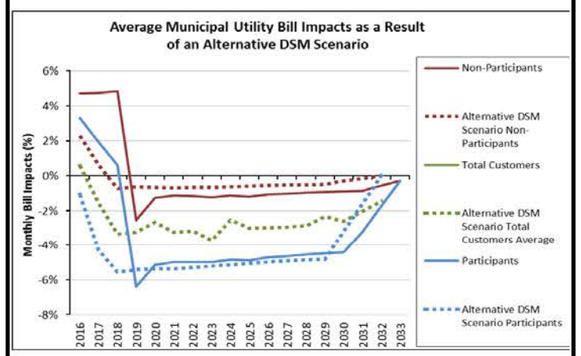


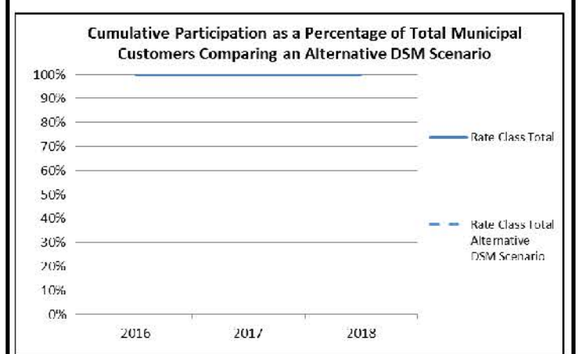




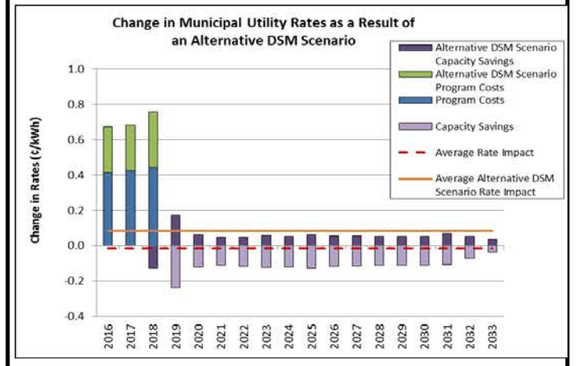
Low

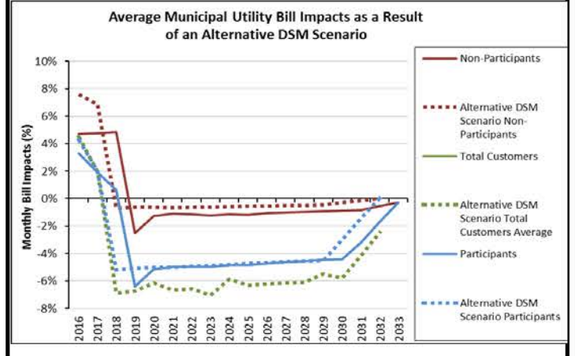


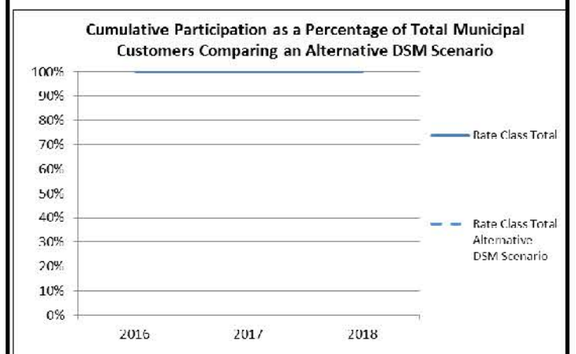




Mid







NAVIGANT

Investing in Demand-side Resources: Considering Affordability

Presented to



February 26, 2015

Presented by
Todd Williams, Managing Director
333 Bay Street, Suite 1250
Toronto, ON M5H 2R2
647.288.5204, TWilliams@Navigant.com

Ralph Zarumba, Director
312.583.4167, Ralph.Zarumba@navigant.com

Stu Slote, Associate Director
802.526.5113, Stu.Slote@Navigant.com

David Purcell, Consultant
802.526.5118, David.Purcell@Navigant.com

Navigant
www.navigant.com

NAVIGANT

Table of Contents

1. Executive Summary 1

1.1 Report Purpose 1
1.2 Summary of Findings 1
1.3 Legislative Charge 2

2. Benefits of Demand-Side Resource Investments in Nova Scotia 4

2.1 Investments in Demand-side Resources 4
2.2 Demand-Side Management is an Investment, Not a Cost 4
2.3 Relative Size of Demand-side Resource Investments in Nova Scotia 5
2.4 Macroeconomic Benefits 7
2.5 Further Benefits of Demand-side Resource Investments 9
2.6 Affordability of Demand-side Resource Investments in Nova Scotia 11

NAVIGANT

List of Figures

Figure 1. Residential Sector Demand-side Investment vs. All Other Sector Electricity Spending – 2011 to 2018 6

Figure 2. Average Cost Share of Demand-side Resource Investments per Residential Customer ($2014/Month, Inflation Adjusted) 6

Figure 3. Residential Sector Demand-side Resource Investments vs. Other Components of Residential Sector Electricity Spending – 2016 to 2018 7

Figure 4. Total Estimated Economic Impact: Energy Efficiency Sector in Nova Scotia Compared to Selected Sectors in 2011 8

NAVIGANT

1. Executive Summary

1.1 *Report Purpose*

This report contextualizes the proposed level of investment in demand-side resources for 2016 to 2018 in Efficiency Nova Scotia's (ENS) three-year Demand-Side Resource Plan. We consider levels of demand-side resource investment in terms of their value for Nova Scotians and the *Public Utilities Act*.

1.2 *Summary of Findings*

1. Since 2011, excluding 2015, Nova Scotia has invested in demand-side resources at or above the level (in real terms) proposed by ENS in the 2016-2018 Demand-Side Resource Plan.

2. Demand-side resource investments yield significant returns and benefits to Nova Scotians that both exceed and justify the investment cost. Black's Law Dictionary defines "affordable" to be "When an acquisition is analyzed and is deemed to be worth the resources it takes to manage it."[1] Efficiency Nova Scotia's proposed demand-side resource portfolio for the period 2016 to 2018 provides net total resource benefits to Nova Scotians of more than $200 million.[2]

3. Demand-side management is a highly cost-effective resource and is expected to decrease Nova Scotia Power's overall revenue requirements as projected over the 25-year period in the 2014 Integrated Resource Plan (IRP) Process. Absent demand-side resource investments, Nova Scotia Power's revenue requirements would be higher over time and the affordability of electric service would suffer over the next 25 years. The selection by Nova Scotia Power of a Preferred Resource Plan in the 2014 IRP Process demonstrates that the lowest revenue requirement over the 25-year period includes the mid-DSM (demand-side management) case investment level from Efficiency Nova Scotia's DSM Potential Study. The Province of Nova Scotia's Electricity Efficiency and Conservation Plan explicitly recognized how demand-side management investment improve affordability: "*This is what happens when you purchase energy efficiency. This makes electricity more affordable for Nova Scotians. This also makes Nova Scotia businesses and our economy overall more competitive.*"[3]

4. Efficiency Nova Scotia's proposed residential sector demand-side resource investments for the 2016 to 2018 period represent 2.4% of estimated average household electricity costs[4] and an even smaller portion of Nova Scotia's total household stationary fuel costs (excluding transportation.) Reducing investments in demand-side resources from the level proposed by ENS would have a very small effect on the short-term affordability of household energy expenditures while sacrificing mid and long-term affordability.

---

[1] Available at: http://thelawdictionary.org/affordability/

[2] Based on analysis using Navigant's Electricity Resource Assessment Model (EL-RAM).

[3] *Using Less Energy: Nova Scotia's Electricity Efficiency and Conservation Plan*, April 2014. Page 13. http://energy.novascotia.ca/sites/default/files/Using%20Less%20Energy%20-%20Nova%20Scotia%2527s%20Electricity%20Efficiency%20and%20Conservation%20Plan%20.pdf

[4] Based on average household usage of about 800 kWh or approximately $130 per month, including the monthly customer charge.

5. Delivering reliable service at least cost is a fundamental tenet of prudent utility service, and lowering both customer usage and marginal system costs through investments in demand-side resources makes electricity bills more affordable for all ratepayers. Maximizing the number of customers that directly benefit from ENS' demand-side services over time is a valuable goal that will result in more customers with reduced bills and broaden affordability through avoided electricity usage across the province. While all electricity customers benefit from investments in demand-side resources, program participants further benefit due to lower bills, which accrue year after year (on average more than fifteen years). Since 2011, over 150,000 households and businesses have directly benefited by participating in electricity demand-side resource programs administered by Efficiency Nova Scotia.[5]

6. There are significant non-energy benefits that accrue to ratepayers, utilities, and society that should be considered. These benefits include environmental and public health benefits from the reduced emissions of carbon dioxide (CO_2) and hazardous pollutants, macro-economic benefits for the Nova Scotia economy, reduced risk for utilities, and additional benefits for demand-side resource program participants, including increased comfort, productivity, and property values. Consideration of direct non-energy benefits can play a significant role in prospective participants' decision-making processes. Indirect and induced non-energy benefits flow to both participants and non-participants.

7. Efficiency Nova Scotia's total proposed demand-side resource investment for the plan period of 2016 to 2018 is lower by more than $60 million than the level of demand-side resource investment included in Nova Scotia Power's most economically-efficient resource scenario during the 2014 IRP Process. [6]

8. Efficiency Nova Scotia's 2016 to 2018 plan offers all Nova Scotians a variety of benefits that greatly exceed the investment amounts.[7] Short-term rate impacts may be best addressed through a strategy that does not include reducing these resource benefits through an investment reduction—other rate mitigation tools can be utilized for this purpose, including rate smoothing strategies.

1.3 *Legislative Charge*

In the *Public Utilities Act*, the Nova Scotia General Assembly mandated that Nova Scotia Power Inc. (NSPI) "undertake cost-effective energy efficiency and conservation activities that are reasonably available *in an effort to reduce costs for its customers"*[8] [emphasis added]. Implicit in this directive are two important facts:

1. Nova Scotia Power must undertake energy efficiency when reasonably available because it is viewed as worthwhile for its customers, and;

---

[5] *Note:* Some customers may have participated in more than one program. Efficiency Nova Scotia 2013 Annual Report, http://efficiencyns.ca/2013annualreport/img/EFF_Annual_Report_2014_Interactive.pdf.

[6] Filing to the Nova Scotia Utility and Review Board on Nova Scotia Power's October 15, 2014 Integrated Resource Plan: Key Planning Observations and Action Plan Elements, Synapse Energy Economics, October 20, 2014. Page 10. http://synapse-energy.com/sites/default/files/Filing%20to%20the%20UARB%20on%20NSP%20October%2015%202014%20IRO%20Key%20Planning%20Observations%20and%20Action%20Plan%20Elements%2013-128.pdf

[7] More than $200 Million in net total resource benefits, based on analysis using Navigant's Electricity Resource Assessment Model (EL-RAM).

[8] *Electricity Efficiency and Conservation Restructuring (2014) Act,* NS 2014, Ch. 5, §79I(1). http://nslegislature.ca/legc/bills/62nd_1st/3rd_read/b041.htm

NAVIGANT

2. The basis for this determination is the ability of energy efficiency to reduce customer costs.

This direction from the general assembly is notable—energy efficiency procurement is specifically recognized for its ability to reduce customer costs and NSPI is called on to undertake this investment when reasonably available. While not defined in absolute terms, 'reasonable availability' is generally interpreted as a balancing of benefits, costs, and the interests of affected rate classes, a tension that is highlighted in §79L(9):

> The Board's assessment of the proposed electricity efficiency and conservation activities for the purpose of the approval *must take into account their affordability to Nova Scotia Power Incorporated's customers*...[9] [emphasis added]

[9] *Electricity Efficiency and Conservation Restructuring (2014) Act,* NS 2014, Ch. 5, §79L(9). http://nslegislature.ca/legc/bills/62nd_1st/3rd_read/b041.htm

2. Benefits of Demand-Side Resource Investments in Nova Scotia

2.1 *Investments in Demand-side Resources*

Demand-side management (DSM) is recognized as a highly cost-effective electricity supply resource.[10] For Nova Scotians, DSM has reduced customer electricity costs, provided substantial economic benefits, and provided system benefits[11] to all electric customers since 2008. Demand-side management has been regularly recognized in Canada (and the United States) as a means for reducing customer costs,[12] and some jurisdictions have instructed their utilities to procure all cost-effective demand-side resources[13] in recognition of its significant value to the electricity system and its customers.

In addition to cost effectiveness, investments in demand-side resources offer returns for ratepayers. An analysis of regulatory jurisdictions in the United States found each "dollar invested by utilities and participants in energy efficiency yields $1.24 to $4.00 USD in benefits."[14] The current investment level proposed by ENS is estimated to yield more than $200 million in direct (net total resource) benefits to ratepayers over the lifetime of the efficiency investments undertaken during the 2016 to 2018 Demand-side Resource Plan period.[15] Demand-side resource investments are a proven resource for affordably reducing customer costs.

2.2 *Demand-Side Management is an Investment, Not a Cost*

Since 2008, demand-side resource investments have provided significant benefits to Nova Scotian households and businesses. On behalf of Efficiency Nova Scotia, Navigant's Electricity Resource Assessment Model (EL-RAM) benefit-cost model assessed planned measure, program, and portfolio cost-effectiveness. The 2016-2018 Demand-side Resource Plan developed by Efficiency Nova Scotia optimizes the level of investment in demand-side resources for cost effectiveness while ensuring the opportunity for broad participation in DSM services across all applicable customer classes.

While all electricity customers benefit from investments in demand-side resources, program participants further benefit due to lower bills. Participating in a demand-side program results in lower net electricity usage, which can offset the investment cost of demand-side resources and directly benefit the customer financially. **In the context of affordability, what ultimately matters most to electricity ratepayers is what they pay in bills for the service rendered.** Maximizing the number of customers that directly benefit from ENS' demand-side services over time is a valuable goal that will result in more customers with reduced bills and improve the affordability of electric service.

---

[10] See, e.g. *Lazard's Levelized Cost of Energy Analysis Version 8.0*. September 2014. http://www.lazard.com/PDF/Levelized%20Cost%20of%20Energy%20-%20Version%208.0.pdf

[11] System benefits accrue to all customers as a result of the integrated nature of the electric grid. These include, though are not limited to, reduced capacity reserve margins, reduced line losses, and a deferral of investments in power transmission, distribution, and generation.

[12] The Nova Scotia General Assembly has charged NSPI to procure energy efficiency "in an effort to reduce costs for its customers". *Electricity Efficiency and Conservation Restructuring (2014),* NS 2014, Ch. 5, §79I(1). http://nslegislature.ca/legc/bills/62nd_1st/3rd_read/b041.htm

[13] Including the US states of California, Massachusetts, Connecticut, Rhode Island, Vermont and Washington.

[14] Molina, M. (2014). *The Best Value for America's Energy Dollar: A National Review of the Cost of Utility Energy Efficiency Programs.* American Council for an Energy-Efficient Economy (ACEEE). http://www.aceee.org/sites/default/files/publications/researchreports/u1402.pdf

[15] Based on analysis using Navigant's Electricity Resource Assessment Model (EL-RAM). The average lifetime of efficiency measures included in the 2016-2018 DSM plan is more than 15 years.

Delivering reliable service at least cost is a fundamental tenet of prudent utility service, and lowering both customer usage and marginal system costs through investments in demand-side resources make electricity bills more affordable for all ratepayers. The proposed level of investment in demand-side resources includes a comprehensive suite of DSM activities, and it supports continued broad services to a wide array of Nova Scotians.

The investment level proposed by ENS for 2016 to 2018 is lower by more than $60 million by comparison with the level selected by Nova Scotia Power in the Preferred Resource Plan for the 25-year 2014 IRP period. Investment in demand-side resources at the level included in the mid-DSM case contributes to the lowest revenue requirement over the IRP period and is projected to offer ratepayers in Nova Scotia the highest net present value. However, even highly cost-effective investments can face short-term cost considerations. To balance these goals, ENS' 2016 to 2018 Demand-side Resource Plan, as compared with the 2014 IRP Preferred Resource Plan, results in lower short-term costs and a higher long-term revenue requirement.

2.3 *Relative Size of Demand-side Resource Investments in Nova Scotia*

Figure 1 includes the investment level proposed by ENS over the 2016-2018 period and approved for 2015, and presents a comparison of both historical demand-side investments over the 2011-2014 period and the size of demand-side resource investments relative to Nova Scotia Power's revenue requirement for the residential sector. The amounts presented do not account for the average bill savings that result from incorporating demand-side equipment and measures.

The data provided in Figure 1 shows that the portion of a residential revenue requirement attributable to demand-side resource investments, not accounting for the direct customer benefits from those investments, represent 2.4% of estimated average household electricity costs over the 2016 to 2018 period.[16] This equates to a gross monthly cost share for the average residential household of less than $3.45, excluding benefits as shown in Figure 2.[17]

[16] Based on analysis using Navigant's Electricity Resource Assessment Model (EL-RAM). We note that, when considered in the context of a household's total monthly expenditures on stationary fuel costs, the share of DSM spending relative to these total costs is smaller.

[17] Based on average household usage of about 800 kWh or approximately $130 per month, including the monthly customer charge.

NAVIGANT

Figure 1. Residential Sector Demand-side Investment vs. All Other Sector Electricity Spending – 2011 to 2018

Year	Residential Revenue Requirement (includes Customer Charge) ($ million) [a]	Demand-side Plan Residential Investment with 50% of Enabling Strategies ($ million) [b]	Plan Investment vs. Residential Revenue Requirement [c] = [b / (a + b)]	Average Cost Share of Plan per Residential Customer ($2014/month, Inflation Adjusted)
2011	$574	$19.71	3.3%	$3.83
2012	$613	$19.40	3.1%	$3.71
2013	$660	$19.70	2.9%	$3.67
2014	$678	$17.70	2.5%	$3.23
2015	$690	$17.70	2.5%	$3.22
2016	$711	$16.15	2.2%	$2.92
2017	$726	$18.03	2.4%	$3.24
2018	$745	$19.33	2.5%	$3.45

Note: 2011 to 2014 data are actuals. 2015 to 2018 data are projected.

Figure 2. Average Cost Share of Demand-side Resource Investments per Residential Customer ($2014/Month, Inflation Adjusted)

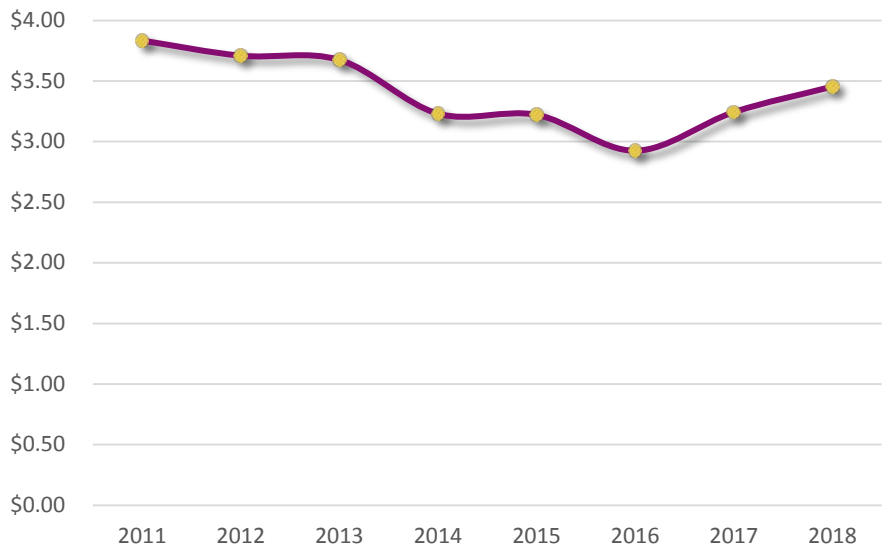
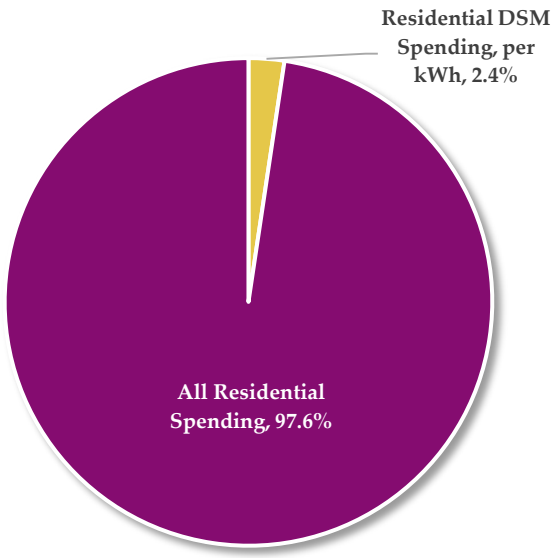


Figure 3 illustrates the relative size of demand-side resource investments versus Nova Scotia Power's revenue requirement for the residential sector, based on the data for 2016 to 2018 presented in Figure 1. Residential sector demand-side resource investments are a relatively small portion of NSPI revenue requirement even if offsetting benefits are ignored.

Figure 3. Residential Sector Demand-side Resource Investments vs. Other Components of Residential Sector Electricity Spending – 2016 to 2018



2.3.1 Relative Size of Household Demand-side Resource Investments as Compared with Total Energy Costs

When compared with total stationary household energy expenditures (excluding transportation), demand-side resource investments are a very small share of the total average monthly household spending in Nova Scotia. In light of the very small effect demand-side investments have on total household energy costs, reducing this investment from the level proposed by ENS would have little impact on the short-term affordability of overall household energy expenditures, while sacrificing mid- and long-term affordability.

2.4 *Macroeconomic Benefits*

The current investment level proposed by ENS is estimated to yield more than $200 million in net total resource benefit to ratepayers over the period of 2016 to 2018.[18] In addition to these benefits, energy efficiency offers significant additional benefits for Nova Scotians that often are not captured in traditional demand-side management cost-effectiveness tests.

[18] Based on analysis using Navigant's Electricity Resource Assessment Model (EL-RAM). We also note per the evidence provided in NSUARB M06475, that net total resource benefits may be underestimated if NSPI's ratepayers maintain a lower cost of capital than the utility. This was suggested based on the desire of ratepayers to pay the outstanding Fuel Adjustment Mechanism (FAM) balance in 2015 instead of deferring payment to 2016 and incurring "carrying charges" of NSPI's weighted average cost of capital, at 7.78%.

2.4.1 Size of the Energy Efficiency Industry in Nova Scotia

Noted as a 'key driver of the provincial economy' by a 2013 Canmac Economics study,[19] the energy efficiency industry in Nova Scotia[20] is almost half as large as the province's key economic sectors.[21] Total economic activity generated by the energy efficiency industry in Nova Scotia was measured by Canmac in 2011 to produce nearly half as much household income as the Fishing/Food Manufacturing or Tourism industries, a contribution that does not include the additional income gains for program participants that realize energy savings from efficiency measures. Figure 4 presents the total estimated economic impact of the energy efficiency sector in Nova Scotia in 2011 as compared to other principal economic sectors.

Figure 4. Total Estimated Economic Impact: Energy Efficiency Sector in Nova Scotia Compared to Selected Sectors in 2011

Sector	GDP ($ million)	Income ($ million)	Employment (number of jobs)
Energy Efficiency	$355.3	$364.8	6,527
Fishing & Other Food Manufacturing	$1.326.8	$796.1	18,972
Tourism	$1.187.0	$795.0	31,700

Data Source: Canmac Economics Ltd. (2013). Includes direct, indirect, and induced benefits.

2.4.2 Economic Benefit of Demand-side Resource Investments for Nova Scotians

Total economic impact analysis examines the direct, indirect, and induced impacts of a particular activity. The energy efficiency sector provides benefits to the Nova Scotia economy across all of these three categories.

2.4.2.1 Direct Benefits

Direct benefits result directly from investments in energy efficiency and include gross domestic product (GDP) growth due to the on-site expenditures, as well as jobs of the construction or trade contractors hired to carry out the work from firms delivering efficiency goods and services (jobs), which includes employee income.

2.4.2.2 Indirect Benefits

Indirect economic benefits that occur as a result of direct energy efficiency investments include goods and services purchased by firms engaged in delivery of efficiency products and services. Indirect benefits include improved economic competitiveness from a lower cost of business for firms that participate in efficiency programs, which can increase demand for products and services for participant firms in Nova Scotia. Increased economic activity also includes benefits to actors, such as the bank that provides financing to the delivery firm, the firm's accountant, and the building owner where the firm maintains its local offices.

---

[19] *Economic Impact Report: Nova Scotia Energy Efficiency Sector*. Canmac Economics Ltd., 2013.

[20] *Note*: For the purposes of the Canmac report, the energy efficiency industry is defined as firms that "receive over 50% of their revenue from the provision of energy efficient goods and services or provide energy efficient housing and commercial buildings".

[21] Ibid. at 30.

2.4.2.3 Induced Benefits

The induced benefits effect derives from the change in spending that energy efficiency investments enable. Broader economic benefits for Nova Scotians include increased household income and purchasing power for program participants and also for efficiency industry employees, and also produces jobs when spending is reinvested in the local economy. Businesses and households are able to meet their energy, heating, cooling, and lighting needs at a lower total cost, due to efficiency investments. This lower cost of doing business and operating households makes greater wealth available for businesses and families to spend or invest in other goods and services, such as food, clothing, or marketing (in the case of businesses).

2.4.3 Electricity System Benefits

Investments in demand-side resources also yield system benefits that support long and short-run cost savings and are included in benefit/cost calculations.

- **Reducing and delaying energy supply requirements:** Demand-side resource investments reduce both total energy consumption and peak demand requirements for utilities. By reducing demand, utility revenue requirements are reduced over the long run as additional supply infrastructure investments can be delayed[22] and transmission/distribution constraints and congestion are reduced, all of which improve long-term affordability for customers. Energy benefits are realized as well through reducing generation requirements, power purchasing, and other market costs that otherwise must be recovered.

- **Line loss reductions:** Increasing end-use efficiency lowers supply delivery requirements which are subject to line losses due to resistance over the length of the transmission and distribution systems. Line loss reductions from energy efficiency provide benefits in both marginal (peak) and average (off peak) terms depending on system load.

- **Capacity Reserve Reductions:** Reducing customer demand lowers the quantity of typically expensive marginal reserve capacity utilities must maintain to support peak load conditions. When also accounting for the higher marginal line losses experienced during peak periods, a kilowatt of demand reduction at the meter has a multiplier effect that makes generation and capacity benefits even greater.[23]

2.5 *Further Benefits of Demand-side Resource Investments*

2.5.1 Overview

Demand-side resource investments provide additional benefits above and beyond the direct system benefits available to all customers and the electricity bill savings that accrue to Nova Scotian households and businesses that participate in ENS' demand-side programs. Benefits not commonly accounted for in benefit-cost analysis are broadly defined as "non-energy benefits" (NEBs) that accrue to three groups: participants, the utility, and society at large. The broad value of these additional benefits underscores the

[22] This includes transmission, distribution, and generation investments.
[23] E.g., cited to be 1.4 times the benefit at the generator. Lazar, J. and Colburn, K. (2013). *Recognizing the Full Value of Energy Efficiency.* The Regulatory Assistance Project. Page 40.
http://www.raponline.org/document/download/id/6798

value of demand-side resource investments in comparison to their low cost and will enhance affordability.

2.5.2 Emissions Reductions

Notwithstanding existing emissions caps and the expectation that the generation portfolio in Nova Scotia will be less reliant on coal and fossil fuels in the future, in 2014, Nova Scotia Power generated 61 percent of its electricity from coal, with 75 percent overall from fossil fuels.[24] These resources contribute adversely to public health through the emission of hazardous air pollutants, including mercury, and are the predominant greenhouse gas (GHG) sources in Nova Scotia[25]. By decreasing supply requirements, demand-side resources reduce these emissions, which benefits the health and well-being of Nova Scotians, Canadians, and society at large.

2.5.3 Participant Non-energy Benefits

In addition to electricity energy savings that produce bill reductions, demand-side program participants may experience non-energy benefits, such as improved comfort, increased property values, improved productivity, among many other indirect benefits.

2.5.4 Utility Non-energy Benefits

In addition to avoided energy and capacity costs, demand-side resources often are considered a lower risk option compared with many supply-side alternatives. By contrast with major supply infrastructure, demand-side resource investments, by nature, consist of a large number of individual resources that are dispersed across the marketplace. Where the record in other jurisdictions has shown a number of examples of physical plant failures and lost investment, demand-side resources are dispersed and "Extensive analysis has shown that acquisition of a portfolio of resources consisting of a large number of discrete small units is inherently more reliable and predictable than a portfolio of a small number of larger units."[26] In addition to reduced failure risk, demand-side resource investments offset fuel supply requirements for fossil generators that subject ratepayers to market price volatility. These benefits are not explicitly addressed in traditional demand-side resource cost-effectiveness analysis.

2.5.5 Further Societal Non-energy Benefits

Demand-side resources also generate additional non-energy benefits for society as a whole that include energy security benefits from a reduced reliance on imported fossil fuels, reduced production of hazardous solid wastes (generally coal combustion residuals), and reduced water withdrawal and consumption from fossil-fired thermal electric generating units.

2.5.6 Summary of Non-energy Benefits Issues

Increasingly, non-energy benefits – especially those that accrue to participants – are viewed as significant benefit streams that the current demand-side resource benefit-cost analysis effectively neglects. This is critical to the extent that the analysis' purpose is to reflect the total benefits and costs that accrue to program participants and non-participants alike. The value of these benefits further justifies an affordable investment already expected to deliver substantial net financial benefits to ratepayers.

---

[24] See, e.g.: http://www.nspower.ca/en/home/about-us/how-we-make-electricity/default.aspx

[25] An Approach to Regulating Electricity Sector Greenhouse Gas and Air Pollutant Emissions in Nova Scotia: A Discussion Paper, February 2009.
http://climatechange.gov.ns.ca/files/03/41/DiscussionPaperEnvironmentGreenhouseGas.pdf

[26] Ibid. at 41.

NAVIGANT

2.6 *Affordability of Demand-side Resource Investments in Nova Scotia*

Utility resource planning efforts face a long-term responsibility to deliver reliable service at least cost for ratepayers. In the context of this guiding principle, the discussion in some jurisdictions has become 'how much more', rather than 'how much less' demand-side investment should be considered in light of demand-side resources' broad benefits, low-risk profile, and high return on investment. By investing in demand-side resources at a level below that which was included in Nova Scotia Power's Preferred Resource Plan, Nova Scotians would leave 'money on the table' over time by investing in demand-side resources to a lesser extent, resulting in reduced benefits and higher bill impacts over the mid to long-term.

Demand-side resource investments produce strong benefits at a low cost even over the short-term and provide greater access for Nova Scotians to bill (the cost ultimately paid by customers) reductions through increased participation. Consideration of short-term affordability has been achieved in ENS' investment proposition by substantially reducing short-term demand-side resource investment from the level identified by Nova Scotia Power in the Preferred Resource Plan, which exhibited the lowest revenue requirement over the 25-year IRP period.

Demand-side resource investments offer broad benefits for Nova Scotia and are a significant value by comparison with their investment costs. While ENS' proposed demand-side resource investment levels are already at or below those paid by ratepayers since 2011, excluding 2015 (in real terms), we further note that consideration of the short-term rate impacts may be best addressed through a strategy that does not include reducing these resource benefits through a spending reduction—other rate mitigation tools could be utilized for this purpose, including rate smoothing strategies.

dunsky ENERGY CONSULTING

MEMO

To: EFFICIENCY NOVA SCOTIA

From: Philippe Dunsky

Date: February 26th, 2015

Re.: DSM Portfolio Design Principles and Considerations

Mandate

As ENS moves into development of its fourth plan – and the first in its new role as franchise holder – it is seeking to define a set of principles or considerations to guide appropriate plan design. Accordingly, ENS has asked us to provide guidance on key principles to consider, based largely on our experience with similar plans across Canada and the U.S.

Approach

Few regions have adopted a formal and publically available set of principles to guide their DSM plans. This is partly the result of the complexity of DSM itself which, for reasons we will explain below, does not lend itself well to a formulaic approach to decision-making.

Nonetheless, through our own experience with DSM Program Administrators (PAs) across Canada and the U.S., and through additional interviews conducted for purposes of this mandate with a range of PAs, we have identified the most common principles that, explicitly or implicitly, drive DSM plans.

As with most energy options – and most businesses, for that matter – these tend to involve trade-offs. And as in most areas, successful enterprises will strive to produce (*read* save) as much of their product as possible, within the bounds of what is profitable (*read* produces net benefits), while balancing short- and long-term interests, minimizing risk, and doing what is needed to obtain the "social license" to operate.

In other words, as with so many activities, a DSM Program Administrator's portfolio should seek to balance multiple goals, which form the basis of guiding principles. This need not imply *equal* weighting of each goal, but explicit *consideration* of each.

These considerations fall within four categories:

1. **Savings**: the plan should seek to maximize energy savings, in both the short and long terms;
2. **Costs & Benefits**: the plan should seek to maximize *net* benefits, i.e. the spread between the portfolio's costs and benefits;
3. **Risk**: the plan should minimize risk through a diverse portfolio and sustained market presence; and
4. **Equity**: the plan should provide broad access to savings opportunities, including adapting strategies to overcome the unique barriers of certain hard-to-serve customers.

Below we address each of these individually, while recognizing that each consideration may involve tensions and trade-offs with others.

Consideration #1: MAXIMIZE **SAVINGS**

A DSM Program Administrator exists first and foremost to produce DSM savings. Yet even this goal is not entirely straightforward, as it involves a tension between two related goals: short-term savings, and long-term savings.

Short-term savings opportunities tend to revolve around the promotion of individual energy-saving measures (e.g. lightbulbs, appliances) that can be implemented immediately (irrespective of how long they last). Long-term savings opportunities tend to revolve around energy-saving practices and market conditions, such as education, training, financing, codes and standards, etc. – i.e. activities that may not translate into immediate savings, but that ultimately transform markets to greater energy efficiency.

Yet even this is a gross oversimplification, as if one didn't strongly influence the other. In practice, without a robust short-term savings plan, long-term success is unlikely. Indeed, short-term success is critical to creating market familiarity, comfort, support for, and interest in efficient products and services. For example, when retail outlets see efficient products gaining strong market share, they are more inclined to investigate them further, set sales targets, and negotiate to bring in other high-efficiency products. Similarly, when HVAC contractors see market share swing to high-efficiency heat pumps, they are more inclined to invest in training and promotion of the efficiency part of the equation. And only when demand for home energy retrofits is sufficiently robust, are larger firms more likely to enter the market and, with them, bring economies of scale and marketing prowess that can ultimately drive growth in home energy performance.

So short-term "resource acquisition" (RA) – the process of incenting adoption of specific measures – prepares the market for long-term change. Yet while such short-term RA may be a precondition to long-run market transformation, alone it is insufficient. Indeed, without a focused effort on long-term tools such as education, training, building allies, changing processes, financial

tools, codes and standards, etc., sustainable and sustained longer-term savings may never materialize.

The challenge for an organization is not to decide *whether* to take a short- or long-term perspective, but rather to strike the right balance of both. Short-term RA efforts pay off immediately – they can be measured by an evaluator and reported to a regulator – but ultimately cost more to secure savings. Long-term change may involve greater risk and short-term pain (investment today with no immediate results to report), yet often involve lower costs in the long run.

The tension here is no different than in other industries. Pharmaceutical companies must balance short-term pill production against long-term investments in R&D. Widget manufacturers must balance short- and long-term considerations when determining whether to invest in capital-intensive plant automation to maximize long-term output, rather than continuing with a more labour-intensive (but cheaper, in the short-term) approach. Nearly all businesses seek to balance investments that may only yield results in the long-term – but which may do so handsomely – against short-term efforts that are more certain to generate near-term returns, albeit smaller ones.

Given our understanding of ENS' mandate, and in particular the long-term resource planning context in which it is designed to operate, we find it is important for the franchise to maintain a significant focus on long-term savings. The reverse – focusing exclusively on short-term resource acquisitions that can be immediately accounted for – would likely deprive ratepayers of lower-cost opportunities to achieve electricity savings over NSPI's full planning horizon.

Maintaining significant focus on long-term savings opportunities must not, however, overshadow ENS' primary objective of producing savings in the course of its three-year planning cycle. Still, a balanced plan will involve freeing up a *reasonable* share of resources to support initiatives that may only begin to materialize *after* the initial three-year plan is complete.

IMPLICATION: In building its three-year DSM plan, we encourage ENS to seek a balance between short- and long-term savings goals. To this end:

- Devote some resources to higher-risk, longer-term efforts at transforming markets, even though such efforts may only produce results after the end of the three-year plan;
- Account for and value the full estimated useful lives of measures – not only savings that occur within the three-year horizon; and
- Consider the long-term, market-moving impact of short-term initiatives when designing programs and market strategies.

Note on tradeoffs: exclusive focus on maximizing quantifiable savings, without regard to cost or to (the variable benefits of savings opportunities), can hinder the goal of maximizing net benefits to ratepayers (see consideration #2 below).

Consideration #2: MAXIMIZE **NET BENEFITS**

One of the key drivers for DSM is its cost-effectiveness – the extent to which benefits exceed costs – when compared against supply-side energy resources. As such, most DSM PAs focus significantly (though not exclusively) on maximizing the net economic benefits of their plans.

We focus here on the spread between costs and benefits – and not merely on lowest cost – because different measures may derive different value (benefits) from the same electricity savings. For example, 100 kWh saved thanks to a more efficient fridge is unlikely to produce as much benefit as 100 kWh saved thanks to a more efficient heating system – the latter's savings occurring far more often, on average, during higher-value peak periods. Similarly, a kWh saved from a more efficient T8 lamp, which may last 6 or so years, is unlikely to be as valuable as the same kWh saved from a more efficient building envelope, which may last 30 years or more, especially insofar as NSPI's avoided costs are temporarily depressed. For this reason, a strong plan will focus on maximizing *net* benefits –encompassing the cost *and benefit* sides of the equation – rather than the more limited goal of minimizing cost alone.[1]

One tension within the goal of maximizing net benefits lies with the interplay between measures. From a purely economic standpoint, one might argue that it is preferable to take an incremental approach, e.g. by ensuring that each measure in a portfolio, in and of itself, produces a positive net benefit. One way to imagine this is through a "supply curve" of DSM measures: the PA may wish to determine its savings goal by pursuing all measures whose benefits exceed their costs, and rejecting all those that do not. Yet this approach is impractical in the real world of consumer markets, in which measures often play off of each other. Much the way producers in other industries deliberately produce loss leaders, DSM PAs may find it preferable to include some non-cost-effective measures in their portfolio, either as a lead-in to more cost-effective measures, or as part of a broader objective to educate customers and transform markets in the longer-term (see section above). The UARB acknowledged this in its decision on ENSC's 2012 DSM Plan.[2]

Similarly, it is theoretically conceivable to build the plan formulaically based on a pure *program*-level "supply curve". In theory, this could lead a PA to determine which programs to retain and which to reject from its portfolio, based exclusively on their benefit to cost ratio. This too would be a very poor guide, for at least two reasons:

- First, programs are not products; they are artificial constructs that aggregate various measures and strategies within a simple nomenclature. As we have explained elsewhere, some regions choose to bundle measures and strategies within a very small number of overarching "programs", while others prefer to give "program" names to each strategy

[1] It is important to note that we refer here to maximizing the *net present value (NPV)* of the plan (as opposed to its benefit/cost *ratio*).

[2] (NSUARB- Decision In The Matter of an Application by ENSC for Approval of its Electricity Demand Side Management Plan for 2012, 2011).

and/or measure individually. The result – two portfolios of the same breadth and depth may contain a dramatically different number of individual "programs" – is a function of semantic, organizational, or marketing preferences; not the reflection of any rational economic decision-making.

- Second, since programs may involve different strategies (e.g. around marketing, incentives, training, etc.), net benefit is not an objective function of a program category, but rather of an array of specific choices made in designing a program. An efficient new homes program can be designed to cost 3¢/kWh or to cost 5¢/kWh; to produce 10 GWh or 25 GWh; to produce a kW/MWh ratio of 0.1 or 0.3; and ultimately, to produce lifetime net benefits of $3 million or of $10 million.[3] In practice, a program's net benefits will depend on how much emphasis is placed on factors like long-run market transformation (which may involve more training, certification systems, demonstration sites, consumer awareness campaigns, etc., the benefits of which may only accrue *after* the plan horizon), or inversely on immediate savings (simpler focus on upstream incentives). Building a plan formulaically based on theoretical program-level costs could incite program designers to bundle measures and strategies in artificial ways (that may not make sense to the market or that may neglect other important principles), and otherwise to focus on factors that may not be in the best interests of efficient use of ratepayer funds.

Finally, while maximizing net benefit should be a critical guiding principle, it may create tensions with other principles. Nearly every portfolio we are aware of balances costs (lower) and benefits (higher) against other goals, including most notably long-term market transformation, risk minimization, and social equity.[4] Below we address the two remaining tensions: risk, and social equity.

IMPLICATION: ENS' portfolio should seek, among other goals, to maximize its net present value (NPV) to ratepayers.

Note on tradeoffs: exclusive focus on maximizing quantifiable net benefits could discourage longer-term market transformation efforts, which may in turn negatively impact net benefits in the long run. It also could lead to greater risk and less universal access (see considerations #3 and #4, below).

---

[3] These are, of course, for illustrative purposes only and not intended to reflect actual options applicable to ENS.

[4] It is worth keeping in mind that both long-run market transformation and risk minimization can, in the long run, *lower* the total cost of savings and therefore *add* net value to ratepayers. The challenge for sophisticated decision-makers is to consider that value even though common metrics for reporting on quantifiable net benefits may fail to account for them.

Consideration #3: MINIMIZE **RISK**

As with any business designed for the long haul, minimizing risk is an important consideration. For DSM, we note at least two ways in which risk ought to be considered: (a) portfolio diversification, and (b) market presence.

Diversification: As with any business, a diversified portfolio adds real value that forward-looking estimates of costs and benefits often fail to capture. In the case of DSM, this added value can be secured in a variety of ways:

- *Diverse measures*: A diverse set of DSM measures implies a diversity of characteristics, notably lifespans, load shapes and customer investment. A portfolio with diverse lifespans – e.g. a mix of behavioural (1-3 years), lighting (5-15 yrs.), appliance and HVAC (10-20 yrs.), and building envelope (20-50 yrs.) measures – provides a hedge against future changes to regulations, technology, or to the province's electricity needs (and thus to the time-dependent value of savings). Similarly, a portfolio with diverse load shapes (baseload-heavy, peak-heavy, in-between) provides a hedge against the utility's evolving peak needs (whether because of changes in load shapes or in the supply mix), and therefore in associated value of certain measures. And a portfolio with measures that require different degrees of customer investment – a few dollars for bulbs, or a few thousand dollars for comprehensive envelope savings – provides a hedge against macroeconomic changes (growth, downturns) that impact consumer discretionary spending and credit.
- *Diverse markets*: Similarly, offering DSM initiatives to a broad range of markets and consumers provides an important hedge against sectoral shifts. For example, with a diversified portfolio, if markets do not respond as anticipated to a strategy aimed at promoting high-efficiency HVAC equipment to homes and small businesses through mid-stream market channel incentives, the PA can shift budget to another area – say, direct customer incentives for high-efficiency lighting, or large commercial Energy Management Information Systems – where market responsiveness may prove stronger than anticipated.
- *Diverse strategies*: Finally, a strong portfolio ought to include different market strategies, including ones that focus on both "market-driven" *and* "discretionary" savings opportunities.[5] For example, a portfolio that is focused exclusively on *market-driven* opportunities may be vulnerable to exogenous events like economic downturns that slow the pace of new home starts or of commercial space fit-outs. In this case, a portfolio that seeks diversity by including *discretionary programs* – e.g. weatherizing homes or direct

[5] "Market-driven" refers to opportunities that arise when consumers were going to add or replace equipment anyhow, and the DSM PA encourages them to choose a higher-efficiency option (e.g. LED bulbs or high-efficiency appliances sold in retail stores, or efficient new homes). "Discretionary" refers instead to opportunities where customers were not planning a purchase or investment (e.g. early replacement of functioning but inefficient lighting, or weatherization of an existing home).

installation of efficient lighting in existing fixtures – is better positioned to maintain performance under new market conditions. Inversely, a portfolio that is invested too heavily in *discretionary* retrofits, at the expense of market-driven opportunities like efficient new home construction, may come to regret its lopsided position when an unanticipated boom in construction occurs (the resulting missed savings opportunities may then be lost for decades, or be achievable only at a much higher cost in later years).

As with any business, DSM operates in an economic context not entirely under its control; a diversified portfolio offers a hedge against real-world changes to even the most thoughtful of forecasts.

For this reason, nearly every advanced DSM portfolio we are aware of includes a full suite of programs and strategies that seeks to address a broad array of opportunities, across all sectors. This is done despite some opportunities presenting a higher unit cost – or a lower benefit/cost ratio – than others. In other words, smart PAs acknowledge and account for risk through market diversification.

Market Presence: Similarly, another strategy to minimize risk involves maintaining market presence during economic downturns or periods of lower avoided costs. As with other considerations, this cannot be absolute – if the value of DSM is depressed to the point where DSM is not expected to be cost-effective for a decade or more, it can be wise to substantially diminish activity. However, long-term success requires market credibility – faith by key partners and suppliers that they can count on a PA's presence over the long haul; that they can make investments in training, marketing, retooling, changing product suppliers and specifications, developing new relationships and business ventures, etc., with a reasonable expectation that their partner will not leave them "high and dry" at the earliest change in short-term context. The reverse – neglecting the interests of partners and suppliers by cycling efficiency on and off too easily – will ultimately harm a PA's market credibility, diminishing its ability to influence market change in the long-term, and adding cost as suppliers demand higher risk premiums in pricing and/or hesitate to adopt changes when DSM programs once again return to their markets.

Ultimately, a sustained presence in markets provides a hedge against future resurgence in DSM needs, while supporting the principle of investing in sustainable, long-run market transformation. Most effective PAs we are aware of have made a point of maintaining investments in markets during short-term lulls (e.g. power surplus periods), in keeping with their long-term mandates.

IMPLICATION: While not reflected in most estimates of costs and benefits, risk mitigation adds real value to a DSM portfolio. ENS should ensure its portfolio is sufficiently diverse in terms of measures, markets and strategies, including initiatives aimed at both market-driven and discretionary opportunities. It should also consider the long-term cost of exiting markets, in terms of maintaining the full faith of key partners and suppliers, and of not putting in peril low-cost opportunities for sustainable, long-term market changes.

Note on tradeoffs: exclusive focus on mitigating risk can result in higher cost and therefore lower net benefits.

Consideration #4: MAXIMIZE **EQUITY (SOCIAL LICENSE)**

Businesses must generally obtain a "social license" – general acceptance of, and support from, the communities in which they operate.

In the case of DSM, to which all customers are required to contribute, social licence is generally obtained by ensuring that the vast majority of contributors also have an opportunity to benefit from programs. In other words, social license is viewed through the lens of providing broad, equitable access to program benefits. In practice, this means taking care to offer opportunities to categories of customers that may not otherwise be able to participate in "majority"-oriented programs.

The most common example of this is lower income customers. Many residential programs focus on measures that involve significant up-front cost, and in an effort to maximize program efficiency, most programs are designed to require participants to pay a portion of that cost. Yet some lower-income customers have neither the requisite cash flow nor credit. If programs are not adjusted to their needs – which typically would involve significantly higher Program Administrator costs – they may be *de facto* unable to benefit from activities that they are nonetheless required to fund. For this reason, most regions offer distinct programs for low-income customers. Similarly, most regions offer programs aimed at lower-cost measures such as lightbulbs and certain appliances – opportunities to which, experience suggests, lower income customers *do* access in significant numbers.

While lower-income customers are the most commonly considered from this perspective, other customer categories may face similar barriers to access more standardized programs. This is often the case of multifamily buildings in which split incentives may impede participation, as well as small businesses, where a combination of split incentives and other barriers can similarly hinder their ability to benefit from DSM programs.[6] Again, more sophisticated DSM plans tend to take this into account and, where possible, address these unique barriers through adapted programs or market strategies. Doing so, however, often requires higher PA costs, which negatively impact net benefits and, where budgets are fixed, total savings.[7]

---

[6] "Split incentives" refers to cases where the person or company that controls energy consumption, including the purchase and operation of related equipment, is not the same as the person or company that pays energy bills (and that would therefore benefit from improved efficiency). This is most common in owner-tenant relationships.

[7] It is worth noting that, to the extent special attention is paid to ensuring broad access to program benefits, concern over rate impacts should be vastly diminished. Only where opportunity is restricted to significant groups do rate – as opposed to bill – impacts take on greater significance.

IMPLICATION: Equitable access to program benefits across customer groups should factor into program and plan design. In particular, the unique barriers faced by low income households, rental (typically multifamily) housing, and small businesses should be considered, despite the higher cost of savings this may imply.

Note on tradeoffs: exclusive focus on equity, to the extent it involves expensive initiatives for niche markets, can come at the expense of net benefits, and/or of maximizing savings.

SUMMARY & CONCLUSION

The business of "selling" Demand-Side Management is not fundamentally different from most business ventures: when taking a long-term perspective, strategic planning involves balancing multiple objectives. In the case of DSM, these include:

- Maximize short-term savings: ENS should seek to encourage immediate adoption and implementation of energy saving measures and practices. By analogy, a business would seek to maximize near-term sales.
- Maximize long-term savings: ENS should seek to develop opportunities that will either create new savings opportunities and/or reduce the cost of savings opportunities in the future. By analogy, a business would invest in R&D, in process automation, or in similar opportunities focused on longer-term sustainability and profitability.
- Minimize costs: ENS should seek to minimize its cost of delivering saved energy in the near-term. By analogy, a business may focus on cost efficiencies in manufacturing, distribution or sales processes.
- Maximize value: ENS should seek to maximize the value of the savings it delivers. This may imply fully accounting for the duration, timing, and load shape of different measures. By analogy, a business might focus on higher margin sales, rather than just lower cost ones.
- Maximize net benefits: ENS should ultimately focus on maximizing the net value of its DSM portfolio, i.e. the spread between the two previous objectives. By analogy, a business will ultimately focus on maximizing returns.
- Minimize Risk: ENS should minimize its portfolio's exposure to exogenous risk, by adopting a fully diversified portfolio. By analogy, a business may invest in and maintain product lines that are not as profitable as others, but act as important hedges against unanticipated market change.
- Preserve Relationships: Similarly, ENS should consider the value of maintaining market presence – or inversely, the longer-term cost that would be incurred if it lost the faith

and collaboration of key partners and suppliers – when faced with a temporary depression in avoided cost value.

- **Ensure Broad Access.** In designing its portfolio, ENS should adapt its strategy to address the unique barriers of certain customer segments – thereby broadening access to program benefits – even if doing so implies a somewhat higher average unit cost of savings. This is not a common business practice, but reflects the nature of ENS' funding structure.

Ultimately, ENS cannot achieve each of these objectives simultaneously. Rather, in designing its portfolio, it should give due consideration to each. This need not imply *equal* consideration – achieving savings in the near-term and value for ratepayer funds in the long term may reasonably be viewed as higher-order objectives. But they cannot and should not eliminate due consideration for other important objectives.

Taking a balanced approach is key to the success of any organization with a responsible, long-term view. Accordingly, it should be the overarching principle that guides Efficiency Nova Scotia in its DSM portfolio (plan) development process.

DSM PERFORMANCE INDICATORS

JURISDICTIONAL REVIEW & RECOMMENDATIONS FOR EFFICIENCY NOVA SCOTIA

PREPARED BY
DUNSKY ENERGY CONSULTING

Philippe Dunsky, President
Bruno Gobeil, Senior Consultant
Martin Poirier, Senior Consultant
Elsa Joly, Consultant

SUBMITTED TO
EFFICIENCY NOVA SCOTIA

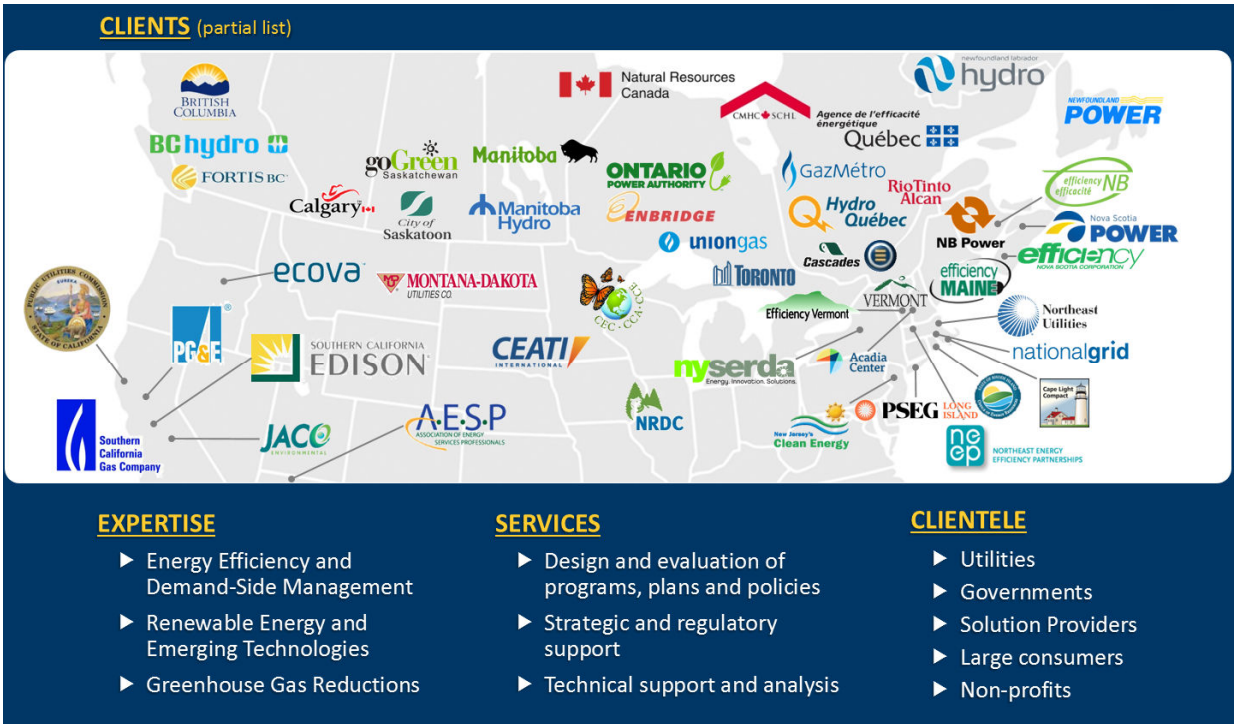
February 26, 2015



50 Ste-Catherine St. W., suite 420, Montreal, Quebec, Canada H2X 3V4 | T. 514.504.9030 | F. 514.289.2665 | info@dunsky.ca
www.dunsky.ca

ABOUT **DUNSKY ENERGY CONSULTING**

Dunsky Energy Consulting is specialized in the planning, design, support and evaluation of sustainable energy programs and policies. Our clients include leading utilities, government agencies, private firms and non-profit organizations throughout North America.



For more information, visit us at www.dunsky.ca.

TABLE OF CONTENTS

EXECUTIVE SUMMARY **1**

1. INTRODUCTION **3**

2. TARGET PERFORMANCE INDICATORS **4**

2.1. Definitions 4
2.2. Main uses 4
2.3. Types of indicators 6

3. JURISDICTIONAL SCAN **8**

3.1. Choice of Case Studies 8
3.2. Results Overview 9
3.3. Case studies 11
3.4. Takeaways 18

4. RECOMMENDATIONS FOR NOVA SCOTIA **21**

4.1. Methodology 21
4.2. Discussion & Recommendations 22

5. CONCLUSION **25**

APPENDIX A: REFERENCES 26

EXECUTIVE SUMMARY

In 2014, the government of Nova Scotia created a new model for the delivery of energy efficiency in the province. Under this model, an Electricity Efficiency Franchise (Efficiency Nova Scotia) was created, and granted by the government to EfficiencyOne for an initial licence period of 10 years. Subsequent licencing decisions will be determined based in part on a review of EfficiencyOne's performance, as ENS franchisee, as measured against predefined targets.

For the purpose of proposing Target Performance Indicators to be considered by Nova Scotia's Utility and Review Board, we performed a jurisdictional scan of almost 30 regions across North America (mostly in the U.S.). The vast majority of jurisdictions track only energy and peak savings, with the exception of five U.S. states that use additional indicators. These indicators measure performance in terms of costs and benefits, long-term market transformation, and societal impacts. It is noteworthy that the rationale for tracking these additional indicators is almost exclusively to earn a performance-based award, except in Oregon where they serve as a trigger for the program administrator's contract renewal.

Based on the jurisdictional scan results and insights resulting from it, we established five criteria for selecting appropriate performance targets for ENS: targets should reflect the scope of ENS' mandate, address important issues, be readily and reliably measurable, be reasonably controllable, and not be duplicative of one another. Using these criteria, we recommend retaining two Target Performance Indicators for the 2016-2018 Plan, and a third one to be applied only on the organization's subsequent three-year plan. We also recommend that ENS consider reporting – albeit without link to specific targets – on a set of additional indicators of success. Specifically:

RECOMMENDATION #1: **ENS adopt two Target Performance Indicators applied to the 2016-2018 Plan, namely:**

- **Cumulative annual energy savings; and**
- **Cumulative annual peak demand savings**

RECOMMENDATION #2: **ENS develop a methodology for assessing lifetime energy savings and report results annually as an Other Performance Indicator throughout the 2016-2018 Plan. This indicator can subsequently be considered as a third Target Performance Indicator applicable to the franchise's subsequent three-year plan.**

RECOMMENDATION #3: **ENS *consider* adding Other Performance Indicators – including total ratepayer benefits, total resource benefits, total DSM spending, customer satisfaction, and project pipeline – to its annual reporting.**

The table below summarizes our recommendations:

Performance Indicator	**Target (TPI)**	**Other (OPI)**	**Note on metrics**
Cumulative Annual Electricity **Savings**	■		GWh/yr (last year of plan)
Cumulative Annual Peak Demand **Savings**	■		MW (last year of plan)
Cumulative Lifetime Electricity **Savings***	←·····	☐	GWh (PV of lifetime)
For consideration: **Value** (Benefits, Cost)◊		☐	$ (Net Present Value)
For consideration: **Others** (Satisfaction, Pipeline)		☐	TBD

** This indicator should move from an OPI to a TPI in time for the next three year plan.*

◊ *Benefits would include the present value of both Total Resource Benefits (TRB) and Total Ratepayer Benefits.*

1. INTRODUCTION

In 2014, under the *Public Utilities Act*, the government of Nova Scotia created a new model for the delivery of energy efficiency in the province. Under this model, the Efficiency Nova Scotia (ENS) Franchise was created, and granted by the government to EfficiencyOne. Following a one-year transition period (2015), the ENS brand will be licensed for a period of nine years, with ongoing evaluation, verification, and reporting. After the first franchise period, the performance of ENS will be evaluated, and the right to operate as ENS could be opened up to competition. The Utility and Review Board (UARB) will be responsible for the oversight of franchisee performance and, as such, shall establish performance requirements for the franchise holder.

ENS retained Dunsky's services to recommend Target Performance Indicators against which ENS' performance can be measured. More specifically, we were asked to i) conduct a jurisdictional scan of target performance indicators used in other jurisdictions across North America, and ii) recommend such indicators for ENS that account for Nova Scotia's specific context.

Section Two of this report provides a brief background on the usage of target performance indicators based on a literature review. Section Three describes the results from our review of 29 jurisdictions across North America, including details from five case studies. Building on the literature review and the jurisdictional scan results, a discussion on the potential target performance indicators for ENS and our recommendations are presented in Section Four.

2. TARGET PERFORMANCE INDICATORS

2.1. DEFINITIONS

Several terms can be used in the context of evaluating program administrators' performance with respect to their mandate of delivering energy efficiency. The following will be used through this report:

- **Target Performance Indicators (TPIs)** are metrics used to measure success against a pre-defined, quantified target. For example, if a performance target of 400 GWh of cumulative annual net savings is established for 2018, the TPI would measure success against this target.[1] This report is focused on selecting appropriate TPIs for ENS' first three year plan.
- **Other Performance Indicators** are quantifiable metrics that could be reported to the UARB in order to provide additional insight into the company's performance. For example, an OPI may measure customer satisfaction, or measure the Program Administrator's pipeline of potential but not-yet-realized savings at the end of a period.

This report is focused on Target Performance Indicators. TPIs are often limited to a small number in order to focus attention on critical goals. They are generally tracked on an annual basis or at the end of the DSM plan period, and are independently verified, given their importance for decision-making by external parties (in this case, the UARB and stakeholders). Performance targets should be established by the regulator.

2.2. MAIN USES

In our literature review, we have referenced three main uses for target performance indicators in a regulatory process:

1. They may be used for **reporting**, i.e. for information purposes only. In this case, the program administrator is to report its performance against the targets defined in the DSM plan on a regular basis in its progress report. Most jurisdictions in Canada only require that the program administrator report achieved savings and real expenditures, as does for instance Manitoba Hydro in its annual report (Manitoba Hydro, 2014).

[1] Performance targets may also be accompanied by thresholds, i.e. predefined quantities or ranges of allowable deviation from the performance target within which acceptable performance is considered as being achieved. The reader should note that we will not include further reference to thresholds in this report since this element is not part of the study's scope.

2. **Target performance indicators may be used as a trigger for contract or licence renewal**. This applies only to jurisdictions that have a third-party program administration model, which are more predominant in the United States (U.S.) than in Canada. An example of this is Oregon, where the grant agreement between the Oregon Public Utilities Commission (OPUC) and the program administrator, Energy Trust of Oregon (ETO), is subject to the achievement of specific goals (OPUC, 2014).

3. Finally, target performance indicators may be the basis for granting **performance incentives** to reward program administrators or utilities for successful delivery of energy efficiency programs (ACEEE, 2011).

This last category represents the dominant use of target performance indicators in the U.S. Indeed, in 2013, 28 U.S. States were reported to have a performance incentive mechanism in place for electric DSM, and 3 were still pending, as illustrated in Figure 1 (IEE, 2013). All these reward mechanisms rely on the evaluation of performance against target indicators.

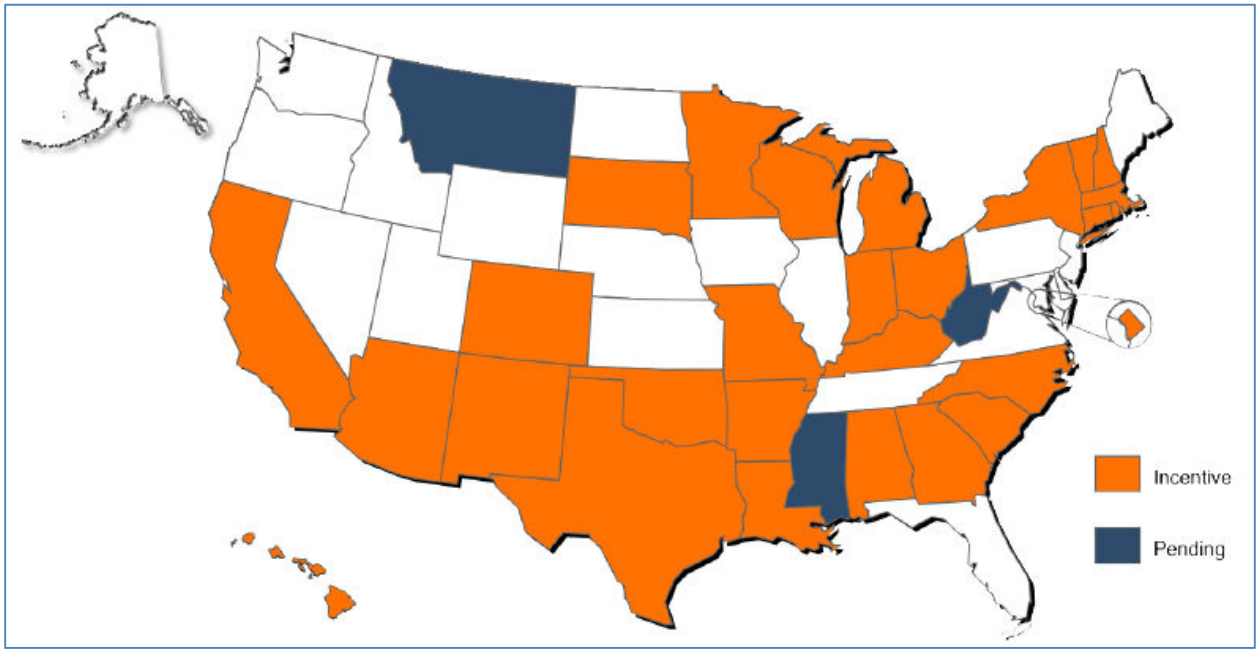


Figure 1: Energy Efficiency Performance Incentives across the U.S. States (IEE, 2013)

Performance incentives can be divided into three main categories (ACEEE, 2015):

- **Shared benefits**: In this case, utilities or program administrators share a portion of the net benefits of a successful energy efficiency program with the ratepayers.

- **Bonus/Penalties**: This mechanism rewards utilities or program administrators for meeting targets by providing them with a bonus payment (in rare cases, penalties can also be applied).

- **Enhanced rate of return**: Tied to the achievement of goals, utilities or program administrators earn a rate of return on investment roughly equal to (or higher than) the return on supply-side investments.

It is our understanding that Efficiency Nova Scotia is not seeking to obtain financial rewards; as such, we are more interested in performance indicators that serve either as information or as a formal trigger in the licence renewal process.

2.3. TYPES OF INDICATORS

Based on our literature review, we identified four main areas of interest when reviewing the performance of program administrators in delivering energy efficiency. These can then be delineated in a number of metrics, shown in Table 1 below, and discussed thereafter.

Table 1: Main Categories of Target Performance Indicators

Energy & Demand	Costs & Benefits	Long Term & Depth	Societal Impacts

• **Energy savings**
  • Annual incremental
  • Annual cumulative
  • Lifetime
• **Peak demand savings**
  • Annual incremental
  • Annual cumulative
  • Lifetime
	• **Total Resource Benefits**
	• **Net Benefits**
	• **Levelized cost**
	• **Total spending**
		• **Market transformation**
		• **Depth of savings**
			• **Jobs**
			• **Regional equity**
			• **Customer equity**
			• **GHG emission reductions**

A brief description of these target performance indicator categories is presented below:

- **Energy** and peak demand savings can be expressed in a number of ways: *Annual incremental savings* refer to savings implemented in a given year; while *cumulative annual savings* are the total savings that occur in a given year, from activities that may have been implemented over several years (e.g. a three-year plan horizon). *Cumulative lifetime savings* are the savings that

are anticipated to occur over the long term as a result of measures implemented in a given period (e.g. the savings to occur over 50 years as a result of three years of DSM)[2]

- **Costs and Benefits**: There are similarly a number of metrics to track costs and benefits. *Total Resource Benefits* (TRB) can be calculated as the total dollar amount of avoided costs – including electricity and, in some cases, other fuels, water, and/or non-resource benefits (sometimes referred to as non-energy benefits, NEBs). *Net Benefits* can be defined as the TRB minus total resource costs (including program costs like incentives and marketing, and customer contributions), or they can be defined more narrowly as direct electric avoided costs minus program costs, thereby reflecting a pure PA perspective.

- **Long-Term Vision**: A variety of indicators may be used to measure market transformation, such as the market share of high efficiency new construction starts; the number of C&I customers participating in a conservation program; or the percent of certain market channel actors participating in programs. Arguably related to longer-term vision, depth of savings is generally evaluated by the number (or share) of customers achieving a defined degree of savings.

- **Societal Impacts** may include several metrics that ensure that energy efficiency investments are fairly distributed, and/or contribute to the prosperity of the jurisdiction or of society at large. These include job creation, geographic equity, equity across rate classes, and reduction of greenhouse gas (GHG) emissions.

[2] Cumulative lifetime energy savings can be calculated as: Annual savings (kWh/yr) x Expected Useful Life (yrs), with adjustments for anticipated re-participation or other anticipated market effects. Cumulative lifetime *peak demand* savings are more difficult to express, but can be converted into equivalent metrics if deemed important.

3. JURISDICTIONAL SCAN

3.1. CHOICE OF CASE STUDIES

For purposes of this study, we conducted a scan of target performance indicators used in ten jurisdictions across the U.S. and Canada. The selected regions were chosen using the following criteria:

- **Third-Party PAs:** We first looked at regions where DSM is delivered by a third-party administrator similar to the model currently applied in Nova Scotia. The following case studies were chosen in order to present a large sampling of these regions, along with various levels of complexity in terms of target performance indicators:
    1. District of Columbia
    2. Hawaii
    3. Ohio
    4. Oregon
    5. Vermont
    6. Wisconsin

- **Recognized Leaders:** We sought to complete the list by focusing on regions that, despite using a different delivery model, are generally viewed to be leaders in the DSM field *and* that use target performance indicators. We also included the only Canadian province where a performance incentive mechanism currently exists:
    7. California
    8. Massachusetts
    9. New York
    10. Ontario

Information was gathered in each case by reviewing public documents and conducting interviews.

3.2. RESULTS OVERVIEW

The table below displays each of the jurisdictions reviewed and the type of indicators used for evaluating their program administrator's performance.

Table 2: Overview of Target Performance Indicators and Minimum Requirements

	VT	DC	MA	HI	OR†	ON	OH	CA	NY	WI	Total
Energy Savings	✓	✓		✓	✓	✓	✓	✓	✓	✓	9
Peak Demand Savings	✓	✓	✓	✓			✓	✓			6
Total Resource Benefits	✓●		✓	✓							3
Market Transformation	✓		✓	✓							3
Total Expenditure	●	●				✓					3
Renewable Energy Generation		✓			✓						2
Service Quality/Customer Satisfaction	●				✓						2
Program Implementation Efficiency	●				✓						2
Geographic Equity	●			✓							2
Business Comprehensiveness	✓		✓								2
Improve EE in Low-Income Housing	●	✓									2
Levelized Program Costs					✓						1
Net Benefits			✓								1
Expenditure with CBE*		●									1
Green Collar Jobs		✓									1
Energy Savings for Largest Users		✓									1
Program Expenditure		●									1
Participation Level by Sector	●										1
TOTAL	11	9	5	5	5	2	2	2	1	1	

LEGEND: ✓ performance target ● minimum requirement (must be met in order to be eligible for incentives)

NOTES: † Oregon is the only state that does not operate under a performance incentive mechanism. * A Certified Business Enterprise (CBE) is a business that is headquartered in the District of Columbia and has been certified by the Department of Small and Local Business Development.

Highlights:

- Nine of the ten jurisdictions have an energy savings metric and six of them also have a peak demand savings metric. Massachusetts is the only region that has not incorporated an energy savings performance target indicator *per se* in its performance incentive mechanism. Instead, its lifetime energy savings are captured through the Total Resource Benefits (TRB) metric.

- Four of the selected regions use no other indicators (beyond energy and/or peak demand savings). We note that beyond our 10 case studies, a higher-level review (IEE, 2013) of the other 19 U.S. states that operate under performance incentive mechanisms found that 18 of the 19

similarly rely exclusively on energy and/or demand savings indicators (New Hampshire, with a cost-effectiveness indicator, being the only exception). In total, 22 of the full slate of 29 regions limit their focus to success in achieving energy and demand targets.

- Six jurisdictions out of 10 have target performance indicators beyond energy and peak demand savings. These indicators include some measurement of cost (either through total spending (Vermont, Massachusetts, Ontario) or levelized program costs (Oregon), of benefits (either through TRB (Vermont, Massachusetts and Hawaii) or net benefits (Massachusetts), of market transformation (Hawaii, Massachusetts, Vermont), and of local economic benefits (D.C.).

- Some target performance indicators are unique to a single region (primarily to D.C., where the local context lends itself to a strong focus on local job creation).

- Vermont and DC both use target performance indicators *and* minimum requirements. In these cases, not meeting the minimum requirements leads to a reduction in the incentive award (see subsection 3.3 for more details). This is of little value to Nova Scotia, given the different context.

- Oregon is the only region in our review that, as with Nova Scotia, does *not* pursue financial reward for performance. Oregon uses a fairly limited set of target performance indicators (energy savings, levelized program costs, program delivery efficiency and customer satisfaction, in addition to an unrelated renewable energy indicator).

Based on the jurisdictional scan above (including the high-level review of 19 U.S. states), we applied our professional judgement to categorize the 29 jurisdictions that use performance indicators according to the level of complexity (low, medium, and high) to administer the performance evaluation process.

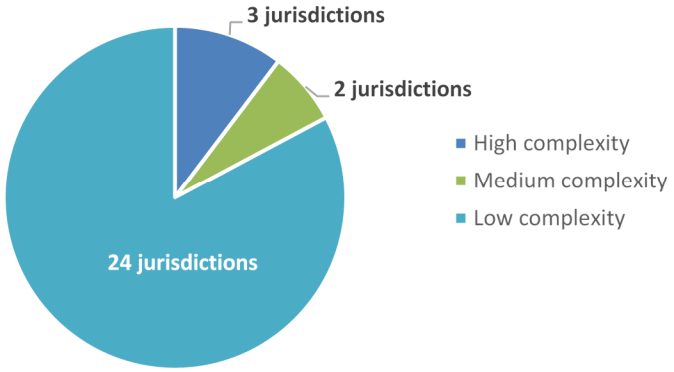


Figure 2: Selected Jurisdictions' Performance Indicators by Level of Complexity

As we will see below, Vermont, DC and Massachusetts have a large number of target performance indicators and some of them require significant effort to be assessed. Hawaii and Oregon have a more limited set of target performance indicators and are categorized as moderately complex, while the remaining 24 jurisdictions (83%) typically use only one or two performance indicators.

3.3. CASE STUDIES

Within the jurisdictions reviewed, we have elected to present five case studies in more detail: Vermont, District of Columbia, Massachusetts, Hawaii and Oregon.

VERMONT

Efficiency Vermont, the program administrator currently operated by Vermont Energy Investment Corporation (VEIC), is eligible to receive a performance incentive of up to $3.9M over the current 3-year Plan period. This represents approximately 2.3% of the total electric DSM budget. The incentive is subject to the achievement of 7 performance targets and 8 minimum requirements (Table 3). While achieving the targets triggers the award of a performance incentive, not meeting the minimum requirements (applied to a different set of metrics) can reduce those incentives considerably. Vermont's performance incentives are subject to annual verification of savings (VEIC, 2014).

Table 3: Target performance indicators and Minimum Requirements in Vermont

Target performance indicators	Metric Unit
Electricity savings (Net annual cumulative)	MWh
Total Resource Benefits (electric, fossil, water)	$ NPV
Summer Peak Demand Savings	kW
Winter Peak Demand Savings	kW
Business Comprehensiveness	Savings as a % of baseline
Market Transformation Residential	% of new construction permits
Market Transformation Business	# partners linked to at least 3 projects
Minimum Requirements	**Metric Unit**
Minimum Electric Benefits	$ NPV
Threshold Level of Participation (Residential)	$ spent
Threshold Level of Participation (Low-Income)	$ spent
Threshold Level of Participation (Small Business)	#
Geographic Equity	Min. TRB per region
Program Implementation Efficiency	Meet milestones
Service Quality	Achieve metrics in Plan
Total Spending	$

The Total Resource Benefits indicator in Vermont is calculated as the present value of lifetime electric, fossil fuel and water benefits. The TRB is based on the most recent avoided cost forecast published in the "Avoided Energy Supply Costs in New England" Report and approved by the Vermont Public Service Board. However, for purposes of measuring performance, the TRB goal is automatically adjusted to account for any change in avoided cost forecasts between when the goal was set and when results are

published (this protects the franchisee from TRB changes that are outside of its control). The measures' estimated useful lives (EUL) used in the TRB calculation are also based on ex-ante values, which are regularly updated.

Figure 3 illustrates the contribution of each indicator to the performance incentive award.

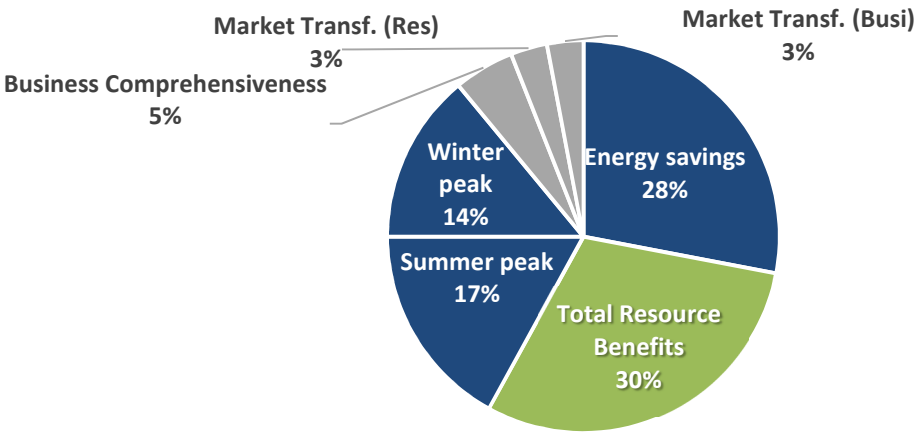


Figure 3: Vermont Indicators – Relative Weights

Despite a complex set of indicators, energy and peak savings (59%), along with related TRB (30%), represent the bulk of performance targets on a weighted basis.

DISTRICT OF COLUMBIA

Following the same structure as Vermont, the performance of the DC Sustainable Energy Utility (SEU), also operated by VEIC, is evaluated using six performance targets and three minimum requirements (Table 4). An annual incentive of up to $600,000 is available, representing about 4% of DC SEU's annual DSM budget. Savings are subject to annual verification (DC Sustainable Energy Utility, 2015).

Table 4: Target performance indicators and Minimum Requirements in DC

Target performance indicators	Metric Unit
Reduced per-capita energy consumption	MWh, Mcf
Increase renewable energy generating capacity	$/kWh
Reduced growth in peak demand	kW
Improve energy efficiency in Low-income housing	% of annual budget
Reduce growth in energy use of largest users	# projects (>200,000 sq.ft)
Increase number of local green collar jobs	# FTEs
Minimum Requirements	**Metric Unit**
Total Expenditure	$
Expenditure with Certified Business Enterprises*	$
Program Expenditure	$

*A Certified Business Enterprise (CBE) is a business that is headquartered in the District of Columbia and has been certified by the Department of Small and Local Business Development (DSLBD).

Figure 4 shows the impact of each indicator on the award of a performance incentive for DC SEU.

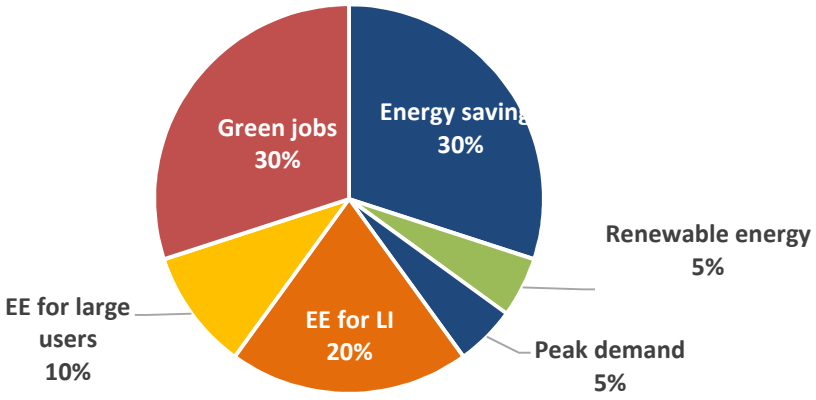


Figure 4: D.C. Indicators – Relative Weights

Contrary to Vermont's targets, in the District of Columbia, fully half of the weighting is given to societal objectives around job creation and social equity (participation of low-income consumers); only a third (35%) of the weighting is allocated to actual savings.

MASSACHUSETTS

In Massachusetts, utilities are responsible for delivering energy efficiency, and can earn performance incentives if they hit performance targets. In aggregate, Massachusetts's utilities can receive performance incentives of up to $63M over 3 years, capped at 5% of the total DSM budget. As shown in Table 5 below, performance is measured through three primary indicators: savings, value, and "performance", the latter relying on a set of ten metrics, most of which measure market transformation and depth of savings.

Table 5: Target performance indicators in Massachusetts

Target performance indicators	Metric Unit
Total Resource Benefits (TRB)	**$ NPV**
Net Resource Benefits	**$ NPV**
Performance	**See below†**
Residential	
Deeper Savings (weatherization)	% energy audits with savings > X%
Lost Opportunity/Market Opportunity	Documentation*
Low-Income	
Best practices Program Strategies Research & Technical Review of Potential New Measures	Documentation*
Multi-family Building Inventory	# buildings added (+ documentation*)
C&I	
Depth of savings (retrofit)	# customers with savings >20%
Comprehensiveness (New Construction)	# customers with savings >20%
Direct Install Electric & Gas Integration	% savings
Combined Heat & Power	% commitments
Other	
Other financing capital	$ loans issued
Cost efficiency of program expenditures	TRC B/C ratio

* Wherever "Documentation" is written in the unit column, it indicates that proving the achievement of a certain level on this metric requires extensive documentation (National Grid, 2013). These are not simple, straight-forward indicators that are easily measured as one single number

† In the "performance" category, each metric contains three levels: Threshold, Design, and Exemplary.

Total Resource Benefits (TRB) includes the lifetime value of saved electricity, non-electric fuels, water, and non-resource benefits (non-energy benefits, or NEBs). The Value metric measures the net benefits and is calculated as the TRB minus the Total Resource Costs[3]. Like Vermont, Massachusetts uses the most recent avoided costs and updates performance goals based on these values, effectively protecting PAs against changes in avoided costs that are outside of their control. For the same reason, for the NEB

[3] The Total Resource Costs in Massachusetts excludes the cost of performance incentives.

portion of benefits, values are determined using agreed upon, ex-ante NEB estimates, which are then applied to realized (ex-post) adoption rates for each measure. Finally, the useful lives (EULs) of implemented measures, used in the calculation of the TRB and the Net Benefits indicators, are also ex-ante estimates.

Figure 5 displays the contribution of the three main metrics to the calculation of the performance incentive.

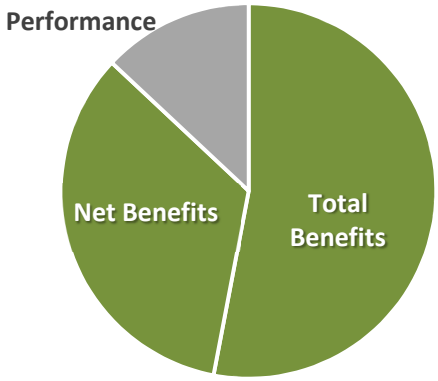


Figure 5: Massachusetts Indicators – Relative Weights

The vast majority of weight (87%) in Massachusetts is attributed to indicators that are focused primarily – though not exclusively – on resource benefits, themselves very closely related to savings.

HAWAII

Hawaii Energy is the program administrator in the island state, and is eligible to receive a performance incentive tied to the achievement of five targets (Table 6). Hawaii Energy's maximum performance incentive is $830,000 per year, which amounts to 2.5% of its total annual budget (Hawaii Energy, 2014).

Table 6: Target performance indicators in Hawaii

Target performance indicators	Metric Unit
Energy Savings	**kWh/yr** (cumul.ann.)
Peak Demand Savings	**kW** (cumul.ann.)
Total Resource Benefit (TRB)	**$ NPV**
Market Transformation - Behavior Modification - Professional Development - Technical 'Know-How'	# participants in "transformational" programs
Island Equity	**% spending vs. % contribution**

Energy and peak demand savings are straightforward. The Total Resource Benefit (TRB) is the estimated total net present value (NPV) of the value of those savings (limited to utility avoided costs only). As with Massachusetts and Vermont, the TRB goal is retroactively adjusted to account for any change in avoided cost forecasts between when the goal was set and when results are published, in order to protect the franchisee from TRB changes that are outside of its control. Also as in other case studies, *lifetime* peak and energy demand savings are based on ex-ante estimates of each measure's EUL.

Figure 6 shows the weight of each indicator's category in the calculation of the performance incentive.

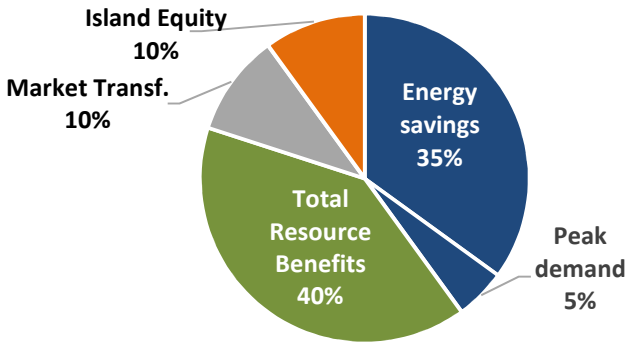


Figure 6: Hawaii Indicators – Relative Weights

Similarly to Massachusetts and Vermont, Hawaii's focus for target performance indicators falls primarily (80%) on energy savings and associated resource benefits.

OREGON

Oregon does not have a performance *incentive* mechanism in place. Nevertheless, the Oregon Public Utilities Commission (OPUC) has set target performance indicators by which the program administrator, Energy Trust of Oregon, is to be measured (Table 6). In the event the TPIs are *not met*, this may trigger a review by OPUC that could ultimately lead to termination of ETO's contract (OPUC, 2014).

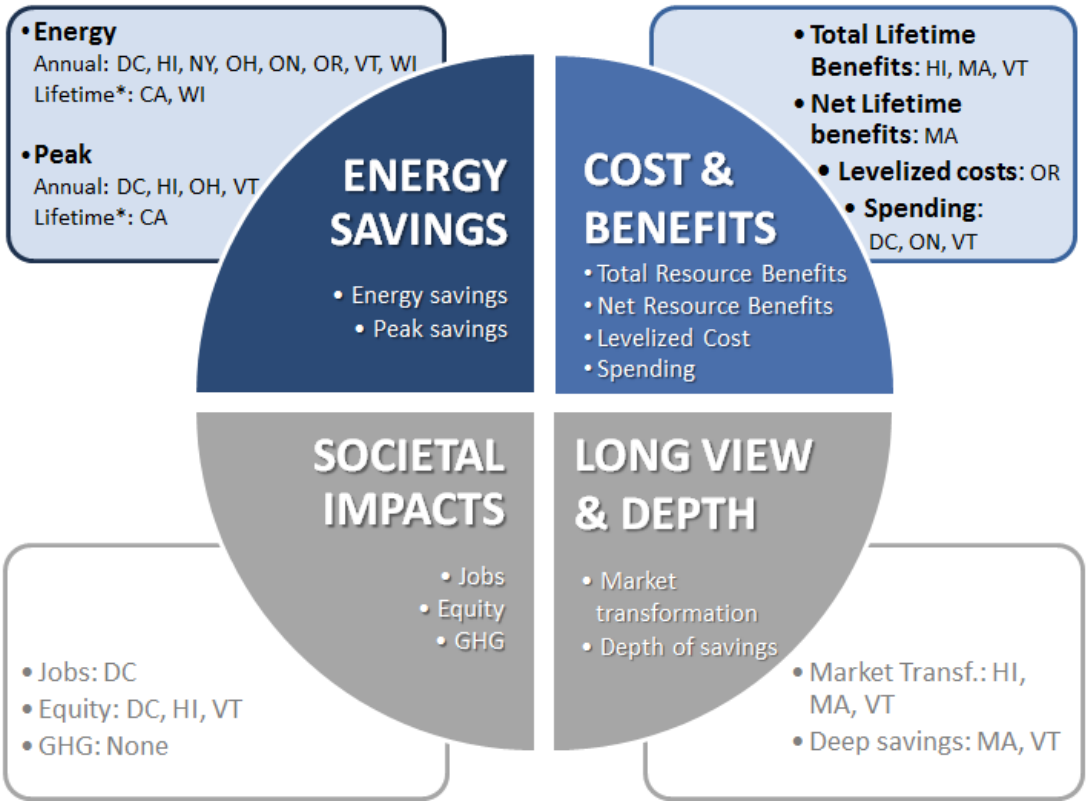
Table 7: Target performance indicators in Oregon

Target performance indicators	Metric Unit
Energy savings (annual)	MWh, therms
Levelized program cost	$/kWh, $/therm
Renewable resource development	MWh, $/MWh
Program delivery efficiency	Admin. and program support as % of revenues
Customer satisfaction	% clients satisfied or very satisfied

As elsewhere, lifetime savings are subject to annual evaluation. However, assumed measure lives remain based on ex-ante values, regularly updated.

3.4. TAKEAWAYS

Returning to the four main categories of target performance indicators identified in Section 2, the chart below illustrates how each jurisdiction's target performance indicators align to the four categories of TPIs discussed previously.



* Lifetime savings (Annual savings x ex-ante EULs) are accounted for in the Total Benefits, Net Benefits, and Levelized Cost indicators (primary factor).

Figure 7: Distribution of Target Performance Indicators Across 10 Case Studies (unweighted)

As indicated in Figure 7, most regions focus their core target performance indicators on energy savings and benefits (and/or costs), while only a minority take into consideration additional metrics. By limiting the number of target performance indicators to a manageable set, and the type of targets to ones that are measurable, reliable and add significant value, most jurisdictions have implicitly valued simplicity.

We should also note that many jurisdictions have emphasized the need for a clear, transparent and independent measurement and verification process that focuses on the accuracy of potential metrics. It is crucial to ensure that the process for measuring performance is clearly defined at the outset in order to allow the program administrator to plan accordingly.

Key takeaways for each of the four main categories of target performance indicators stemming from our jurisdictional scan are:

Energy & Capacity

- Energy savings: California and Wisconsin are the only two regions that have a formal lifecycle (lifetime) energy saving target.[4] All other regions track cumulative annual savings (over the Plan's duration). However, lifetime energy savings are explicitly accounted for within other target performance indicators; they are the prime factor in both Total Resource Benefits and Net Resource Benefits, and figure prominently in Levelized Cost of Saved Energy as well.
- Peak Demand savings: Six regions have formal peak demand target performance indicators, but only California measures it over the full lifetime of the measures. Again, it is important to recall that lifetime peak demand savings feed directly into the Total Resource Benefits, Net Benefits, and Levelized Cost indicators.

Costs and Benefits

- Several metrics may be used to ensure effective use of program expenditures, the most frequently used being Total Resource Benefits (Hawaii, Massachusetts and Vermont), which focuses on the benefits side of the equation. Net Benefits accounts for both benefits and costs. In either case, they commonly (though not always) account for *all benefits*, not just those associated with direct electricity avoided costs.
- Tracking total expenditure as a target performance indicator is also done in Vermont, DC and Ontario.

Societal Impacts

- The District of Columbia is the only region that includes job creation as a formal target, both because it is a key issue locally and because of the greater than usual possibility of DSM-related jobs leaking outside of the region.
- Ensuring geographic equity is also important in Hawaii and Massachusetts, while sectoral equity (in particular for low-income customers) is a key requirement in Vermont and DC.

---

[4] For calculating lifetime savings, California uses a combination of ex-ante savings (for measures that have a low degree of uncertainty) and ex-post values for "uncertain" measures (custom projects and specific "deemed measures" identified as highly uncertain). The ex-ante savings portion is based on the locked down ex-ante parameter values (from DEER), including EULs (PG&E, 2015).

Wisconsin tracks EULs in the program's database. However, in the last evaluation cycle, the implementation staff encountered challenges in determining EUL values for custom and hybrid measures (Hybrid projects are those that include HVAC equipment and electric motors with prescriptive incentives but receive some technical review by Focus on Energy) (Cadmus, 2014).

Long-Term View / Depth of Savings

- Three jurisdictions apply a broad array of target performance indicators regarding market transformation (Hawaii, Massachusetts and Vermont). Although Hawaii simply measures the number of participants to market transformation programs, Vermont and Massachusetts have taken a far more complex approach to measuring this factor.
- Finally, Vermont and Massachusetts are alone in valuing depth of savings among their target performance indicators.

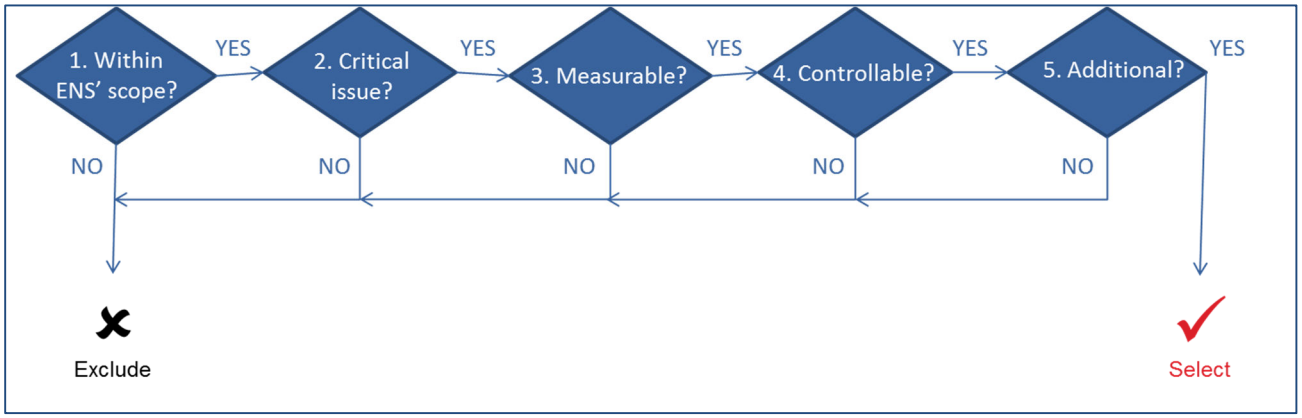
4. RECOMMENDATIONS FOR NOVA SCOTIA

Efficiency Nova Scotia has requested that we recommend a set of target performance indicators that would apply to the franchise holder over the 2016-2018 period.

4.1. METHODOLOGY

To this end, we began by developing selection criteria, as indicated in Figure 8 below.

Figure 8: Performance Targets Selection Process



1. **"Scope":** Is the indicator relevant to Efficiency Nova Scotia's mission and scope of work?
2. **"Issue":** Does it address an issue of significant interest in the province?
3. **"Measurable":** Is the indicator easily measurable, with reasonable accuracy, using current practice?
4. **"Controllable":** Does ENS have a reasonable degree of control or influence over the outcome?
5. **"Additional":** Is the indicator largely additional – as opposed to redundant – to other indicators?

We then proceeded to screen each of the Target Performance Indicators against these criteria.

4.2. DISCUSSION & RECOMMENDATIONS

Two target performance indicators meet all of the above-noted five criteria, namely: Cumulative annual energy savings, and Cumulative annual peak demand savings.

These indicators are clearly within the scope of ENS' mandate; their achievement represents an important measure of success; they can *and already are* being measured to a reasonable degree of accuracy; they are largely (not entirely) under ENS' control; and they are additional to one another.

RECOMMENDATION #1: ENS adopt two Target Performance Indicators applied to the 2016-2018 plan, namely:

- **Cumulative annual energy savings; and**
- **Cumulative annual peak demand savings**

Should these recommendations be accepted, the UARB would be responsible for approving a specific target value for each, which would be used to assess ENS' performance and to inform future decisions regarding franchise renewal.

A third indicator – cumulative *lifetime* energy savings – meets most of these criteria, with one caveat: it does not have a history of being reported on in Nova Scotia.

Cumulative lifetime energy savings is an important indicator of success – over and above cumulative annual savings – insofar as it adds the important *time* dimension to the equation. This allows for a reflection of value, by distinguishing between savings with shorter or longer measure lives. Doing so is critical when we consider that a DSM portfolio and associated savings may arise from any combination of measures with as varied lifespans as behaviour change, lightbulbs, heating systems, and building envelopes. Clearly, performance of a plan whose savings will last 20 years beyond the plan period must be understood differently from a plan whose savings will cease 5 years after the end of the period.

Cumulative lifetime energy savings have not been reported in Nova Scotia in the past. In order to gain comfort with the metric, it may be wise to delay adopting it as a formal *target* performance indicator. Rather, we recommend that ENS develop a methodology for tracking estimated lifetime savings (without immediately being attached to a formal target), and begin reporting results as soon as possible. ENS could subsequently propose this as a third target performance indicator in its *next* three year plan (2019-21).

RECOMMENDATION #2: ENS develop a methodology for assessing lifetime energy savings and report results annually as an Other Performance Indicator throughout the 2016-2018 Plan. This indicator can subsequently be considered for use as a third Target Performance Indicator applicable to the franchise's subsequent three-year plan.

For the time being, we do not recommend additional *target* performance indicators (see discussion below). However, we a limited number of other indicators – including ones that did not arise from our case studies – may be of value *for reporting purposes only.* These could serve to clarify the value of ENS' performance, and to contextualize reported *target* performance results. These may include:

- **Total Ratepayer Benefits:** The total benefit to ratepayers is aligned with – and essentially allows for an after-the-fact reporting of – the program administrator cost (PAC) metric. It adds value to the lifetime energy savings indicator by accounting for the economic value to ratepayers of both energy *and capacity savings*, and the way in which both overlap with higher or lower avoided cost periods across time. In comparing the present value of total ratepayer benefits (measured as lifetime avoided electricity costs from ENS' verified energy savings) with the actual funds used by ENS to implement its plan, this would indicate the net value ENS' plan has provided to ratepayers.

- **Total Resource Benefits:** TRB reflects the monetary value of both energy *and non-energy* benefits of DSM. It adds value to the Total Ratepayers Benefit by accounting for DSM's broader set of benefits and costs. For example, it can account for impacts – positive or negative – on the use of other fuels, as well as on other factors that ratepayers value or dislike. TRB, expressed as a present value thereof, is therefore a useful indicator of the value of ENS' performance to Nova Scotia.[5]

- **Total Spending:** Reporting on ENS' actual DSM spending, especially within the context of reporting on ratepayer and resource benefits, will allow the reader to clearly compare value with cost.

- **Customer Satisfaction:** Customer satisfaction is not a core goal of ENS' DSM franchise. However, from both a long term perspective and one of sound management, there could be value in requiring its consistent reporting.

- **Pipeline of Projects:** Given the sales lead time for larger DSM projects, there is a risk that the annual savings indicators are somewhat skewed by timing. Yet project pipeline data can complement achieved savings to provide a more accurate picture of success. This would be the case, for example, if the Corporation fell short of its savings target but had built an unusually extensive pipeline of projects, or inversely, if the Corporation achieves its target but only by emptying its pipeline. [6]

RECOMMENDATION #3: That ENS *consider* adding Other Performance Indicators – including total ratepayer benefits, total resource benefits, DSM spending, customer satisfaction, and project pipeline – to its annual reporting.

---

[5] Note that we have not recommended this as a *target* performance indicator because ENS has not yet developed a method to this end, and because doing so *for purposes of a target* would require a degree of rigour that could be cost prohibitive.

[6] For example, a pipeline metric can report potential savings from projects submitted by Commercial and Industrial customers that are currently under technical review and not yet approved and implemented.

We have considered other performance indicators, and conclude that, for the time being at least, they would add little value to the broader appreciation of ENS' performance. These include:

- **Levelized Costs**: Given our recommendations to report on both spending and lifetime savings, reporting on levelized cost (¢/kWh, i.e. the ratio of the former over the latter) would add no value.
- **Market Transformation**: Although market transformation is an important DSM goal from a long-term perspective, it is difficult to measure. In the few jurisdictions that have adopted metrics, some require extensive documentation. The challenges in measuring it are high, the uncertainty of the results may be significant, and it might become a source of contention between parties.
- **Depth of Savings**: In the context of a set budget, adding a target for deep savings at the individual project level would focus investments to fewer projects. Whether "deep and narrow" is preferable to "broad and shallow" is not immediately clear, and we believe this determination should be left to the program administrator, who will be judged on overall, province-wide savings.
- **Geographic Equity**: In Nova Scotia, geographic distribution of savings across the province has not been raised as a concern of the same order of magnitude as achieving province-wide savings to reduce electricity system costs.
- **Low-income Equity**: In Nova Scotia, equity for low-income customers is already addressed by a new mechanism to fund low-income DSM. This indicator would therefore be redundant with the funding mechanism.
- **Sector Equity**: Sectoral equity has not been raised as a major issue, since program offerings are currently accessible to all customers in Nova Scotia *and* because it is our understanding that DSM cost allocation already accounts for sector-level spending. Furthermore, ENS' concurrent proposal to require cost-effectiveness at the sector level on an ex-ante basis addresses this issue upfront.
- **Jobs**: The creation of local jobs in Nova Scotia is not part of ENS' mandate, and in any event, is unlikely to be controllable to any significant degree by ENS (contrary to the situation in DC, where the narrow City limits lend themselves to job spillage, and to associated retention strategies). Furthermore, there is an important degree of uncertainty with respect to job estimates since they are based on macro-economic models.
- **GHG Emissions**: The reduction of greenhouse gas emissions is implicit in Nova Scotia's long-term planning process, to the extent that it already accounts for fixed emissions constraints. Additional emissions concerns could arise if DSM allowed for or led to additional fuel substitution; however this does not appear to be a primary concern at this point in time.

This concludes our recommendations.

5. CONCLUSION

The jurisdictional scan showed that a vast majority of North American jurisdictions reviewed (over 80%) have restrained their set of target performance indicators to energy and peak demand savings only. These regions have focused their target performance indicators on energy and peak savings because measuring these is easy to implement and the impact evaluation process is well established. Many jurisdictions emphasize the importance of setting clear measurement and verification rules from the start as a pre-requisite for defining any performance indicator.

Our own experience broadly supports this view. While exceptions – even strong ones – exist, there is clear value to focusing management attention on a small set of key indicators. For this reason, we recommend two primary Target Performance Indicators, or TPIs, with a third to be added at a later date (and reported on as an Other Performance Indicator, or OPI, in the interim). However, we also believe there is value to reporting on other indicators without linking them to achievement of specific targets. To this end, we recommend considering up to five additional OPIs.

The table below summarizes our recommendations:

Performance Indicator	**Target (TPI)**	**Other (OPI)**	**Note on metrics**
Cumulative Annual Electricity **Savings**	■		GWh/yr (last year of plan)
Cumulative Annual Peak Demand **Savings**	■		MW (last year of plan)
Cumulative Lifetime Electricity **Savings***	←·····	☐	GWh (PV of lifetime)
For consideration: **Value** (Benefits, Cost)◊		☐	$ (Net Present Value)
For consideration: **Others** (Satisfaction, Pipeline)		☐	TBD

** This indicator should move from an OPI to a TPI in time for the next three year plan.*

◊ *Benefits would include the present value of both Total Resource Benefits (TRB) and Total Ratepayer Benefits.*

APPENDIX A: REFERENCES

ACEEE. (2011). *Carrots for Utilities: Providing Financial Returns for Utility Investments in Energy Efficiency.*

ACEEE. (2015). *Incentivizing Utility-Led Efficiency Programs: Performance Incentives.* Retrieved from http://www.aceee.org/sector/state-policy/toolkit/utility-programs/performance-incentives

Cadmus. (2014). *Focus on Energy Calendar Year 2013 Evaluation Report Volume II.* Public Service Commission of Wisconsin.

Chandrashekeran, S., Zuckerman, J., & Deason, J. (2014). *Raising the Stakes for Energy Efficiency: California's Risk/Reward Incentive Mechanism.* Climate Policy Initiative.

DC Sustainable Energy Utility. (2015). *The Model City for Sustainability: Annual Report 2014.*

Hawaii Energy. (2014). *Annual Report Program Year 2013.* Prepared for the Hawaii Public Utilities Commission.

IEE. (2013). *State Electric Efficiency Regulatory Framework.*

Manitoba Hydro. (2014). *Re-powering our province, Manitoba Hydro Electric Board 63rd Annual Report.*

National Grid. (2013). *2012 Energy Efficiency Annual Report Massachusetts Electric Company and Nantucket Electric Company each d/b/a.*

OPUC. (2014). *Approved 2014 Performance Measures for the Energy Trust of Oregon.*

PG&E. (2015). *Request of PG&E for 2012 and 2013 Energy Efficiency Incentive Award.*

VEIC. (2014). *Efficiency Vermont 2015-2017 Triennal Plan.* Prepared for the Vermont Public Service Board.



50 Ste-Catherine St. West, suite 420, Montreal, Québec, Canada H2X 3V4 | T. 514.504.9030 | F. 514.289.2665 | info@dunsky.ca
www.dunsky.ca

MEMORANDUM

101-120 Eileen Stubbs Ave
City of Lakes Business Park
Dartmouth, Nova Scotia
Canada B3B 1Y1

P: 902.404.4000
F: 902.404.3099
www.collinsbarrow.com

To: Gina Thompson, CMA, Director, Finance
EfficiencyOne

From: Michael D. Casey, CA, CBV

Date: February 25, 2015

Re: Establishment of a Reserve Account

Further to your request, we are summarizing the results of our review of the propriety of EfficiencyOne establishing a reserve account in its financial statements.

The most important issue is establishing the reasons for the creation of the reserve fund.

It cannot be based upon rules of thumb, but must be specific to your particular organization and tied into its long term plans and strategies.

Generally, the methodology for establishing a reserve is to forecast ahead to identify future events which may impact the financial condition of EfficiencyOne, quantify these items, and then establish the timeline over which funds should be reserved in order to meet the expected future financial commitments.

As such, these calculations are very organization specific.

There are several overarching constraints to consider when EfficiencyOne is establishing reserves:

(1) **Legality**

EfficiencyOne has to be acting within the limits of its legal authority as established by its constating documents. You have assured us that this is indeed the case.

(2) **Income Tax Rules and Regulations**

The Canada Revenue Agency ("CRA") has administrative positions on the matter of taxation for Not-For-Profit Organizations ("NPO'S"). Recently it has undertaken a multi-year study of NPO's[1]. In particular, it has noted the issue of disproportionately large reserves. An acceptable reserve must be reasonable in size given the organization's operational requirements. Whether the establishment of the proposed reserves by EfficiencyOne will meet the CRA's guidelines is beyond the scope of this memo. However, it would appear that as long as the reasons for the reserves are clearly articulated, identified in the financial statements, and actually used for the intended purposes, they should qualify under CRA's guidelines. Should you wish us to research this particular area further, please let us know.

(3) **Accounting Standards**

EfficiencyOne prepares its financial statements in accordance with Canadian Accounting Standards for NPO's. Management must ensure that the establishment of the reserves as presented meets these requirements.

We have reviewed the reserve balances that you are proposing to establish. These can be summarized as follows:

- Severance for employees and estimated winding up costs should the franchise agreement expire or be terminated;
- Significant loss of other funding sources resulting in the loss of cost synergies currently receiving a benefit; and,
- Providing for external factors that may impact EfficiencyOne's financial ability to offer programs that are consistent with its long-term plans.

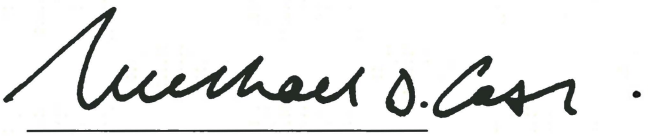
[1] On February 17, 2014, the Canada Revenue Agency released its report on the Non-Profit Risk Identification Project and an accompanying Q&A.

We have reviewed the calculations supporting the final reserve balance totaling $9,003,018 in 2024, and find them to be plausible.

The calculations used in computing the reserves are based upon future events which are not susceptible to independent verification. We would strongly suggest EfficiencyOne establish a program wherein the various components and assumptions of the reserve balance are reviewed on an annual basis, and updated accordingly as a result of changing events, conditions and trends existing at that time that may impact them in a material way.

We would also recommend that this review be handled by the audit and finance committee, or similar committee, and then reviewed and approved by the Board of Directors.

Based upon our understanding of the three consideration points outlined above, we are in agreement with both management and the Board that it is not unreasonable for EfficiencyOne to establish a reserve fund for the purposes outlined.



Michael D. Casey, CA, CBV

DSM SCREENING IN NOVA SCOTIA

TOWARD A BALANCED COST-EFFECTIVENESS FRAMEWORK

PREPARED BY
DUNSKY ENERGY CONSULTING

Philippe Dunsky, President
François Boulanger, Senior Consultant

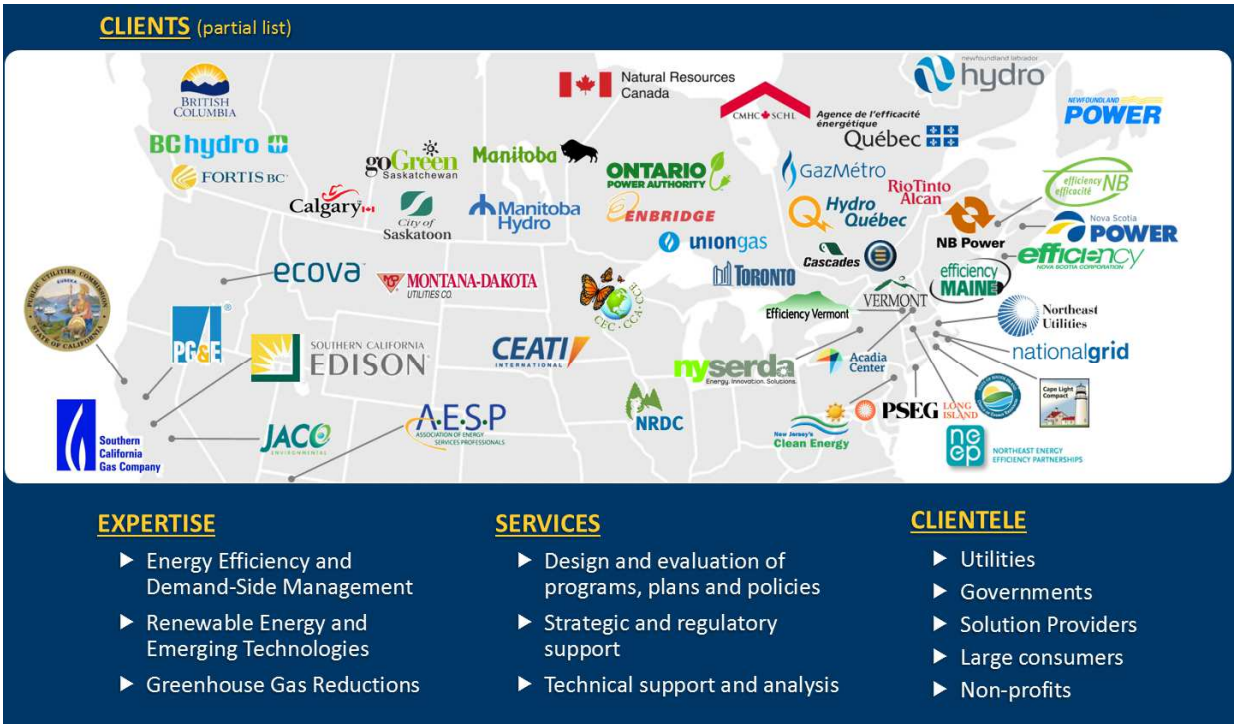
SUBMITTED TO
EFFICIENCY NOVA SCOTIA

February 23rd, 2015

50 Ste-Catherine St. W., suite 420, Montreal, QC, Canada H2X 3V4 | T. 514.504.9030 | F. 514.289.2665 | info@dunsky.ca
www.dunsky.ca

ABOUT **DUNSKY ENERGY CONSULTING**

Dunsky Energy Consulting is specialized in the planning, design, support and evaluation of sustainable energy programs and policies. Our clients include leading utilities, government agencies, private firms and non-profit organizations throughout North America.



For more information, visit us at www.dunsky.ca.

TABLE OF CONTENTS

EXECUTIVE SUMMARY **1**

INTRODUCTION TO DSM SCREENING **4**

Brief History 4
Standard Cost-effectiveness Tests 4
Choice of Tests: The Rise of the TRC and More Recent Trends 6
Cost-Effectiveness in Nova Scotia 7

CONCERNS WITH THE CONVENTIONAL TRC **9**

Introduction 9
Issue #1: accuracy: Is the TRC Calculated Correctly? 10
Issue #2: Bias: Does the Conventional TRC Neglect Important Benefits? 13
Issue #3: Ratepayer Value: Does The TRC Best Reflect A Ratepayer Perspective? 20
Issue #4: Policy: What if the TRC Is Inconsistent with Public Policy? 22

RECENT CHANGES TO STANDARD PRACTICES **24**

Trends in Leading Regions 24
The NESP's Resource Value Framework 26
New Northeast Cost-Effectiveness Guidelines 27

OPTIONS FOR NOVA SCOTIA **28**

Overview 28
Option A. Fix the TRC (Assess Non-Energy Benefits + Other Changes) 29
Option B. Move Focus to PAC Test 32
Primary Recommendation 33
Notes on Application 34

CONCLUSIONS & RECOMMENDATIONS **35**

REFERENCES **37**

APPENDIX A: RESOURCE VALUE FRAMEWORK – N.S. ASSESSMENT **41**

(page intentionally left blank)

EXECUTIVE SUMMARY

The Total Resource Cost (TRC) test was first defined, along with a series of other "standard" tests, in 1983, in the context of California's initial, utility-driven energy efficiency and demand-side management (DSM) programs.[1] Since the early to mid-1990s, the TRC has commonly been used as the primary method to determine the cost-effectiveness of demand-side management (DSM) options.

More recently, the DSM community has come to question the wisdom of basing key decisions on the TRC. Specifically, four concerns have come to light:

1. **Accuracy:** To many, the TRC has been approached as a black box – assumed to be right, but rarely opened. In practice, key assumptions vary significantly from region to region, and are often more accidental than the result of deliberate choices and tradeoffs. Many TRCs may be using inappropriate inputs that can significantly impact the accuracy of key results.

2. **Bias:** While the TRC is meant to address all costs and all benefits, in practice it often addresses all costs *but only a portion of benefits*. **This fundamental flaw in the way the TRC is often practiced produces a systemic bias against DSM** as compared with supply-side options. As a result, the test often fails to fairly reflect its intended "total" cost and benefit perspective.

3. **Ratepayer Value:** The TRC perspective itself is focused on a sort of theoretical optimum – a maximization of the combined economic welfare of participants and non-participants. Yet in doing so, it ignores a more practical perspective: maximizing the value that ratepayers receive from the dollars invested on their behalf.

4. **Policy Conflict:** In some circumstances, DSM screening may clash with policy objectives, especially to the extent policymakers have defined a quantified savings target (or related goals) outside of the TRC framework. In Nova Scotia's case, no such targets exist, but emphasis on utility least-cost procurement provided for in 2014 legislation may be inconsistent with the TRC.

As a result, the majority of leading DSM regions across North America today have either sought to modify their TRC to account for the missing (non-energy) benefits, among other changes, or moved toward other tests such as the Program Administrator Cost (PAC) test. These jurisdictions include four of the "Top 5" and eight of the "Top 10" states as rated by the most recent American Council for an Energy-Efficiency Economy (ACEEE) Scorecard.

[1] For all intents and purposes, the tests have remained unchanged for the past 30 years.

In the same vein, the National Efficiency Screening Project[2] (NESP) recently developed best practice guidelines that similarly call for either wholesale changes to the TRC, or a shift toward the PAC test. Finally, the Northeast Energy Efficiency Partnership's (NEEP) Evaluation, Measurement and Verification Forum[3] adopted similar guidelines at the end of 2014 (NEEP EM&V Forum, 2014).

Our review of the issues and options for Nova Scotia concurs with the need for changes to the current cost-effectiveness framework, to ensure internal consistency and reflect best practices. In the absence of significant change, we find that current practice cannot accurately reflect the costs and benefits of DSM, potentially leading to inefficient levels of investment and program design choices, to the detriment of ratepayers as a whole.

Correcting this problem can be done either through complex corrections to the TRC itself, including its inputs, or by moving to the more straightforward PAC test. While both options involve tradeoffs, in the case of Nova Scotia, the preponderance of arguments point strongly toward focusing on the PAC test:

- **Simplicity:** Applying the PAC will be a far simpler – and far less expensive – exercise than "fixing" the current TRC by, among other things, assessing non-energy benefits. It may also be less contentious (see below).
- **Accuracy:** Even if the TRC were to be corrected, in part by efforts to account for non-energy benefits (NEBs), the accuracy of such assessments may raise concerns, leading to lengthy discussions, ongoing debate, and more contentious hearings than otherwise necessary.
- **Relevance:** While the TRC (once corrected) arguably would provide a more balanced picture of cost-effectiveness from the perspective of all consumers, our experience with past Nova Scotia UARB hearings and stakeholder sessions points to a strong interest in the value of ratepayer DSM dollars, a perspective reflected only by the PAC test.
- **Alignment:** Similarly, the PAC test perspective, with its utility cost focus, would be more aligned with the structure created by the Nova Scotia *Electricity Efficiency and Conservation Restructuring (2014) Act* in that it requires the utility to procure DSM services.

As a result of our review, we make the following recommendations:

[2] The National Efficiency Screening Project (NESP) is comprised of organizations and individuals focused on improving the way that electricity and natural gas energy efficiency resources are screened for cost-effectiveness. For more information: http://www.nhpci.org/natlscreeningprinciples.html

[3] NEEP's EM&V Forum consists of nine states across the Northeast and mid-Atlantic regions. It is steered by a committee of state public utility commissioners, energy office and air agency representatives. Its participants include state energy and environmental agency staff, program administrators and evaluation practitioners/experts.

RECOMMENDATIONS

1. **Nova Scotia adopts the Program Administrator Cost (PAC) as the primary test for purposes of screening DSM cost-effectiveness;**
2. **The PAC test be applied for information purposes at the program and portfolio levels, and for decision-making purposes at the sector level;**
3. **That critical inputs, including most notably the discount rate, be re-examined for consistency with Nova Scotia's DSM context as well as risk; and**
4. **That a transparent reporting template, adapted from NESP's Resource Value Framework and designed to address key test inputs, be developed to facilitate future understanding of critical test choices by all parties involved.**

INTRODUCTION TO DSM SCREENING

BRIEF HISTORY

In the early 1980s, following on the heels of the second energy crisis, California's utilities moved to encourage improved customer energy efficiency. In order to provide a framework for judging the appropriateness of utility DSM spending, the California Energy Commission and California Public Utilities Commission jointly developed a series of standardized "tests", published in 1983 in what is commonly referred to as the Standard Practice Manual (SPM). While the manual has since undergone two revisions, they have been by and large cosmetic.[4]

STANDARD COST-EFFECTIVENESS TESTS

The tests provided an analytical framework designed to reflect different perspectives. Among them, three are commonly used today[5], namely:

- **The Total Resource Cost (TRC)** test is designed as a sort of combination of the participant and non-participant perspectives, seeking to compare all direct costs (both utility and participant contributions) to all direct benefits. As we will see, the TRC in particular has often overlooked considerable participant benefits, a bias that is the subject of strong critique because of the lopsided results it can produce. As a result, a number of regions have established Modified Total Resource Cost (MTRC) tests, primarily to integrate non-energy benefits into the equation.
- **The Societal Cost Test (SCT)** is treated as a variant to the TRC in California Standard Practice Manual; however, it provides a distinct perspective from the TRC that has been used by

[4] The bulk of changes brought to the second version of the original manual, published in 1987, were focused on semantics – the names of various tests (the "Non-Participant Test" became the "Ratepayer Impact Test"; the "All-Ratepayer Test" became the "Total Resource Cost (TRC)" test. A similarly cosmetic change involved declaring the Societal Cost Test a variant of the TRC rather than an entirely distinct test. This was again largely the case with the 3rd edition, published in 2001 (wherein the Utility Cost Test was renamed the Program Administrator Cost test, in recognition of the fact that a new, non-utility entity was by then responsible for parts of California's overall DSM effort. Additional changes involved defining self-generation as a type of DSM, and expanding on the nature of externalities that should be included in the Societal Cost Test (California Public Utilities Commission and California Energy Commission, 2001).

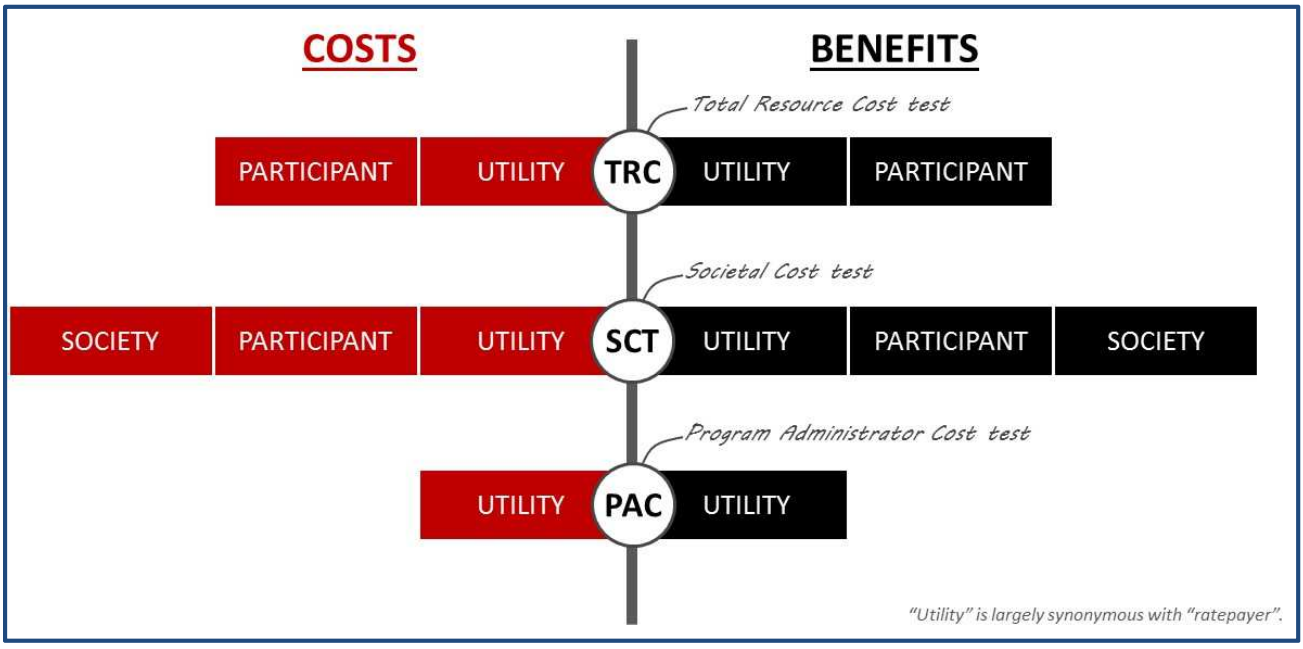
[5] In addition to the three perspective presented here, the manual also includes tests to reflect the narrower participant and non-participant perspectives. While providing useful information for program design, notably to determine incentive levels, these are not used as screening tests since they each address only one group of customers.

different jurisdictions. The SCT takes a more holistic view than the TRC by accounting for other benefits to society, primarily environmental.

- **The Program Administrator Cost (PAC) test,** previously known as the Utility Cost test, compares the utility's savings (primarily the present value of long-run avoided energy and capacity costs) to its DSM expenditures. This effectively compares its cost of procuring DSM with the alternative cost of procuring supply, and treats DSM in a manner analogous with alternative supply options.

Figure 1 below provides an illustrative view of the costs and benefits included in these three tests. We will return to this illustration later in the paper.

Figure 1: Simplified Illustration of the Intended Primary Benefit/Cost Tests



The tests described in the Standard Practice Manual should be viewed in relation to each other. The tests with a broader perspective typically include either, implicitly or explicitly, the components of some of the other tests.

Finally, it is worth mentioning that in all cases, the tests were initially devised to provide guidance to inform reasonable judgment, rather than to be used individually as a hard "go/no-go". To wit:

> "The tests set forth in this manual are not intended to be used individually or in isolation… This multi-perspective approach will require program administrators and state agencies to consider *tradeoffs between various tests*." (*our emphasis)* (California Public Utilities Commission and California Energy Commission, 2001)

While some regions have maintained the original intent by using the test results as guidance within the context of multiple perspectives and considerations, many regions have, over time, drifted toward the use of hard thresholds, often relying on a single test.

CHOICE OF TESTS: THE RISE OF THE TRC AND MORE RECENT TRENDS

Through the vagaries of time and the shifting importance given to DSM, most states and provinces that gave it consideration have, in the end, landed on the use of the TRC test as either the primary or sole indicator of cost-effectiveness.

One of the reasons this was deemed acceptable to even the most ardent DSM advocates was that, in practice, few measures had difficulty passing the standard TRC. Indeed, throughout the 1990s, significant "low-hanging fruit" (low-cost and achievable) was available to DSM administrators, the result of a dearth of codes and standards, and the relative newness of DSM programs themselves that had not yet made a significant dent in market penetration of more efficient technologies. With inefficient equipment so ubiquitous, opportunities readily passed the TRC, with portfolio-wide benefit/cost ratios routinely exceeding 3 or even 4 to one. This context was further heightened by the arrival, at the turn of the century, of fluorescent lighting equipment (CFLs and high performance T8s), which offered tremendous savings opportunities at extremely low cost.[6] As a result, the limitations of the TRC, which we will address later in this paper, were to a large extent considered theoretical, and serious consideration of them was, notwithstanding the odd paper or report[7], largely non-existent.[8]

Today, however, with much of the low-hanging fruit already picked, and with a recent resurgence in the adoption of tighter codes and standards, ensuring a proper assessment of the costs *and benefits* of DSM potential is no longer a luxury. Indeed, some Program Administrators have begun to examine more closely their application of the TRC, including the simplifying steps that may inadvertently have removed some of DSM's inherent value (e.g. measure lives cut artificially short because of software limitations); or neglected it altogether (e.g. ignoring the lower risk profile offered by DSM as compared to supply options). Similarly, some are taking a second look at key assumptions.

---

[6] For much of the first decade of this century, CFLs alone accounted for an overwhelming share of residential electricity savings. For example, CFLs accounted for fully 90% of Efficiency Vermont's residential electricity savings in 2009 (Efficiency Vermont, 2010).

[7] One example of an early challenge can be found in (Fulmer & Biewald, 1994).

[8] Similarly, a variety of application problems were also given scant attention. For example, in some regions the useful lives of longer-lasting measures (e.g. envelope improvements, which arguably persist for decades) were severely restricted because a planning tool initially designed for another purpose could not accommodate more than 15 or 20 years of data. Again, because the limitation was more theoretical than practical – i.e. because there were so many low-hanging fruit and savings goals were not as aggressive as today – the cost of accommodating more appropriate inputs was not deemed a worthwhile investment.

Most significantly, many are considering and to varying degrees integrating the value of non-energy benefits (otherwise known as NEBs) that accrue to participants and, to a lesser extent, utilities. Finally, some authors and a number of leading regions have begun to take the position that the TRC is just not the appropriate test to begin with. As we will see in the case studies presented on page 24 and beyond, **the vast majority of DSM leaders now apply something other than the traditional TRC test.**

COST-EFFECTIVENESS IN NOVA SCOTIA

REGULATORY DRIVERS

While the current effort at DSM in Nova Scotia is relatively new, the province's consideration of DSM dates back over fifteen years. Indeed, in the mid-1990s, in the context of an Integrated Resource Planning (IRP) process, the province's UARB selected the TRC as the primary screening tool for consideration of DSM opportunities. At the time, the Board determined that the IRP should integrate DSM to the extent that it met an economic threshold equivalent to a TRC of 0.8 (Faulkner, 2015). More recently, the role of DSM in Nova Scotia Power Inc.'s 2009 IRP update is rooted in a 2006 potential study that screened DSM opportunities using a threshold of 1.0 on the TRC. While the UARB initially applied this threshold at the measure level (Nova Scotia Power Inc. (NSPI) - Demand Side Management (DSM) - Proposal for 2010 & Cost Recovery Rider for 2010 and beyond, 2009), it later raised this threshold to the program level, recognizing that there may be valuable interaction between measures that do and do not pass the TRC, so long as the program as a whole passes (NSUARB - Decision In The Matter of an Application by ENSC for Approval of its Electricity Demand Side Management Plan for 2012, 2011).

The Terms of Reference of NSPI's 2014 IRP specify that "the primary criterion will be cumulative present worth of the annual revenue requirements of the resource plan over the planning horizon" (NSPI, 2014). Synapse Energy Economics (Synapse Energy Economics, 2014), in its October 3rd Commentary on the NSPI draft 2014 IRP final report, applied this definition to the analysis of the candidate resource plans, and did not include customer costs in the revenue requirement, and thus assessed DSM components of NSPI's revenue requirements from a PAC perspective.

Finally, in its *Electricity Efficiency and Conservation Restructuring (2014) Act*, the Province has created a structure whereby the *supply* of energy efficiency by the Efficiency Nova Scotia Franchise is a means to *reduce costs for [NSPI] customers* (Nova Scotia General Assembly, 2014). This perspective is reflected by the Program Administrator Cost (PAC) test, which accounts for the utility's payments for those services.

POLICY DRIVERS

Nova Scotia's DSM is arguably driven by imperatives outside of the strict regulatory arena as well. We note that in 2012, an equivalency agreement between the Province and the federal government was reached on climate change, allowing the province's individual power plants to be exempt from plant-level carbon emissions ceilings, in exchange for the province's plan to achieve broader, sectoral carbon reductions. The province's renewable energy *and DSM activities* are part and parcel of this policy equation.

More recently, the 2014 Electricity Efficiency and Conservation Plan (Nova Scotia, 2014) introduced or formalized several key elements to the Energy Policy environment that can serve as additional guidance in the assessment of DSM cost-effectiveness. Among these, one is of particular relevance to the discussion around cost-effectiveness screening tests: the new franchise (ENS) will "*sell long-term energy savings in direct competition with energy supply options. It if costs less to save energy than it costs to produce energy, saving energy wins"*. The emphasis on the competition between demand-side and supply-side options is analogous to a utility least-cost procurement process, which in turn is consistent with the PAC test perspective.

As we will see, Nova Scotia is not alone in reconsidering the question. In fact, more often than not, it's for the same, or similar, reasons.

CONCERNS WITH THE CONVENTIONAL TRC

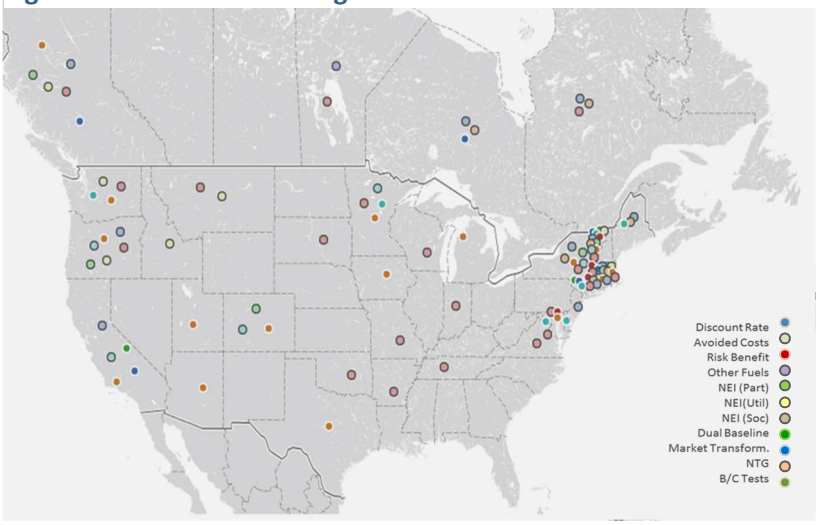
INTRODUCTION

The Total Resource Cost test is meant to measure cost-effectiveness from the perspective of consumers, writ large, i.e. something akin to a societal perspective. In itself, this is a valid and important perspective. However, as we noted previously, a growing number of DSM professionals and jurisdictions have begun to raise concerns regarding either the TRC itself, or the way in which it is often applied. We note four concerns of particular importance:

1. **ACCURACY**: Is the TRC (and its critical inputs) calculated correctly?
2. **BIAS**: Does the TRC systematically neglect important benefits?
3. **RATEPAYER VALUE**: Does it matter that the TRC does not reflect a ratepayer value perspective?
4. **POLICY CONFLICT**: What if the TRC is inconsistent with formal policy goals?

Some of these questions are inherent to the TRC itself, while others have more to do with the way in which the TRC is being applied. We examine each of these four questions below.

Figure 2. Identified "Leading or Innovative" Practices Elsewhere



Several jurisdictions have undertaken to review some of these issues, and as a result have made deliberate changes to either the way in which the TRC is calculated, or use of the TRC itself. In one survey we conducted (Figure 2) we identified 100 "leading-edge or innovative" practices across 33 jurisdictions, tackling either the choice of tests or the inputs to those tests. **The extent of experimentation underway underscores a point that is often lost when considering the TRC: while it was borne of a Standard Practice Manual, its use today is anything but standardized.**

As other jurisdictions have demonstrated, cost-effectiveness methodologies can evolve to address the issues presented in this paper and to reflect the appropriate perspective for a given jurisdiction.

ISSUE #1: ACCURACY: IS THE TRC CALCULATED CORRECTLY?

The TRC is the most common test currently in use, and compares all direct benefits, expressed through avoided energy and capacity supply costs, to all direct costs, both for the DSM program administrator *and* related participant contributions. Its general benefit/cost ratio formula is expressed with this simplified formula:

$$TRC\ ratio = \frac{Avoided\ Energy\ and\ Capacity\ Supply\ Costs}{Program\ Administrator\ costs + Participants\ costs}.$$

While the simplified TRC ratio formula is straightforward, it is important to note that the detailed algorithm in the Standard Practice Manual – Figure 3 below – is not entirely clear in prescribing key inputs and assumptions.

Figure 3. TRC Equation[9]

$$BCR = \frac{\left[\sum_{t=1}^{N} \frac{UAC_t + TC_t}{(1+d)^{t-1}} + \sum_{t=1}^{N} \frac{UAC_{at} + PAC_{at}}{(1+d)^{t-1}}\right]}{\sum_{t=1}^{N} \frac{PRC_t + PCN_t + UIC_t}{(1+d)^{t-1}}}$$

where:
BCR = Benefit Cost Ratio
UAC_t = Utility avoided supply costs in year t
UAC_{at} = Utility avoided supply costs for the alternate fuel in year t
TC_t = tax credits in year t
PAC_{at} = Participant avoided costs for the alternate fuel in year t
PRC_t = Program Administrator program costs in year t
PCN_t = Net participant costs in year t
UIC_t = Utility increased supply costs in year t

Specifically, at least six key components of the TRC calculation may be subject to entirely different methodological approaches (many of these apply to other tests as well):

i. **Measure Costs:** The TRC seeks to account for the full cost of DSM measures, irrespective of who (the Program Administrator or the participant) pays. Yet one issue that is approached very differently from region to region is the extent to which costs and/or benefits associated with free riders are accounted for. For example, in some regions (e.g. Ontario), the cost of measures adopted by free riders is considered a transfer payment and, as such, the TRC accounts for neither the benefits (savings) nor the measure costs.[10] In other regions (e.g. California), the incentive portion of the cost is included, but neither the customer share nor the savings are accounted for. And in others still (e.g. Quebec), the TRC accounts for the full

[9] Note that the utility avoided cost terms (UAC and UIC) are further defined as the reductions in net energy use or demand in each year, multiplied by the marginal cost in each year.

[10] This is arguably the most appropriate approach, conceptually, for reflecting the intended perspective.

cost of the measures adopted by free riders (irrespective of who paid them), but none of the savings.

ii. **Avoided Costs:** Avoided costs should encompass generation, transmission, distribution as well as any relevant ancillary costs. Ideally, avoided costs should include both energy and capacity as distinct components, and in some regions are differentiated by time.[11] While some do all of this, others may bundle costs together; in some cases, not all cost components are fully accounted for.

iii. **Net Savings:** While the test refers to "net" savings, there is a variety of approaches to determining what "net" means. In some regions, net is interpreted as gross savings minus estimates of free ridership. In others, estimates of spillover (aka "free drivers") are also considered. And in others still, broader market effects are considered, as well as a program's potential impact on longer-term market transformation (including realized or anticipated savings from codes and standards). Finally, a related issue concerns the rate at which future savings should be discounted, irrespective of the choice of tests.

iv. **Life of Savings:** The TRC clearly attempts to account for the stream of benefits associated with a stream of savings over time. Some regions have adopted a simplified approach to the time component of this equation, assuming that energy savings last for the expected lifespan of the new equipment. Other regions, in particular those that practice what are called "discretionary" DSM (e.g. early replacement or removal of functioning equipment such as a second refrigerator or a T12 lamp), have adopted a dual baseline approach that accounts for both the life of the new equipment (effective useful life, or EUL) and the likelihood that the original equipment would have otherwise been replaced by a more efficient version after some number of years (Remaining Useful Life, or RUL). Calculating dual baselines can be more complex but also lead to more accurate savings forecasts.

v. **Capital and O&M Savings:** While most DSM options involve "like-to-like" replacements, others involve equipment with very different lifespan profiles. For example, an LED bulb may be expected to last 20 years, while the CFL or incandescent counterpart would have lasted 5 and 1 year respectively. The TRC should normally capture this difference by accounting for the avoided cost of *twenty* (not one) incandescent bulbs or of *four* (not one) CFLs. Yet some regions have not adjusted their models and continue to assume matched lifespans, thereby

[11] This is meant to account for the different load shapes of DSM measures which, in turn, should provide a different economic value. Some regions' avoided costs are developed on an "8760" – meaning distinct costs for each hour of the year – basis, though it is not clear that the increased precision necessarily improves accuracy, nor that it would always be worth the additional cost and complexity.

leading to potentially significant inaccuracies for certain measures. Similarly, O&M profiles may also involve substantial cost differences.[12]

vi. **Other Fuels:** In many cases, DSM initiatives may have either a direct or indirect impact on the consumption of other resources such as natural gas, heating oil or water. The most obvious example is a deliberate fuel switching program. But many other examples abound: electronically-commutated motors on an oil furnace will be largely offset by increases in oil consumption; similarly, a part (but not all) of the gains from efficient lighting and appliances can lead to increases in space heating needs in the winter (and/or a reduction in space cooling needs in summer and shoulder seasons); conversely, efficient faucets and showerheads can lead to a reduction in water consumption. Different regions account for these impacts on non-electric resources in a variety of ways, from taking a comprehensive approach, to limiting their consideration to only cases of direct fuel switching, to not considering them under any circumstances.

As we can see, test inputs are not applied uniformly, and the approaches taken on any or a combination of the above issues can lead to vastly different results. Indeed, results for the very same measure (assuming the very same avoided costs) can differ substantially from one region to another. This raises important questions as to the appropriateness of the specific methodologies and algorithms used to calculate the TRC, and to the accuracy which one should reasonably expect of any TRC analysis.[13] As noted previously, this concern applies equally to other tests.

It is worth noting that some regions have deliberately considered and debated some or all of the issues and options noted above, making clear choices that presumably best reflect their needs (e.g. striking the appropriate balance between accuracy and cost/complexity). Yet in many other cases, methodologies have been more accidental than deliberate: a new staff member may have built a spreadsheet in whatever way seemed logically intuitive at the time, leading to a *de facto* methodological approach that was never questioned thereafter. Often, the test – a "black box" to many – is just *assumed* to incorporate a universally-applied methodology. As a result, accidental methodological choices with a significant impact on the bottom-line results become permanent, and unverified, fixtures.

---

[12] For example, when considering CFLs in a large hotel, the avoided annual incandescent replacement involves cost savings not only from the saved energy and the avoided purchase of five standard bulbs, but also from staff time needed to install them. This can be particularly important in high-bay applications.

[13] Beyond these issues of interpretation, our experience also suggests that TRC calculations sometimes involve errors that may not be noticeable when examining results. For example, in some regions, planning models are limited in the number of years of analysis they can account for, and the benefits of measures with longer lifespans (e.g. new construction, envelope retrofits, ground source heat pumps) may literally be cut short as a result.

ISSUE #2: BIAS: DOES THE CONVENTIONAL TRC NEGLECT IMPORTANT BENEFITS?

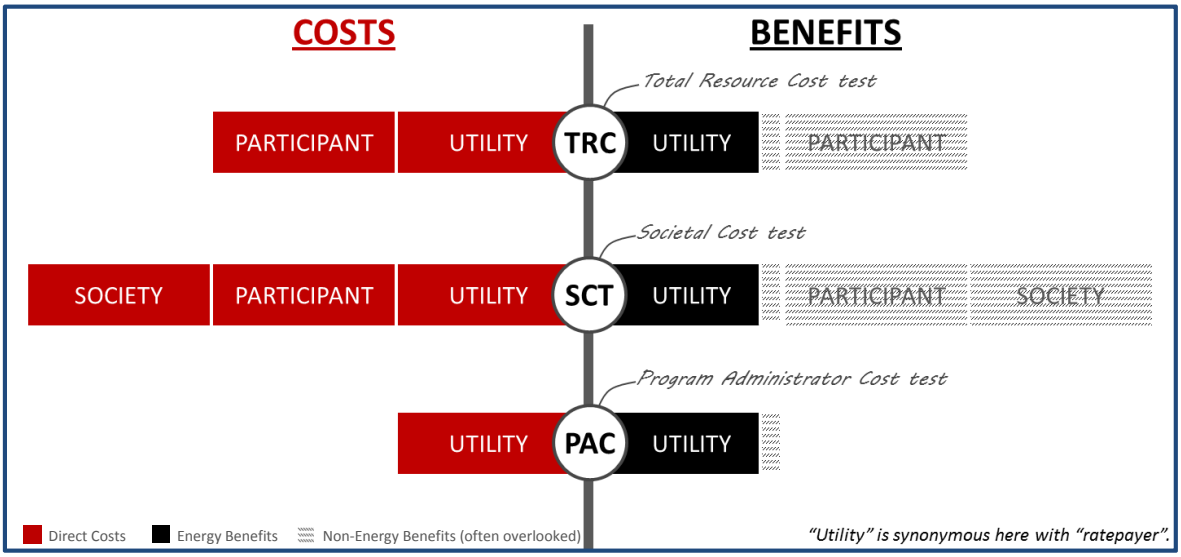
Beyond issues of interpretation, many now question whether and to what extent the Total Resource Cost test, as commonly applied, may also contain an inherent bias.

The TRC is *meant* to account for all costs and all benefits of a DSM measure or program, irrespective of who bears the cost or to whom the benefits accrue. The test does a good job at accounting for all costs, since they are tangible.[14] Yet on the other side of the equation, the TRC, at least as it was initially designed, is able to account for only a portion of benefits.

The benefits *not commonly* accounted for can be broadly defined as "non-energy benefits (NEBs)" that accrue to three groups: participants, the utility, and society at large.

There are three common themes to this discussion: first, that non-energy benefits can be substantial (while non-energy *costs* are rare); second, that they are often hard to quantify; and third, that as a result, they are often ignored, i.e. effectively valued at *zero*. The simplified illustration of the costs and benefits accounted for in each cost-effectiveness test, presented initially on page 5, can therefore be more realistically revisited, per Figure 4 below. Here, we see that in practice, while all costs are typically accounted for by the traditional tests, many benefits are either partially accounted for, or not accounted for at all.

Figure 4: Realistic Illustration of the Primary B/C Tests



We discuss the non-energy benefits that accrue to each group below.

[14] Arguably, some of the neglected facets discussed hereafter may involve not only benefits but non-energy costs as well; however, these are very rare exceptions to the rule.

PARTICIPANT NON-ENERGY BENEFITS (NEBS)

Participant NEBs are increasingly understood to play a significant role in the overall value proposition that consumers derive from many energy efficient technologies or services. To understand the extent to which these NEBs are valued, it is worth viewing them through three distinct, but supportive, perspectives: those of program marketers, the academic literature, and market prices.

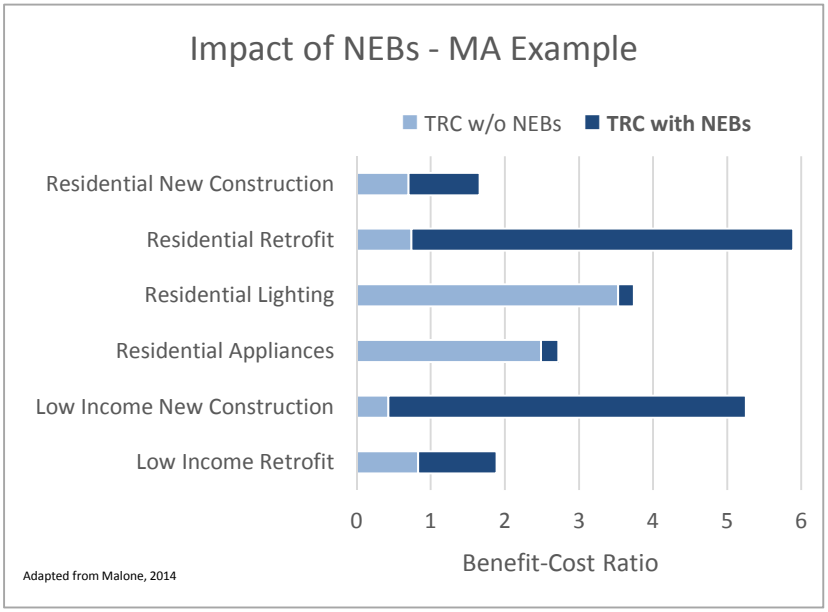
a) **Program Marketers:** While theoreticians may argue amongst themselves as to the importance of "non-energy benefits" and the theoretical basis for valuing them, they need look no further than DSM Program Administrators themselves. Indeed, good program managers, marketing specialists and account managers know that DSM measures are often sold on their *non-energy* benefits as, or more, convincingly than on their energy-related economics alone. This is regularly borne out by market research (polls, focus groups, and one-on-one discussions with facilities managers, operations VPs, home buyers and others). It is for this reason that most home retrofit programs, for example, market the increased comfort and health of occupants as much as reduced utility bills. Similarly, when talking with hotels and owners of buildings with high-bay areas about the value of moving toward fluorescent or LED lighting, account managers will typically focus on the capital savings and reduced staff time associated with much longer equipment lives (i.e. reduced frequency of equipment replacement). Meanwhile, incorporating daylighting into new commercial office buildings is sold far more on improved worker productivity and rental/resale value than on reduced power consumption for lighting, and sellers of solar hot water or solar photovoltaic systems are far more likely to push their products' "green bragging rights" – highly prized in some niche markets – than the net present value of the utility bill savings. Yet while those tasked with selling efficiency understand how significant these non-energy benefits are to customers, the TRC values them at zero.

> ***"[If NEBs are not accounted for,] the TRC Test will be internally inconsistent. This in turn will cause program administrators to underinvest in energy efficiency programs and will impose higher costs on utility customers"***
>
> - Tim Woolf et al., in "Energy Efficiency Cost-Effectiveness Screening", Nov. 2012.

b) **NEBs Literature:** In the past decade, there has been a small but growing body of literature that seeks to quantify and indeed monetize the value of participant non-energy benefits. While the literature is by no means mature, findings consistently point to significant participant NEB values across a broad spectrum of measures and sectors. Recently, Massachusetts has completed a thorough evaluation of DSM non-energy benefits for the residential (NMR Group Inc., 2011) and commercial (Tech, 2012) sectors. Figure 5 illustrates the impact of those NEBs on the benefit-cost ratios of their residential DSM programs (Malone, 2014), where non-energy benefits can represent up to 70% of a program's total benefits. Other studies conducted in the past 10 years also provide evidence of significant and material non-enegy benefits of DSM programs. For

example, for new, energy efficient homes, studies have found the value of participant NEBs alone at between 0.5 to 3.6 times the energy savings, or some $5,000-$30,000 in present value terms (Ujjwal Bhattacharjee, 2009). A U.S. DOE study found the value of NEBs to exceed the full value of energy savings from low-income weatherization programs (Amann, 2006). A similar study found NEBs to be more than five times the value of energy savings from new construction building commissioning (Evan, 2004). An assessment of 52 industrial energy efficiency improvements found productivity benefits to exceed 120% the value of energy savings alone (Worrell, Laitner, Ruth, & Finman, 2001). Even residential lighting and appliances have been shown to generate NEB benefits that participants value at between 30% and 90% of the related energy savings (Fuchs, Skumatz, & Ellefsen, 2006).

Figure 5: Massachusetts' (MA) Benefit/Cost: Impact of Neglecting NEBs



Again, while these studies often find that participants value non-energy benefits at least as much or more than they value the direct energy savings themselves, the *standard* TRC values them at zero.

c) **Market Prices:** Partly as a result of the efforts of policymakers and program administrators over the past twenty-plus years, some markets have begun to show signs of valuing energy efficiency far more than in the past.[15] For example, we recently reviewed the market price premiums fetched for homes with high-energy efficiency labels in three regions of the globe: Australia (specifically the Canberra region), the Netherlands, and the U.S. northwest (specifically the cities of Portland and Seattle). In all three cases, homes with higher energy performance, as communicated through a label or rating, were sold at a premium that varied between CA$12,090 and $29,315 (after controlling for other variables). Of course, the market's ability to value efficiency may point to opportunities to reduce incentives in certain circumstances, yet the TRC cares neither about incentives (considered a mere transfer payment), nor about homebuyers' motivations. Real estate markets could value efficiency at $20,000 per home, but if

[15] This is notably, though not solely, the case where strong energy performance labeling policies are in place.

the discounted value of avoided energy is only half that, then the TRC effectively says "the market is wrong" and suggests the measure is not worth promoting.

As we have seen, the TRC accounts for all participant costs, but for only a portion of participants' benefits. Yet our experience suggests that in many markets, participants are increasingly driven to spend their money on energy efficiency measures or options because of those very NEBs that the TRC does not account for.

It has been suggested – and we concur – that where the TRC is used to screen DSM measures or programs, its asymmetrical treatment of measure costs and benefits "fundamentally biases regulatory decisions against efficiency investments" (Neme & Kushler, 2010).[16] In the past, this bias may have had only a marginal real-world impact, as an abundance of low-hanging fruit meant that direct TRC benefits were typically double or triple the full costs of measures anyhow. In other words, few measures were screened out as a result of the test's bias. However, the combination of increasingly aggressive DSM goals and improving baselines (whether by codes and standards or market interest) is turning a largely theoretical bias into a practical – and increasingly significant – problem.

In fact, in the past two years alone, clients of ours with aggressive DSM targets have faced situation after situation – solar hot water, deep energy retrofits, ground source heat pumps, high-efficiency new construction, etc. – in which measures they deem to be of high value – indeed that may be needed to achieve their energy savings targets – fail the TRC, primarily because they neglect certain NEBs, and *despite* clear consumer interest.

> ***"A major concern with the TRC is that it typically includes the full costs, but often does not include the full benefits to customers because the [risk reduction] value and many non-energy benefits are difficult to quantify. This introduces a potential bias in the TRC against conservation programs."***
>
> -Washington Utilities and Transportation Commission, *Policy Statement on the Evaluation of the Cost-Effectiveness of Natural Gas Conservation Programs*, Oct. 2013

No test is perfect, and it is understandable that this failing was often overlooked in the past, when NEBs were not considered as significant and TRC thresholds were easier to pass. But today, thanks to the very programs the TRC previously allowed, NEBs are more prevalent, and their exclusion from one side of the equation has created a fundamental imbalance to which many have begun to give greater consideration.

As we will see, a growing number of regions that use the TRC are moving toward accounting for these participant NEBs.

[16] To the extent that the very term *Total* Resource Cost test is likely a misnomer.

OTHER NON-ENERGY BENEFITS AND ISSUES

Beyond Participant NEBs, DSM may offer additional non-energy benefits that accrue to the utility, and/or to society as a whole.

→| *Utility NEBs*

Other than avoided energy and capacity costs, DSM is often considered a lower risk option than many of its supply-side alternatives. This lower risk is primarily related to four aspects of the DSM profile:

1. **Hedge against fuel prices**: When compared with supply-side alternatives, DSM is akin to renewable energy in that it involves none of the risks of fuel price changes borne by thermal power plants (for which fuel prices can account for two thirds or more of the total levelized cost of power). The value of DSM as a fuel price hedge depends on the extent to which it avoids power generation options that require substantial fuel purchases.[17]

2. **Power Planning / Reliability:** From a power planning perspective, DSM may be considered more reliable than the construction and operation of new power plants. This is primarily because DSM does not suffer from the risks associated with permitting and/or construction delays, as well as the risk of unplanned slowdowns or shutdowns. Inversely, DSM may run the risk of not producing as much savings as planned; however, where program administrators have sufficient flexibility and incentive, this risk is greatly limited, for three reasons: (a) because DSM is fundamentally a "load-matching" resource, whose greatest non-performance risk relates to the arrival of *other,* offsetting load-reducing events;[18] and (b) because DSM Program Administrators have a vast array of levers (incentives, advertising, direct install, others) at their disposal, and furthermore work on a large diversity of opportunities (technologies, markets, sectors), such that a reduction in anticipated savings in one area can typically be offset by increases elsewhere (i.e. the risk is heavily diluted).

3. **Planning flexibility:** On a very short-run basis, conventional fossil and hydro plants offer the highest planning flexibility as they are a fully dispatchable resource. While DSM is not as fully dispatchable, as noted above, its savings are inherently likely to match loads, providing a significant value-add over intermittent renewables.

---

[17] In a power pool context (not Nova Scotia's), DSM acts as a hedge against power prices, which can be a function of both fuel prices *and other market dynamics*.

[18] For example, program-related DSM savings may be at risk during an economic downturn when natural market turnover (equipment replacement, new construction) slows down. Similarly, net program impacts can be at risk when governments adopt tighter codes and standards. Yet in both cases, from a reliability perspective, total loads go down; what is at risk is the *attribution of savings to the program administrator*, not the load reductions themselves.

For all of these reasons, a number of regions – and most notably the northwest U.S., which has historically given perhaps the most consideration to power planning risk issues in North America – have chosen to attribute a risk benefit to DSM for purposes of cost-effectiveness analysis.[19,20]

→ı *Societal NEBs*

While we have discussed participant and utility NEBs, DSM is also known to generate non-energy benefits for society as a whole, primarily through (1) environmental benefits (to the extent they are not already internalized in the planning process and associated avoided costs), and (2) macro-economic benefits (as they pertain to increased economic activity related to either greater domestic content and/or productivity gains).

> ***"[The conventional TRC is] a test that is both biased against energy efficiency resources and that provides decision-makers with inaccurate information regarding 'total resource' costs and benefits."***
>
> - National Efficiency Screening Project, *The Resource Value Framework – Reforming Energy Efficiency Cost-Effectiveness Screening*, August 2014

Historically, environmental NEBs (primarily carbon emissions and, to a lesser extent, air pollutants and/or other environmental impacts) have received the bulk of attention in terms of accounting for and valuing societal NEBs within cost-effectiveness frameworks. Indeed, in a recent ACEEE survey (Kushler, Nowak, & Witte, 2012), nearly one-third of all regions surveyed reported accounting for environmental NEBs in their cost-effectiveness screening.[21]

In some regions, DSM is also considered to generate a superior macroeconomic benefit as compared with power generation alternatives. This can be a result of both a higher domestic spending multiplier (especially where DSM avoids conventional plants that require fuel imports), as well as productivity and competitiveness improvements associated with Commercial and Industrial (C&I) sector savings. A recent study (Acadia Center, 2014) found that aggressive energy efficiency efforts in Nova Scotia would

---

[19] In Vermont, the Vermont Public Service Board reduces the cost of energy efficiency options by 10% "to reflect the benefits of DSM in mitigating supply-planning risk" (Investigation into Least-Cost Investments, Energy Efficiency, Conservation, and Management of Demand for Energy, 1990). In the northwest U.S., where planners have found that "It is clear that the more aggressive level of conservation results in both much lower expected cost and risk", the cost of supply options (i.e. DSM's avoided costs) are attributed a 10% risk adder.

[20] Another non-energy benefit that can accrue to utilities is related to their ability, by reducing overall energy bills, to reduce arrearages, collection costs and defaults. While conceivably applicable to all sectors, consideration of this benefit is typically reserved for DSM programs that specifically or primarily target low-income residential customers.

[21] In Nova Scotia, because of the legislated CO_2e cap applied to Nova Scotia Power Inc., carbon emissions are already internalized, at least to some degree, in the utility's avoided costs and, through them, in the cost-effectiveness analysis for DSM options. This applies to other emissions addressed through legislation in Nova Scotia as well.

generate, for every million dollars in DSM program spending, a net increase in provincial GDP of between $2.7 and $4.1M, and from 22 to 33 job-years of net employment.[22]

Other regions, Wisconsin and New York for example, account for these societal *economic* NEBs to varying degrees in their own cost-effectiveness reporting.

We note that contrary to Participant and Utility NEBs, Societal NEBs are arguably not missing, per se, from the TRC calculation, to the extent that the standard TRC is meant to reflect only the perspective of consumers (including costs and benefits that accrue to participants, non-participants and the utility), not of society writ large.

→| *Discount Rate Issues*

The TRC determines the present value of costs and savings over time. For these purposes, it uses a discount rate equal to the weighted average cost of capital (WACC) of the utility involved.

Yet a number of regions now question the extent to which the utility WACC is the appropriate discount rate, reflecting concern that it may unduly discount future benefits. While there are a number of reasons for this, the primary one is that DSM is often driven as much by public policy as by utility cost minimization (and furthermore, is often delivered by non-utility, state or state-driven entities). This raises the question: to the extent that DSM is public policy, then might it be more appropriate to apply a societal discount rate, which is commonly viewed as the government's cost of borrowing?[23] New York and many New England states use a societal discount rate within their own TRCs.

SUMMARY OF NEB ISSUES

Increasingly, non-energy benefits – especially those that accrue to participants – are viewed as significant benefit streams that the current TRC effectively neglects. This is critical to the extent that the TRC's purpose is to reflect the total costs and benefits that accrue to program participants and non-participants alike.

As a result, a number of regions have begun to either (a) modify their TRCs, often by accounting for non-energy benefits and redefining the test as a "Modified TRC", or (b) selecting a different perspective – and test – altogether. We discuss these options, as they apply to Nova Scotia, beginning on page 28.

---

[22] The study assessed three electric DSM scenarios: 1.0%, 1.75%, and 2.5% annual savings over total consumption. For references, Nova Scotia's DSM programs achieved 1.52% of annual sales in 2012.

[23] In some cases, a more arbitrary "low" rate is chosen as a means of deliberately *not* unduly discounting the interests of future generations.

IMPLICATIONS FOR NOVA SCOTIA

Nova Scotia's current TRC does not account for non-energy benefits, whether they accrue to participants, the utility, or society at large. By failing to account for these benefits, while fully accounting for participant costs, the TRC inadvertently introduces a significant bias against DSM.

ISSUE #3: RATEPAYER VALUE: DOES THE TRC BEST REFLECT A RATEPAYER PERSPECTIVE?

The Total Resource Cost test seeks to find the theoretically optimal investment, irrespective of who – ratepayers (through the program administrator) or participants – contributes. This is valid from a broader perspective, but is not reflective of the concerns of stakeholders and regulators.

One way to understand this is to imagine how program administrator budgets would be set if the primary concern were indeed "total cost". In such a case, budgets would be established as the full amount of the "total cost" side of the TRC equation, and as a corollary, program administrators would merely arrange for the direct installation, at no cost to participants, of all possible measures. There would be no value to encouraging consumers to adopt measures on their own, nor would there be interest in transforming markets in the long-term, since under the TRC perspective, there is no difference – and hence no preference – between costs incurred by the consumers who benefit directly or by others (through contributions to the program administrator budget). This approach – direct installation of all TRC-positive measures – could well achieve the most possible savings that are deemed cost effective from the TRC perspective, at the least *total* cost.[24]

"[T]he costs of the DSM 'resource' in the TRC test are based on the total costs of the program, including costs incurred by the participant. Supply-side resource options are typically based only on the costs incurred by the power suppliers."

- CPUC and CEC, *California Standard Practice Manual for Economic Analysis of DSM Programs*

[24] We make the simplifying assumption here that the PA's installation costs would be more than offset by both economies of scale and the elimination of marketing, incentive processing and other associated costs.

Of course, in practice, regulators and stakeholders are usually very interested in the question of "Who pays?" Indeed, while they care about minimizing the theoretical total costs, they also care deeply about maximizing program efficiency, i.e. achieving the most savings possible with the lowest ratepayer-funded program budgets (as opposed to total costs).

Unfortunately, because it bundles all costs together, the TRC does not provide any indication of program efficiency. Nor does it provide an indication of how efficiently program funds *could* be used to achieve energy savings. Rather, if too much emphasis is placed on the TRC results, measures and indeed entire programs that could be delivered cost-effectively from the standpoint of program budgets, may never be approved, or vice versa. This may use more ratepayer funds than necessary to achieve the desired results.

Because the TRC accounts for *all costs* and not just program costs, it may arguably be an unfair measure by which to compare options. This is noted in the California Standard Practice Manual's own discussion of the TRC:

> "In addition, the costs of the DSM 'resource' in the TRC test are based on the total costs of the program, including costs incurred by the participant. Supply-side resource options are typically based only on the costs incurred by the power suppliers."

Furthermore, the TRC can create occasional distortions *between measures*. Indeed, because consumers may derive far greater value than reflected in the TRC, and because this value varies tremendously from measure to measure, programs that are too-strictly constrained by TRC requirements may unwittingly be losing savings opportunities and/or incurring unnecessary costs. [25]

IMPLICATIONS FOR NOVA SCOTIA

Nova Scotia has been using the TRC, which attempts to reflect the sum of participant and non-participant perspectives, to screen DSM programs. The Electricity Efficiency and Conservation Restructuring (2014) Act sets the structure of DSM as a procurement by the utility, in direct competition with procurement of supply. Only the Program Administrator Cost (PAC) test reflects the costs and benefits of DSM from a utility least-cost procurement perspective.

[25] For example, if consumers value solar hot water (SHW) systems more than, say, a heat pump water heater, a program may be able to provide lower relative incentives and generate greater energy savings through the SHW option, i.e. the most efficient use of ratepayer dollars. Yet by failing to reflect the customer's perspective, and indeed by substituting its judgment for that of consumers, the TRC may determine instead that the heat pump water heater is more theoretically beneficial, and in so doing constrain program administrators to spend more money incenting a less productive energy saving opportunity.

ISSUE #4: POLICY: WHAT IF THE TRC IS INCONSISTENT WITH PUBLIC POLICY?

Throughout the 1990s, when the TRC first took on prominence as the pre-eminent DSM screen, most program administrators were working against growing but still modest DSM goals. As a percent of total system energy requirements (a commonly used, if imperfect, indicator of DSM aggressiveness), incremental annual energy savings during that period tended to be in the range of 0.25-0.75% for the reasonably aggressive regions, with a small handful of outlier regions aiming slightly higher.

Today, DSM goals (and in some cases, legislated requirements) have by and large shifted upward, to the point where leading regions today target between 1.5% and nearly 3% annual savings.[26] These higher targets alone may demand higher-cost savings. Yet the higher relative savings are only a part of the picture.

The other part involves baselines. Indeed, in many regions today, baselines have improved considerably from where they were twenty years ago. In some markets and market segments, this is due primarily to consumer awareness and interest, whether driven by high energy prices and price swings, or a wave of "green" consumerism, or still by increased awareness of the value of (and access to) energy savings opportunities. In other markets and segments, this is due to new codes and standards affecting everything from home and building construction, to appliances, motors, and most recently and significantly, lighting.[27]

The combined result of significantly more efficient baselines *and* significantly higher savings targets are squeezing DSM administrators, pushing them toward options with higher incremental cost than in the past. Among these, in the residential sector we note a recurring focus on such measures as deep envelope retrofits, solar hot water, and advanced construction techniques, among others, needed to secure deeper, long-term energy savings.

This is not a theoretical issue. In fact, we are increasingly finding that in order for our clients to achieve their savings targets, what appear as "TRC-negative" measures are not only worth considering, but are often essential to achieving policy goals. This begs the question of which – policy goals or cost-effectiveness tests – should determine which DSM to pursue.[28]

---

[26] Another way of viewing the rapid growth in goals: since 2011, the ACEEE Scorecard has reserved its top score to states with *binding* requirements in excess of 1.5%/yr (Sciortino, et al., 2011); the 2006 Scorecard reserved its top score for states that had *any* binding requirement at all (Eldridge, Prindle, York, & Nadel, 2007).

[27] While codes and standards will typically result in higher official baselines, market preferences may result in either increased baseline efficiencies *or* lower net-to-gross (or higher free-ridership) assumptions. The net effect is the same from the perspective of tightening the scope of net program savings opportunities.

[28] One recent example can be seen in British Columbia, where the Clean Energy Act established a legislated savings requirement for BC Hydro of 66% of projected load growth. At the time, this goal was deemed to be 25% higher than the highest achievable scenario when constrained by TRC cost-effectiveness, yet the regulatory framework –

In Nova Scotia, this is not yet an important concern in that specific electric DSM goals are based on an assessment of the potential for cost-effective DSM, and not on a predefined, legislated target. The Electricity Efficiency and Conservation Restructuring (2014) Act provides the legislative framework under which DSM should be assessed, and puts emphasis on the *procurement* of energy efficiency, thus treating DSM as a resource to compete with other procurement options. Cost of procurement is explicitly about the *utility*'s cost (not a conceptual *total* cost that includes participant contributions and ought to account for participant benefits), and is therefore reflected by the PAC test, not the TRC. Use of the total resource cost test to screen DSM is inconsistent with a policy of utility least-cost procurement. This situation is far more analogous to the context in Nova Scotia, where recent legislation focuses on least-cost procurement.

IMPLICATIONS FOR NOVA SCOTIA

Nova Scotia has no binding targets for energy efficiency. However, the Electricity Efficiency and Conservation Restructuring (2014) Act structures DSM as a utility least-cost procurement. As previously noted, this is the perspective reflected by the PAC test, not by the TRC.

contradictory in that all programs were required to pass the original TRC – remained in place for another five years. This framework was finally modified in December 2011.

RECENT CHANGES TO STANDARD PRACTICES

TRENDS IN LEADING REGIONS

The concerns noted previously – errors in applying the TRC, unintentional bias in TRC results, conflict with official energy policies, and neglect of bottom-line concerns – are increasingly shared across the energy efficiency community. As a direct result, a growing number of regions have been moving to either correct the TRC, or to use other tests altogether. This is notably the case of most DSM leaders across the continent.

In preparing this report, we examined eleven cases of states and provinces that have chosen to either fix or abandon the original TRC as their primary cost-effectiveness test. Interestingly, they include four of the "Top 5" rated states in the ACEEE's most recent (October, 2014) Scorecard, and eight of its "Top 10". The table below summarizes the alternatives used by each of these regions.

As can be seen, case studies include six regions that have sought to adjust the TRC, in the process adopting what may be termed a Modified Total Resource Cost (MTRC) test. Four regions have opted instead for the Program Administrator Cost (PAC) test, in combination with either the TRC or the SCT. Finally, one region uses the PAC alone, and one uses the SCT alone. We note an absence of consistency in the terms used, such that MTRC and SCT can to some extent be interchangeable.

Figure 6. Case Studies: Select Regions that Use Alternatives to the Standard TRC

STATE (2014 SCORECARD POSITION)	PRIMARY TEST	TEST COMPONENTS				SCREENING LEVEL	Notes
		Non-Energy Benefits (NEBs)			Disc. Rate		
		Participant	Utility	Societal	(Societal)		
MASSACHUSETTS (#1)	mTRC	●		●	●	Program	Hybrid delivery. Recent integration of substantial NEBs
CALIFORNIA (#2)	TRC*	*	*	●	*	Portfolio	* California is in the process of revisiting its C-E framework.
OREGON (#3)	SCT+PAC	◖	◖	●		Measures, Programs	Non-profit DSM administrator similar to ENS
VERMONT (#3)	SCT	◖	◖	●	●	Project, Program, Portfolio	Non-profit DSM administrator similar to ENS
CONNECTICUT (#6)	PAC	n/a		●		Program, Portfolio	Utility delivery. CT now actively seeks to be rated #1 on ACEEE
NEW YORK (#7)	mTRC	◖		●	●	Measures, Programs	Hybrid delivery. Participant NEBs for certain programs
WASHINGTON (#8)	mTRC|PAC	◖	◖	●		Project, Portfolio	Utility delivery. For gas, PAC *unless* TRC includes *all* benefits.
MINNESOTA (#10)	SCT+PAC			●	●	Program, Portfolio	SCT considered the primary test; PAC secondary.
COLORADO (#13)	mTRC	◖		●		Program, Portfolio	Although officially named TRC, it is closer to a SCT
BRITISH COLUMBIA (n/a)	mTRC	◖	◖	◖		Portfolio	15% adder to whole portfolio; program NEBs can be higher.
ONTARIO (n/a)	mTRC	◖	◖	◖		Portfolio	Generic NEB adder. New policy (adopted October 23, 2014).

Legend: ● Significant inclusion ◖ Partial inclusion

References: BC (Muncaster, 2011); CA (Application of Southern California Edison Company for Approval of its 2009-2011 Energy Efficiency Program Plans ans Associated Public Goods Charge, 2009) (CAPUC, 2008); NY (New York Public Service Commission, 2011) (New York Public Department of Public Service, 2011); OR (Energy Trust of Oregon, 2011); VT (Vermont Public Service Board, 2011); CT (State of Connecticut, 2011); MN (Reha, 2010) (Xcel Energy, 2009); CO (Colorado General Assembly, 2007) (Colorado PUC, 2011). (Washington Utilities and Transportation Commission, 2013)

While the table above reflects changes being brought to DSM screening by the continent's leaders, as is often the case, such changes are ushering in additional questions.

THE NESP'S RESOURCE VALUE FRAMEWORK

One result of the ongoing revision of cost-effectiveness frameworks is the recent publication of the Resource Value Framework, or RVF.

Developed by the National Efficiency Screening Project (NESP)[29], the RVF is not a test but rather a tool designed to assess a state or province's cost-effectiveness screening against sound principles and best practices, and to provide guidance in the selection of an appropriate cost-effectiveness approach.

The RVF shares many of the concerns outlined previously with past test applications, and puts forward the following guiding principles for developing/selecting a specific cost-effectiveness test for DSM analysis:

- ***The Public Interest****. The ultimate objective of efficiency screening is to determine whether a particular energy efficiency resource is in the public interest.*
- ***Energy Policy Goals.*** *Efficiency screening practices should account for the energy policy goals of each state, as articulated in legislation, commission orders, regulations, guidelines and other policy directives.*
- ***Symmetry.*** *Efficiency screening practices should ensure that tests are applied symmetrically, where both relevant costs and relevant benefits are included in the screening analysis. For example, a state that chooses to include participant costs in its screening test should also include participant benefits.*
- ***Hard-to-Quantify Benefits.*** *Efficiency screening practices should not exclude relevant benefits on the grounds that they are difficult to quantify and monetize. Several methods are available to approximate the magnitude of relevant benefits.*
- ***Transparency.*** *Efficiency program administrators should use a standard template to explicitly identify their state's energy policy goals and to document their assumptions and methodologies.*

Among other things, the RFV proposes a template by which to assess to what extent a given cost-effectiveness approach is consistent with these principles. Based on this template, the TRC as currently applied in Nova Scotia does not appear to be consistent with the RVF principles. A completed version of the template is included here as Appendix A.

[29] The National Efficiency Screening Project (NESP) is a group of utilities, program administrators, DSM practitioners and non-governmental associations brought together to examine screening issues under the auspices of the U.S. National Home Performance Council. The current report's co-author, Philippe Dunsky, serves as an advisor to the NESP.

NEW NORTHEAST COST-EFFECTIVENESS GUIDELINES

At the time of completing this report, states across the northeast U.S. had agreed to adopt a set of guidelines largely inspired from the RVF framework. Specifically, representatives of the states of Connecticut, D.C., Delaware, Massachusetts, New Hampshire, New York, Rhode Island and Vermont came together under the auspices of the Northeast Energy Efficiency Partnerships (NEEP)'s Evaluation, Measurement &Verification (EM&V) Forum to develop cost-effectiveness screening guidelines for the region.

These guidelines do not prescribe any one cost-effectiveness test, but focus instead on five key principles:

(1) Aligning screening practices with state energy policies

(2) Ensuring a symmetrical treatment of relevant costs and benefits, notably by accounting for Non-Energy Benefits if using the TRC[30]

(3) Accounting for relevant environmental compliance costs

(4) Accounting for risk and using an appropriate discount rate

(5) Ensuring transparency by using a standard template to document key assumptions.

Given the difficulty involved in accounting for NEBs, the guidelines also suggest starting with the Program Administrator Cost (PAC) test as a foundation.

In adopting the guidelines in November of 2014, the NEEP EM&V Forum Steering Committee signaled "the states' intent to encourage the consideration, use and reference of the Guidelines in their respective state".

[30] The Guidelines use a slightly different term ("Non-Energy Impacts").

OPTIONS FOR NOVA SCOTIA

OVERVIEW

We previously discussed our concerns with current use of the TRC, as well as alternatives applied in a growing number of leading regions across the continent. The table below summarizes the implications of these concerns – and of the corresponding guidelines recently developed by the National Efficiency Screening Project and adopted by the Northeast Energy Efficiency Partnerships' EM&V Forum – for Nova Scotia.

Fig. 7. Overview of Concerns & Implications for Nova Scotia

OUR CONCERNS	NESP & NEEP GUIDELINES	CONSIDERATIONS FOR NOVA SCOTIA
ACCURACY Key assumptions may not reflect deliberate or appropriate choices.	Both guidelines insist on need for transparent documentation of key inputs	Key inputs & assumptions of the Cost-Effectiveness methodology should be reviewed and properly documented for transparency and to support a collective understanding, thus opening the "black box". This is irrespective of the *choice* of test.
BIAS The TRC may neglect significant benefits, while accounting for all costs.	Both guidelines insist on critical importance of symmetry and, if the TRC is to be used, inclusion of non-energy benefits in particular.	Critical issue. Either invest time and effort into defining and accounting for non-energy benefits within TRC, or move to the PAC test with its fully vetted inputs and inherent symmetry.
RATEPAYER VALUE The TRC does not reflect value for ratepayer dollars, a common concern.	NESP silent on whether ratepayer dollar efficiency should trump societal efficiency. NEEP recommends focusing on ratepayer dollar efficiency as a starting point.	Give strong consideration to value of the PAC test, which focuses on value of savings set against direct ratepayer funds used to procure them.
POLICY CONFLICT The TRC may not be consistent with key policy goals or direction.	NESP recommends accounting for both official state/provincial policy and broader public interest concerns. NEEP guidelines limited to clear policy direction.	No explicit policy direction or binding DSM targets. However, the Nova Scotia *Electricity Efficiency and Conservation Restructuring (2014) Act* aligns with the PAC (formerly known as the Utility Cost Test) perspective with its requirement for the Utility to purchase DSM from the Efficiency Franchise holder.

These implications strongly suggest that, going forward, Nova Scotia should consider two pathways to ensuring its cost-effectiveness framework is internally consistent and in line with best practices:

1. Fix the TRC by addressing its current shortcomings, including through valuation of non-energy benefits to ensure a balanced, symmetrical approach, or
2. Focus instead on the narrower but simpler ratepayer value perspective, conveyed through the PAC.[31]

Below, we discuss these two pathways. In all cases, we note the importance of deliberately assessing and vetting key inputs (see pages 10-12 above).

OPTION A. FIX THE TRC (ASSESS NON-ENERGY BENEFITS + OTHER CHANGES)

One solution to the above concerns is to directly address each – or as many as possible, within reason – of the missing benefits or other algorithmic concerns, namely: accounting for participant and utility NEBs, as well as deliberate reconsideration of the appropriate rate by which to discount DSM's future benefit streams.

1. ACCOUNT FOR PARTICIPANT NON-ENERGY BENEFITS (NEBS)

The exclusion of participant NEBs is arguably the most important factor in generating bias against DSM. On the other hand, the reason that NEBs have historically been excluded is that they are difficult to quantify with any accuracy – indeed, different assessments can lead to radically different valuations of the same or similar participant NEBs.

Because of this, the regions that have begun to account for NEBs have done so in different ways.

- ***Specific NEB valuations:*** conduct market research to quantify the value of NEBs to program participants and integrate them into their TRC cost-effectiveness assessments;
- ***Inferred NEBs:*** apply a simplified algorithm based on participant net incremental costs, annual energy savings, and an acceptable payback period, in order to infer a minimal participant NEB valuation;
- ***Approximate NEBs:*** adopt an arbitrary (but conservative) percentage adder to the energy benefits to represent a portion of the anticipated participant NEBs.

[31] The latter option may be chosen because it is the preferred perspective, or because of a lack of confidence that the "total resource cost" perspective can be adequately conveyed.

Should Nova Scotia choose the route of integrating participant NEBs, it may want to consider these options. Each has its strengths and drawbacks, with the first raising issues of false precision and the third raising concerns about being overly conservative. Ultimately, any approach to integrating NEBs has to balance the inaccuracies of *any value* against the inaccuracy of *no value*.

Figure 8. Participant NEBs: The Case of B.C.

In British Columbia, the ambitious DSM goals of BC Hydro and Fortis BC recently began to hit up against the limitations of the TRC. As a result, in December 2011, the province chose to redefine a number of the parameters of its TRC test, notably by directing a different approach to avoided costs and by seeking to integrate non-energy benefits in the TRC equation.

Under the new approach, participant NEBs can now be included in the TRC benefits, through one of three ways: (1) direct quantification, if NEBs are deemed sufficiently important and if there is sufficient evidence to back up the values, (2) use of a proxy (conservative) 15% adder applied to the energy and capacity benefits (avoided costs) of the program for non-low income programs, and (3) use of a proxy 30% adder for low-income programs.

The role that NEBs can play in TRC cost-effectiveness is, however, constrained *at the portfolio level* (excluding low-income programs) to a maximum 15% impact.

2. ACCOUNT FOR UTILITY NEBS

As discussed previously, DSM arguably brings additional non-energy benefits to the utility (and hence ratepayers), primarily through risk mitigation.

While risk benefits are important, they are even more difficult to quantify than participant NEBs. In fact, the two regions that explicitly account for these NEBs, Vermont and the U.S. northwest, merely use a proxy adjustment factor in their cost-effectiveness algorithms: in the case of Vermont, the cost of DSM measures is reduced by 10%, whereas in the northwest U.S. (e.g. in Oregon), the DSM's benefits (avoided costs) are subject to a 10% adder.

We also note that Nova Scotia Power may benefit from the reduced late payments, write-offs and collection costs associated with a reduction in consumer electricity bills. Several studies have analyzed these benefits and several jurisdictions have in some way included these in their analysis of low-income programs, but not as a quantified utility NEB.

3. ACCOUNT FOR ENVIRONMENTAL EXTERNALITIES?

Environmental externalities are the most common DSM non-energy benefit included in cost-effectiveness screening. A recent ACEEE study (Kushler, Nowak, & Witte, 2012) reports that 35% of the surveyed jurisdictions in the United States include environmental benefits of DSM in their primary screening test. Greenhouse gas emissions and/or other atmospheric emissions are most common, and are expressed either through a proxy environmental adder, or through a fixed dollar per ton of pollutant avoided.

We note that accounting for environmental externalities goes beyond what is needed to more accurately reflect the TRC's stated "all consumers" perspective (it is in fact only needed to reflect a societal perspective). We also note that in seeking to address externalities, care must be taken not to include those environmental costs that are already internalized, such as the cost of compliance with existing regulation. In the case of Nova Scotia, it is possible that most or all avoided emissions have already been internalized in the utility's avoided costs, given the combination of hard emissions caps and minimum renewable energy content requirements that apply to NSPI.

4. REVISIT DISCOUNTING PRACTICE

One last component that can be addressed relates to the treatment of future streams of energy savings. In the past, when utilities were by and large the sole administrators of DSM programs, the TRC typically used the utilities' weighted average cost of capital (WACC) as a simplifying assumption. Yet given the dramatic impact of the discount rate on the cost-effectiveness of long-lived measures such as building envelope improvements, measures that are increasingly required to achieve targets, a simplifying assumption may no longer be appropriate. This is more significant for a region like Nova Scotia, served by a shareholder-owned utility, than for many other Canadian provinces, served by Crown Corporations, where the cost of borrowing is much lower due to provincially-backed debt.

For purposes of the TRC (or of the PAC), Nova Scotia should reconsider what constitutes an appropriate discount rate. Administration of DSM by the non-profit ENS is one reason why the WACC may no longer be appropriate (we note that Efficiency Vermont, which shares much of ENS's model, uses a societal discount rate). Another reason is that DSM is at least in part driven by societal policy. Finally, while discount rates typically are meant to reflect risk, we note that DSM's risk profile is largely understood to be significantly more advantageous than most competing supply options (Binz, Sedano, Furey, & Mullen, 2012).

CONSIDERATIONS

We note that although a significant modification to the TRC, most notably in its treatment of DSM benefits, has the potential to address the concerns highlighted in this paper with regards to the analysis of DSM cost-effectiveness, it also brings additional challenges for the DSM administrator and the regulator.

The exercise of properly quantifying the additional benefits is not trivial, and is a considerable endeavor. And although significant insight into the value of those benefits may be gained, the accuracy of the results obtained is not of the same magnitude as what can be obtained for other measurable benefits such as energy savings.

OPTION B. MOVE FOCUS TO PAC TEST

The other primary option for Nova Scotia is to focus instead on the narrower but more straightforward PAC test.

Using the PAC test provides a clear measure of a program's (past or anticipated) performance, from a "yield" perspective. As such, it may be more meaningful to both the utility and ratepayers, for whom maximizing value for ratepayer dollars is a common goal. It also provides a clearer comparison with supply-side options, and a clear indicator of the extent to which various levels of DSM can be procured at lower cost than supply alternatives. Furthermore, because it does not need to incorporate non-energy benefits, it is far more accurate in reflecting its intended perspective.

The current application of the PAC also provides a far more symmetrical treatment of benefits and costs. Although some hard-to-quantify NEBs appear to benefit the utility, they are not nearly of the same magnitude as participant NEBs, and their exclusion is unlikely to materially impact results.

The PAC has also been reported by Efficiency Nova Scotia Corporation in its previous DSM Plan Applications and reports; stakeholders and the UARB are already familiar with its workings.

The State of Connecticut currently focuses exclusively on PAC-level results for determining the cost-effectiveness of DSM options. We note that Connecticut is not only among the historical DSM leaders in North America, but has recently adopted an unofficial goal of becoming the top U.S. state in future ACEEE scorecard results.

In the past five years, other jurisdictions have also re-evaluated their cost-effectiveness framework, and purposefully substituted an imbalanced TRC with the PAC. This is notably the case of Michigan (2008), Utah (2009), Washington (2013), and New Mexico (2013).

We note that use of the PAC raises a concern that programs aimed at ensuring equity (e.g. for low-income participants that cannot contribute to measure costs) may be viewed less favourably through its lens *in relation to* other programs. This can be addressed through specific policy exceptions, or as is already the case in Nova Scotia, with funds specifically dedicated to provide efficiency services for low-income homeowners. Another concern may arise if the PAC's algorithm does not capture DSM's potential impact on non-electric energy sources, which may matter from a broader policy perspective. This can easily be addressed either by including those impacts in the PAC equation, or through other reporting mechanisms.

As can be seen, these considerations are easily addressed in Nova Scotia, and do not change the overwhelming value of moving to the PAC as the primary test of ENS' effective use of ratepayer funds.

PRIMARY RECOMMENDATION

Our review of the issues and options for Nova Scotia concludes with the need to change the current cost-effectiveness framework, to ensure internal consistency and best practices. In the absence of significant change, we find that current practice cannot accurately reflect the costs and benefits of DSM, potentially leading to inefficient levels of investment, as well as program design choices, to the detriment of ratepayers as a whole.

Correcting this problem can be done either through potentially laborious corrections to the TRC itself, including to its key inputs, or by moving to the more straightforward PAC test. While both options involve tradeoffs, in the case of Nova Scotia, the preponderance of arguments point strongly toward focusing on the PAC test. These include:

- **Simplicity:** Applying the PAC will be a far simpler – and far less expensive – exercise than "fixing" the current TRC by, among other things, assessing non-energy benefits. It may also be less contentious (see below).
- **Accuracy:** Even if the TRC were to be corrected, in part by efforts to account for non-energy benefits (NEBs), the accuracy of such assessments may raise concerns, leading to lengthy discussions, ongoing debate, and more contentious hearings than otherwise necessary.
- **Relevance:** While the TRC (once corrected) arguably would provide a more balanced picture of cost-effectiveness from the perspective of all consumers, our experience with past Nova Scotia UARB hearings and stakeholder sessions points to a strong interest in the value generated by ratepayer DSM funds, a perspective reflected only by the PAC test.
- **Alignment:** Similarly, the PAC test perspective, with its utility cost focus, would be more aligned with the structure created by the Nova Scotia *Electricity Efficiency and Conservation Restructuring (2014) Act* in that it requires the utility to procure DSM services. It would also presumably be more clearly aligned with NSPI's latest Integrated Resource Plan (IRP) and its similar focus on utility least-cost planning.

For these reasons, we recommend moving to use of the Program Administrator Cost (PAC) test for screening DSM in Nova Scotia.

NOTES ON APPLICATION

Beyond the choice of tests, the way in which they are applied is also important. Indeed, screening tests can be applied in a number of ways: as information to be balanced with other considerations; as a hard threshold applied to the portfolio as a whole or at the sector level; as a hard threshold to be applied at the program level; or as a "soft" threshold to guide program-level decisions while allowing for exceptions (e.g. low-income or small business programs). We note that the UARB previously lifted an earlier approach of applying screening as a hard threshold at the measure level.

NSPI's recent IRP process considered DSM as a single supply source, i.e. at the portfolio level. This is consistent with treating DSM on par with other supply options. Applying this same approach on a planning basis further provides valuable flexibility to the Program Administrator – in this case Efficiency Nova Scotia – to design its portfolio in the most efficient manner possible. For example, while some Administrators opt to have many individual programs, others find that they can be more responsive to market dynamics by bundling measures and markets in portfolios of as few as 3 or 4 "programs". Applying cost-effectiveness screening at the (somewhat artificial) "program" level may force a delineation that is not considered most effective by the Administrator nor by the market it is attempting to influence – while providing no added value or protection to customers – in order to satisfy a "program"-level cost-effectiveness threshold.

On the other hand, applying a cost-effectiveness threshold at the portfolio-level raises legitimate equity concerns, in particular by leaving open the possibility of cross-subsidization between sectors. For example, if cost-effectiveness is required only at the portfolio level, it is conceivable that the costs to residential sector clients could outweigh their benefits, insofar as the imbalance were to be compensated in the commercial, institutional and industrial sectors (and vice versa). This portfolio-wide approach would be unwise; each sector should receive benefits in excess of its costs.

For this reason, we recommend using the primary cost-effectiveness test as a decision-making screen *at the sector level*. This allows flexibility needed to ensure that the Administrator's DSM portfolio is designed to be as effective as possible (and to avoid artificial delineations between markets and programs), while at the same time ensuring that the portfolio as a whole remains cost-effective *for each customer sector individually*.

Finally, per our previous discussion on the importance of developing appropriate and *deliberate* inputs for any test, we recommend developing a transparent reporting template that provides for explicit discussion of ENS' approach to critical inputs to the PAC test, including to those inputs discussed on pages 10 through 12 above.

CONCLUSIONS & RECOMMENDATIONS

There are several options available to Nova Scotia to improve the value provided by cost-effectiveness screening of DSM initiatives. Some aim at correcting the problems inherent in the TRC; others propose shifting perspectives altogether; and others still are focused on at least ensuring the basic inputs are appropriate and as accurate as possible for whatever test is used.

As demonstrated in this paper, there are sufficient concerns with the current application of cost-effectiveness analysis in Nova Scotia to warrant changes to the framework. Although more comprehensive accounting of benefits under the TRC could be valuable, this raises methodological challenges as well as concerns over time, cost, uncertainty, and risk of disagreement. In addition, a corrected TRC would still not align well with the IRP process, which is focused on minimizing NSPI's revenue requirements.

The PAC is inherently a balanced test, where the full costs and benefits accruing to the program administrator (or utility and through it, ratepayers) are accounted for and compared. It is also the appropriate measure of a plan's efficiency and value to ratepayers, i.e. of the value provided for each dollar provided to ENS. In addition, stakeholders and the UARB are already familiar with the workings of the PAC, which has been reported on in DSM Plans for several years.

Finally, the PAC perspective is strongly aligned with key objectives of Nova Scotia's Electricity Efficiency and Conservation plan, namely by focusing on least-cost procurement, and by supporting innovative technologies to achieve long term market transformation through increased demand for energy efficient technologies and practices.

RECOMMENDATIONS

1. **Nova Scotia adopts the Program Administrator Cost (PAC) as the primary test for purposes of screening DSM cost-effectiveness;**
2. **The PAC test be applied for information purposes at the program and portfolio levels, and for decision-making purposes at the sector level;**
3. **That critical inputs, including most notably the discount rate, be re-examined for consistency with Nova Scotia's DSM context as well as risk; and**
4. **That a transparent reporting template, adapted from NESP's Resource Value Framework and designed to address key test inputs, be developed to facilitate future understanding of critical test choices by all parties involved.**

This concludes our review.

REFERENCES

Acadia Center. (2014). *Energy Efficiency: Engine of Economic Growth in Canada .*

Amann, J. (2006). *"Valuation of Non-Energy Benefits to Determine Cost-Effectiveness.* ACEEE Report Number A061.

Application of Southern California Edison Company for Approval of its 2009-2011 Energy Efficiency Program Plans ans Associated Public Goods Charge, Decision 09-09-047 (CAPUC September 24, 2009).

Binz, R., Sedano, R., Furey, D., & Mullen, D. (2012). *Practicing Risk-Aware Electricity Regulation: What Every State Regulator Needs to Know.* Ceres.

California Public Utilities Commission and California Energy Commission. (2001). *California Standard Practice Manual: Economic Analysis of Demand-Side Programs and Projects.*

CAPUC. (2008). *Energy Efficiency Policy Manual, Version 4.0.*

Colorado General Assembly. (2007). *House Bill 07-1037: Concerning Measures to Promote Energy Efficiency.*

Colorado PUC. (2011). *Strategic Issues relating to its DSM Plan, including long-term electric energy savings goals, and incentives.*

Dunsky Energy Consulting. (2010). Electricity Demand-Side Management (DSM) Review., (p. 16).

Efficiency Vermont. (2010). *Year 2009 Savings Claim.*

Eldridge, M., Prindle, B., York, D., & Nadel, S. (2007). *The State Energy Efficiency Scorecard for 2006.* Washington: ACEEE.

Energy Trust of Oregon. (2011). *Cost Effectiveness Policy and General Methodology for Energy Trust of Oregon.*

Evan, M. (2004). *The Cost-Effectiveness of Commercial Buildings Commissioning: A Meta-Analysis of Energy and Non-Energy Impacts in Existing Buildings and New Construction in the United States.* LBNL – 56637 (Rev.).

Faulkner, C. (2015, January 7). Personal Email.

Foreman, S. (2012, April 4). Re: NSUARB-E-ENSC-R-12 – Request for Hearing Adjournment. Halifax, NS.

Fuchs, L., Skumatz, L. A., & Ellefsen, J. (2006). Non-Energy Benefits (NEBs) from Energy Star: Comprehensive Analysis of Appliance, Outreach and Homes Programs. *ACEEE Summer Study on Energy Efficiency in Buildings*, (pp. 2.79 - 2.89). Asilomar, CA.

Fulmer, M., & Biewald, B. (1994). Misconceptions, Mistakes and Misnomers in DSM Cost Effectiveness Analysis. *ACEEE Summer Study on Energy Efficiency in Buildings.* Asilomar, CA: ACEEE.

Government of Nova Scotia. (2009). *Toward a Greener Future: Nova Scotia's Climate Change Action Plan.*

Hamilton, B. (2009). *Efficiency Vermont Cost Effectiveness Screening.* Efficiency Vermont.

Investigation into Least-Cost Investments, Energy Efficiency, Conservation, and Management of Demand for Energy, 5270 (Vermont Public Service Board April 16, 1990).

Kushler, M., Nowak, S., & Witte, P. (2012). *A National Survey of State Policies and Practices for the Evaluation of Ratepyer-Funded Energy Efficiency Programs.* Washington: ACEE.

Kushler, M., Nowak, S., & Witte, P. (2012). *A National Survey of States Policies and Practices for the Evaluation of Ratepayer-Funded Energy Efficiency Programs.* ACEEE Report U122.

Malone, E. (2014). Driving Efficiency with Non-Energy Benefits. *ACEEE National Symposium on Market Transformation.* ACEEE.

Moore, G. A. (1991). *Crossing the Chasm: Marketing and Selling High-Tech Products to Mainstream Customers.* Harper Business Essentials.

Muncaster, K. (2011). *Demand Side Measures Regulation -- Workshop.* BC Ministry of Energy and Mines.

National Home Performance Council. (2014). *The Resource Value Framework - Reforming Energy Efficiency Coxt-Effectiveness Screening.*

Navigant Consulting. (2010). *Benchmarking of Vermont's 2008 Electric Energy Efficiency Programs: A Comparative Review of Efficiency Vermont and Burlington Electric Department.*

NEEP EM&V Forum. (2014). *Cost-Effectiveness Screening Principles and Guidelines.*

Neme, C., & Kushler, M. (2010, Washington, D.C. : American Council for an Energy Efficient Economy, 2010. Proceedings of the ACEEE 2010 Summer Study. pp.). Is It Time to Ditch the TRC? Examining Concerns with Current Practice in Benefit-Cost Analysis. *Proceedings of the ACEEE 2010 Summer Study* (pp. 5-299 - 5-310). Washington, D.C.: ACEEE.

New York Public Department of Public Service. (2011). *Energy Efficiency Portfolio Standard Program Review White Paper.*

New York Public Service Commission. (2011). *Order Authorizing Efficiency Programs, Revising Incentive Mechanism, and Establishing a Surcharge Schedule .*

NMR Group Inc. (2011). *Massachusetts Special and Cross-Sector Studies Area, Residential and Low-Income Non-Energy Impacts (NEI) Evaluation.*

Northwest Power and Conservation Council. (2010). *Sixt Northwest Conservation and Electric Power Plan.*

Nova Scotia. (2014). *Using Less Energy: Nova Scotia's Electricity and Conservation Plan.*

Nova Scotia Department of Energy. (2009). *Toward a Greener Future: Nova Scotia's 2009 Energy Strategy.*

Nova Scotia General Assembly. (2014, May 1). Electric Efficiency and Conservation Restructuring (2014) Act. Nova Scotia, Canada.

Nova Scotia Power Inc. (NSPI) - Demand Side Management (DSM) - Proposal for 2010 & Cost Recovery Rider for 2010 and beyond, M01439 (NSUARB August 4, 2009).

NSPI. (2014, February 7). *Nova Scotia Power Integrated Resource Plan - 2014 Terms of Reference.*

NSUARB - Decision In The Matter of an Application by ENSC for Approval of its Electricity Demand Side Management Plan for 2012, M03669 (NSUARB June 30, 2011).

Reha, P. (2010). *Bill Impacts of Energy Efficiency Programs.* NARUC Comittee on Energy Resources and the Environment.

Rogers, E. M. (2003). *Diffiusion of Innovations* (Fifth ed.). New York: Free Press.

Sciortino, M., Neubauer, M., Vaidyanathan, S., Chittum, A., Hayes, S., Nowak, S., & Molina, M. (2011). *The 2011 State Energy Efficiency Scorecard.* Washington: ACEEE.

Skumatz, L. A. (2009). *Lessons Learned and Next Steps in Energy Efficiency.*

State of Connecticut. (2011). *Public Act no. 11-80: An act concerning the establishement of the department of energy and environmental protection and planning for Connecticut's energy future.*

Synapse Energy Economics. (2014). *Commentary on Nova Scotia Power's Draft 2014 Integrated Resource Plan - Key Planning Observations and Action Plan.*

Tech, T. (2012). *Final Report - Commercial and Industrial Non-Energy Impacts Study.* Tetra Tech.

Ujjwal Bhattacharjee, S. D. (2009). *A Review and Update of NEBS Values for Residential Programs.* PA Consulting Group.

Vermont Public Service Board. (1999). *Memorandum of Understanding - Docket no. 5980, Investigation into the Department of Public Service's Proposed Energy Efficiency Plan.*

Vermont Public Service Board. (1999). *Order - Docket 5980 - Investigation into the Department of Public Service's Energy Efficiency Plan, Re: Phase II.*

Vermont Public Service Board. (2011). *Order approving updated avoided costs for use by the Energy Efficiency Utilites (EEU-2011-02).*

Washington Utilities and Transportation Commission. (2013, October 9). *Policy Statement on the Evaluation of the Cost-Effectiveness of Natural Gas Conservation Programs - Case UG-121207.*

Worrell, E., Laitner, J. A., Ruth, M., & Finman, H. (2001). *Productivity benefits of industrial energy efficiency measures.*

Xcel Energy. (2009). *2010/2011/2012 Triennial Plan.*

APPENDIX A: RESOURCE VALUE FRAMEWORK – N.S. ASSESSMENT

Figure 9: Resource Value Framework - NS Qualitative Assessment

Qualitative Resource Value Framework – Nova Scotia Legacy TRC			
Program Name: Electric DSM		Date: December 2014	
1. Key Assumptions, Parameters and Summary of Results			
Analysis Level	✓ Program □ Portfolio		
Measure Life	n/a	Discount Rate	WACC
2. Monetized Program Administrator Costs		**Monetized Program Administrator Benefits**	
Program Administration	✓	Avoided Energy Costs	✓
Incentives Paid to Participants	✓	Avoided Capacity Costs	✓
Shareholder Incentive	n/a	Avoided T&D Costs	Partial
Evaluation	✓	Avoided Environmental Compliance Costs	✓
Other PA Costs	✓	Other Utility System Benefits	✗
3. Monetized Participant Costs		**Monetized Participant Benefits**	
Participant Contribution	✓	Participants' Savings of Other Fuels	✓
Participant's Increased O&M Costs	✓	Participant Non-Energy Benefits:	
Other Participant Costs	✓	Participants' Water and Sewer Savings	✓
		Participants' Reduced O&M Costs	✓
		Participants' Health Impacts	✗
		Participant Employee Productivity	✗
		Participant Comfort	✗
		Additional Low-Income Participant Benefits	✗
		Other Participant Non-Energy Benefits	✗
4. Monetized Public Costs		**Monetized Public Benefits**	
Public Costs	✗	Public Benefits of Low Income Programs	✗
		Reduced Environmental Impacts (if monetized)	✗
		Public Fuel and Water Savings	✗
		Reduced Public Health Care Costs	✗
		Other Public Benefits	✗

5. Non-Monetized Public Costs and Benefits	
Non-Monetized Benefits	Comments
Promotion of Customer Equity	
Reduced Risk	
Increased Reliability	
Reduced Environmental Impacts (if not monetized)	
Increased Jobs and Economic Development	



50 Ste-Catherine St. West, suite 420, Montreal, Québec, Canada H2X 3V4 | T. 514.504.9030 | F. 514.289.2665 | info@dunsky.ca
www.dunsky.ca

Supply Agreement for

Electricity Efficiency and Conservation Activities

Between

Nova Scotia Power Incorporated

and

EfficiencyOne

Effective Date – January 1, 2016

Table of Contents

1. INTERPRETATION 1
2. TERM & RESERVATION OF RIGHTS 5
3. ELECTRICITY EFFICIENCY and CONSERVATION ACTIVITIES 5
4. PRICE & PAYMENT 6
5. NOTIFICATION OF SIGNIFICANT CHANGES 6
6. SAFETY 7
7. PROTECTION OF PROPERTY 7
8. ENVIRONMENT 7
9. EFFICIENCYONE'S COVENANTS 7
10. SUBCONTRACTORS 8
11. CONFIDENTIAL AND PERSONAL INFORMATION 9
12. PERFORMANCE REQUIREMENTS AND EVALUATIONS 9
13. FORCE MAJEURE 9
14. INDEMNITY 10
15. LIMIT OF LIABILITY 10
16. INSURANCE 11
17. INTELLECTUAL PROPERTY 12
18. LIENS AND CLAIMS 12
19. DISPUTE RESOLUTION 13
20. DEFAULT AND TERMINATION 13
21. NOTIFICATIONS 15
22. AUDIT AND INSPECTION 16
23. ASSIGNMENT 16
24. SHARING OF DATA AND INFORMATION 16
25. COORDINATION MEETINGS AND REPORTS 16
26. GENERAL 17

27. SURVIVAL 17

List of Schedules

Schedule "A": Electricity Efficiency and Conservation Activities
Schedule "B": Compensation
Schedule "C": Performance Requirements
Schedule "D": Confidentiality Agreement
Schedule "E": Approved EECA Plan

THIS AGREEMENT made as of the _____ day of _____, 2015 and effective as of the 1st day of January, 2016 (the "**Effective Date**").

BETWEEN:

NOVA SCOTIA POWER INCORPORATED,
a body corporate, organized under the laws
of the Province of Nova Scotia

(hereinafter called "**NSPI**")

- and -

EFFICIENCYONE,
a body corporate, organized under the laws of
Canada

(hereinafter called "**EfficiencyOne**")

WHEREAS:

A. EfficiencyOne and NSPI are both public utilities pursuant to the Act; and

B. Pursuant to the Act, EfficiencyOne has the exclusive right to supply NSPI with reasonably available, cost-effective Electricity Efficiency and Conservation Activities as the Franchise Holder; and

C. Pursuant to the Act, NSPI is obligated to undertake cost-effective Electricity Efficiency and Conservation Activities that are reasonably available in an effort to reduce costs for its customers; and

D. Pursuant to the Act, NSPI shall meet its obligations by entering into an agreement with the Franchise Holder for the supply of cost-effective Electricity Efficiency and Conservation Activities.

NOW THEREFORE witnesses that in consideration of the premises and the mutual covenants and obligations herein and other good and valuable consideration, the sufficiency and receipt of which are hereby acknowledged, the parties agree as follows:

1. INTERPRETATION

1.1 The following terms shall be interpreted as follows in this Agreement:

(a) "**Act**" shall mean the *Public Utilities Act*, R.S.N.S. 1989, c.380, as amended from time to time.

(b) "**Agreement**" means this agreement between NSPI and EfficiencyOne including all Schedules attached hereto.

(c) "**Business Day**" means Monday to Friday, except federal, provincial, and civic holidays within the Province of Nova Scotia.

(d) "**Consequential Losses**" means consequential, special, incidental, multiple, exemplary or punitive damages including lost profits, whether such claim of lost profits is categorized as indirect, direct or consequential damages or under any alternative theory of recovery.

(e) "**Contract Documents**" means without limitation, the following documents, including any amendments thereto agreed in writing by the parties:

(i) this Agreement; and

(ii) all Schedules to the Agreement.

(f) "**Contract Price**" has the meaning ascribed to it in Section 4.1.

(g) "**EECA Plan**" means the plan prepared by EfficiencyOne and approved by the UARB and attached hereto as Schedule "E".

(h) "**Electricity Efficiency and Conservation Activities"** or "**EECA**" means the electricity efficiency and conservation activities as identified in Schedule "A" attached hereto.

(i) "**Event of Default**" has the meaning ascribed to it in Section 20.4.

(j) "**Environmental Laws**" means all applicable federal, provincial, regional, municipal or local laws with respect to environmental matters contained in the statutes, regulations, rules, standards, requirements, ordinances, policies, guidelines, orders, approvals, notices, permits or directives having the force of law, in effect as at the date hereof and as may be brought into effect at future date.

(k) "**Force Majeure Event**" means any event or circumstance not reasonably within the control of the Party affected which wholly or partly prevents the performance by that Party of its obligations under this Agreement, provided that such Party is in good faith unable to perform such obligations by any commercially reasonable substitute. A Force Majeure Event includes acts of God, war, riot, fire, explosion, flood, hurricane, epidemics, acts of governmental authorities, acts of terrorism. Notwithstanding anything else contained herein, a Force Majeure Event excludes (a) any event or circumstance causing direct or indirect delay in, or failure to perform any of a Party's obligations under this Agreement, attributable to a lack of reasonable diligence on the part of a Party or on the part of any vendor or subcontractor of a Party, including any event or circumstance which a Party or any vendor or subcontractor, acting diligently, could reasonably have been expected to foresee, avoid or overcome in the performance of its obligations; and (b) any event or circumstance caused by the breach of a Party's obligations or the fault or negligence of a Party or the fault or negligence of any vendor or subcontractor, or by violation of applicable laws or regulations by a Party or any of a Party's vendors or subcontractors. For certainty, adverse weather of any kind other than events specified above shall not be considered a Force Majeure Event.

(l) "**Franchise**" has the meaning ascribed to it in the Act.

(m) "**Franchise Holder**" has the meaning ascribed to it in the Act.

(n) "**Governmental Authority**" means any federal, provincial, regional, municipal or local government or authority or other political subdivision thereof and entity or person exercising executive, legislative, judicial, regulatory or administrative functions of, or pertaining to, government.

(o) "**Hazardous Substances**" means any substance or material that is prohibited, controlled or regulated by any Governmental Authority pursuant to Environmental Laws, including any contaminants, pollutants, petroleum or other hydrocarbons and their derivatives and by-products, dangerous substances or goods, including asbestos, liquid wastes, special wastes, toxic substances, hazardous or toxic chemicals, hazardous wastes, hazardous materials or hazardous substances as defined in or pursuant to any Environmental Law, or any substance or material not inherently hazardous but which would, in sufficient quantities, be hazardous.

(p) "**Indemnified Costs**" means all liabilities, claims, actions, causes of action, judgments, orders, damages, costs (including those incurred in connection with any investigation of site conditions or any clean-up, environmental remediation, removal or restoration work), expenses (including all reasonable consultant, expert and legal fees and expenses), fines, penalties, losses, or any resulting damages, harm or injuries to the person or property of any third parties or to any natural resources and for which the indemnified party is liable and has incurred losses. Without limiting the foregoing, Indemnified Costs shall include:

(i) the costs of defending and/or counterclaiming or claiming over and against third parties in such manner as the indemnified party in its sole discretion may determine;

(ii) the costs relating to any governmental investigation, proceeding or claim; and

(iii) any costs, liabilities or damages arising out of a settlement of a claim by the indemnified party, with or without the consent of the indemnifying party.

(q) "**Law**" means the common law, the law of equity and all federal or provincial statutes or municipal by-laws and all regulations, orders, directives, permits and licenses thereunder, which apply to or otherwise affect NSPI or EfficiencyOne with respect to the supply of the EECA, or the property of NSPI or EfficiencyOne, real or personal, or any part thereof, including the Act and all environmental, occupational, health and safety laws.

(r) "**Liens Indemnities**" has the meaning ascribed to it in Section 19.1.

(s) "**Liens and Claims**" has the meaning ascribed to it in Section 19.1.

(t) "**Minister**" has the meaning ascribed to it in the Act.

(u) "**Party**" means either EfficiencyOne or NSPI. "**Parties**" means EfficiencyOne and NSPI.

(v) "**Personal Information**" shall mean the information provided by NSPI to EfficiencyOne pursuant to Section 79K of the Act.

(w) "**Release**" or "**Released**" means a releasing, adding, spilling, leaking, pumping, pouring, emitting, emptying, discharging, injecting, escaping, leaching, migrating, dispersing, dispensing, disposing or dumping.

(x) "**Significant Changes**" means any proposed change to the EECA Plan for which the UARB orders or directs EfficiencyOne to obtain the approval of the UARB prior to the implementation of such proposed change.

(y) "**Subcontractor**" means any contractor, supplier or consultant hired by EfficiencyOne in accordance with this Agreement to perform any portion of the EECA.

(z) "**Term**" has the meaning ascribed to it in Section 2.1.

(aa) "**UARB**" means the Nova Scotia Utility and Review Board.

1.2 Unless otherwise specified in this Agreement or unless the context otherwise requires:

(a) words of any gender include each other gender;

(b) using the singular or plural number also include the plural or singular number, respectively;

(c) the insertion of headings in this Agreement is for convenience only and shall not be construed so as to affect the interpretation or construction of this Agreement;

(d) the terms "hereof," "herein," "hereto," "hereunder" and words of similar or like import refer to this entire Agreement and not to any particular Section, Schedule or other subdivision of this Agreement;

(e) references to a particular "Section" or "Schedule" are, unless otherwise noted, references to that Section of, or Schedule to this Agreement;

(f) the words "include," "includes" and "including" shall be deemed to be followed by "without limitation" or "but not limited to";

(g) references to any applicable law, legislation or regulation shall be construed as a reference to such law, legislation or regulation as each may be in effect from time to time;

(h) references to any agreement or document (including this Agreement) shall (i) include all Schedules, appendices, and other attachments thereto, and (ii) be construed at the particular time as a reference to such agreement or document as amended, modified or supplemented and in effect from time to time and shall include a reference to any document which amends, modifies or supplements it, or is entered into, made or given pursuant to or in accordance with its terms;

(i) references to (i) days shall refer to calendar days unless Business Day is specified, (ii) weeks and months shall refer to calendar weeks and months, respectively, and (iii) years shall refer to calendar years;

(j) in computing any period of time prescribed or allowed under this Agreement, the day of the act, event or default from which the designated period of time begins

to run shall be included. If the last day of the period so computed is not a Business Day, then the period shall run until the close of business on the next Business Day;

(k) the Contract Documents are complementary, and what is required by any one shall be as binding as if required by all;

(l) words and abbreviations which have well known technical or trade meanings are used in the Contract Documents in accordance with such recognized meanings; and

(m) as both Parties were actively involved in preparing the terms and conditions of this Agreement and as they both had access to and relied upon counsel in this process, there shall be no presumption that any one or the other Party prepared this Agreement and no provision of this Agreement shall be construed against either Party based upon the process of preparation of proposals and drafts of the Agreement.

1.3 If there is a conflict within the Agreement, the order of precedence of documents, from highest to lowest, shall be:

(a) Sections 1 to 27;

(b) Schedule "A" – Electricity Efficiency and Conservation Activities; and

(c) all other Schedules.

2. TERM & RESERVATION OF RIGHTS

2.1 The term of this Agreement shall be three (3) years from the Effective Date and shall automatically terminate on December 31, 2018 unless terminated earlier in accordance with the terms of this Agreement and the Act (the "**Term**").

2.2 During the Term, NSPI shall purchase from EfficiencyOne and EfficiencyOne shall supply to NSPI, the EECA in accordance with the terms and conditions of this Agreement and the Act.

2.3 Notwithstanding anything contained herein, and subject to any requirement for review or approval by the UARB, nothing contained in this Agreement shall in any way effect the rights of NSPI pursuant to Section 79I(3) of the Act.

3. ELECTRICITY EFFICIENCY and CONSERVATION ACTIVITIES

3.1 For the Term of this Agreement, EfficiencyOne will,

(a) provide the EECA in accordance with this Agreement;

(b) provide sufficient resources to enable EfficiencyOne to perform its obligations on time and in accordance with this Agreement;

(c) carry out the EECA in a professional, expeditious and economical manner, in accordance with the Act;

(d) manage the EECA in an efficient manner; and

(e) perform and supply the EECA in a safe and environmentally sound manner and in compliance with applicable Law.

3.2 The Parties acknowledge and agree that EfficiencyOne shall be solely responsible for the delivery of the EECA Plan. For greater certainty and notwithstanding the attachment of the EECA Plan as Schedule "E" – Approved EECA Plan, NSPI shall have no liability with respect to the EECA Plan saving and excepting any liability which may arise as a result of NSPI's failure to comply with the Act.

4. PRICE & PAYMENT

4.1 NSPI agrees to pay EfficiencyOne for EECA as set out in Schedule "B" – Compensation (the "**Contract Price**").

4.2 The Contract Price shall constitute full compensation for the EECA, and no additional compensation shall be payable to EfficiencyOne arising out or resulting from any productivity losses, overhead or indirect costs or other costs and expenses of any kind whatsoever.

4.3 NSPI shall make monthly payments in accordance with Schedule "B" to EfficiencyOne on account of the Contract Price when due, together with applicable taxes. EfficiencyOne will submit an invoice to NSPI in advance of the payment date referenced in Schedule "B".

4.4 Unless otherwise indicated all dollar amounts referred to in this Agreement are in lawful money of Canada.

4.5 If applicable, payments shall be subject to harmonized sales tax (as defined in the *Excise Tax Act* (Canada)) ("**HST**"). No additional taxes (foreign or domestic), customs, duties or brokerage fees shall apply..

4.6 If applicable, NSPI will withhold from payments to EfficiencyOne any amounts required to be withheld under applicable Laws and treaties in respect of services rendered in Canada by a non-resident and may remit them to the relevant authority. Where available, statutory withholding may be waived if EfficiencyOne delivers to NSPI a formal waiver of the withholding requirement issued and signed by Canada Revenue Agency. The Parties shall cooperate at all times to ensure that all proper withholdings are deducted from payments and if any withholdings are overlooked then such withholdings may be deducted from later payments.

5. NOTIFICATION OF SIGNIFICANT CHANGES

5.1 EfficiencyOne shall provide notice of Significant Changes to NSPI at the same time as EfficiencyOne makes application to the UARB for the approval of the Significant Changes. Subject to the terms of the Act and the general discretion of the UARB under the Act, NSPI shall, have the right to make written submissions to the UARB on any such Significant Changes to the EECA Plan.

6. SAFETY

6.1 EfficiencyOne shall at all times be responsible for safety and loss management in the supply or performance of the EECA.

6.2 EfficiencyOne shall ensure that all employees, Subcontractors, agents and representatives of EfficiencyOne comply with all federal, provincial and municipal health, safety and environmental statutes, regulations, policies and guidelines and all health, safety and environmental rules as prescribed by EfficiencyOne.

7. PROTECTION OF PROPERTY

7.1 EfficiencyOne shall take all commercially reasonable steps to protect the property of NSPI's customers and other third parties from damage which may occur as the result of the performance of the EECA.

7.2 Should EfficiencyOne damage the property of NSPI's customers or property of other third parties while performing the EECA, EfficiencyOne shall make good such damage at EfficiencyOne's expense and shall indemnify NSPI from and against all liabilities, claims, damages, settlements, awards, costs, expenses and proceedings incurred by NSPI or its servants, employees and/or agents in respect of such damage, except to the extent such damage occurs as a result of the negligent acts of NSPI or those for which NSPI is responsible at Law.

8. ENVIRONMENT

8.1 EfficiencyOne and its Subcontractors shall at all times comply with all Environmental Laws that apply in any way to the supply or performance of the EECA. EfficiencyOne and its Subcontractors shall not cause, permit or suffer the Release of a Hazardous Substance in contravention of any Environmental Laws.

8.2 Notwithstanding any other provision in this Agreement (and in addition to any other right to indemnity held by NSPI under the terms of the Agreement) EfficiencyOne shall indemnify NSPI, NSPI's parent, their respective subsidiaries, affiliates and related companies, and their respective officers, directors, employees, agents and shareholders, and agrees to hold each of them harmless from and against any and all Indemnified Costs resulting from any Release of any Hazardous Substance which is caused or contributed to by EfficiencyOne or its Subcontractors or any breach of any Environmental Law by EfficiencyOne or its Subcontractors.

9. EFFICIENCYONE'S COVENANTS

9.1 EfficiencyOne warrants, covenants and agrees with NSPI that:

(a) it has all requisite capacity and authority to execute, deliver and perform its obligations under this Agreement;

(b) this Agreement has been duly and validly executed and delivered by EfficiencyOne and constitutes a legal, valid and binding obligation of EfficiencyOne enforceable against EfficiencyOne in accordance with its terms;

(c) to its knowledge, there is no matter, thing or event, including without limitation, any litigation, proceeding, breach, default or financial circumstance that would

adversely affect EfficiencyOne's ability to perform its obligations under this Agreement;

(d) it will furnish all labour, materials, products, tools, and other necessary components necessary to perform and provide the EECA, unless otherwise provided herein;

(e) it shall diligently perform or cause to be performed the EECA in a proper and workmanlike manner;

(f) it has the skills, expertise and resources to carry out the EECA and to comply, observe and perform the obligations to which it is subject in accordance with the terms of this Agreement;

(g) prior to commencing any work hereunder, it shall obtain and maintain all permits, licenses and notices that a prudent supplier acting in accordance with industry standards would be required to obtain, maintain and provide in comparable circumstances and shall comply with all applicable Laws, ordinances, rules, regulations, codes and orders of any and all authorities having jurisdiction which are or become in force during the Term in respect of the EECA;

(h) it will comply with applicable federal, provincial and municipal statutes, regulations and bylaws pertaining to the EECA performed by or on behalf of EfficiencyOne under this Agreement. EfficiencyOne shall be responsible for ensuring similar compliance by any suppliers and Subcontractors;

(i) it is the Franchise Holder pursuant to the Act;

(j) it is not a non-resident of Canada for the purposes of the *Income Tax Act*;

(k) it will execute or cause to be made, done and executed all further acts, deeds, assurances, agreements, instruments or other documents as may be reasonably required to ensure fulfillment of the terms of this Agreement;

(l) the EECA shall be delivered and performed by individuals duly licensed and authorized by Law, if applicable, to perform said undertakings;

(m) the EECA shall be delivered and performed solely by EfficiencyOne or its Subcontractors and EfficiencyOne acknowledges that EfficiencyOne shall at all times remain responsible for the proper completion of this Agreement; and

(n) upon becoming aware of a potential disruption having a material impact in the supply of the EECA, EfficiencyOne shall provide notification to the UARB and NSPI.

10. SUBCONTRACTORS

10.1 EfficiencyOne shall be permitted to subcontract the performance of any part of the EECA without the prior written approval of NSPI.

10.2 Where EfficiencyOne subcontracts any part of the EECA, EfficiencyOne shall preserve and protect the rights of the Parties under this Agreement with respect to the EECA to be supplied or performed under subcontract, and shall be as fully responsible to NSPI

for the acts and omissions of Subcontractors and of persons directly or indirectly employed by them, as if they were acts and omissions of persons directly employed by EfficiencyOne.

10.3 Nothing contained in the Contract Documents shall create a contractual relationship between a Subcontractor and NSPI.

11. CONFIDENTIAL AND PERSONAL INFORMATION

11.1 The Parties have executed or agree to execute the confidentiality agreement attached hereto as Schedule "D" - Confidentiality ("**Confidentiality Agreement**").

11.2 EfficiencyOne shall be responsible for all physical and electronic security required to ensure the security of the Personal Information which has been provided by NSPI to EfficiencyOne.

11.3 EfficiencyOne shall indemnify and hold harmless NSPI for any liabilities, claims, damages, settlements, awards, costs, expenses and proceedings incurred by NSPI or its servants, employees and/or agents in consequence of EfficiencyOne's misuse of the Personal Information or any disclosure, whether intentional, inadvertent, negligent or otherwise of any of the Personal Information by EfficiencyOne contrary to the terms of this Agreement or the Act.

12. PERFORMANCE REQUIREMENTS AND EVALUATIONS

12.1 EfficiencyOne's performance under the terms of this Agreement shall be measured in accordance with the performance requirements established by the UARB pursuant to Section 79M of the Act as set out in Schedule "C" – Performance Requirements.

13. FORCE MAJEURE

13.1 Neither Party shall be in breach of its obligations under this Agreement where failure to perform or delay in performance of any obligation is due, wholly or in part, to a Force Majeure Event.

13.2 Each Party shall notify the other Party promptly of any Force Majeure Event and shall take reasonable steps to minimize the impact of the failure or the delay and to resolve the event or occurrence that has given rise to the Force Majeure Event in order to resume performance. The time for performing an obligation as a result of Force Majeure Event shall be extended for the period lost, subject to the condition that the Term of this Agreement shall not be extended as a result of any Force Majeure Event.

13.3 Each Party suffering a Force Majeure Event shall take, or cause to be taken, such action as may be necessary to void, or nullify, or otherwise to mitigate, in all material respects, the effects of such Force Majeure Event. The Parties shall take all reasonable steps to ensure normal performance under this Agreement, including the resumption of any disrupted obligations.

13.4 For certainty, in no case shall the failure or omission of EfficiencyOne to carry out or observe any of the terms, provisions, or conditions of this Agreement or any negligent act or omission of EfficiencyOne, or others for whom EfficiencyOne is responsible constitute an event of Force Majeure or result in an extension of the time to perform the EECA.

14. INDEMNITY

14.1 EfficiencyOne shall assume all risk of loss, damage or injury, including death, to person or property, caused by its directors, officers, employees, Subcontractors, agents or representatives, and agrees not to make or bring any claim, action or demand against NSPI or its directors, officers, servants, agents, or employees in respect of such loss, damage or injury excepting such loss, damage or injury caused by the negligence or wilful misconduct of NSPI or NSPI's directors, officers, servants, agents or employees.

14.2 EfficiencyOne agrees to indemnify and save harmless NSPI, its directors, officers, servants, agents, or employees, and their heirs, executors, administrators, successors and assigns, or any of them, from and against any liabilities, losses, expenses (including legal costs on a solicitor-client basis), claims, demands, actions, and causes of action, whatsoever suffered by NSPI by reason of, or in any way arising out of or in connection with a breach of this Agreement by EfficiencyOne excepting only to the extent caused by the negligence or wilful misconduct of NSPI or NSPI's directors, officers, servants, agents or employees.

14.3 NSPI agrees to indemnify and save harmless EfficiencyOne, its directors, officers, servants, agents, or employees, and their heirs, executors, administrators, successors and assigns, or any of them, from and against any liabilities, losses, expenses (including legal costs on a solicitor-client basis), claims, demands, actions, and causes of action, whatsoever suffered by EfficiencyOne by reason of, or in any way arising out of or in connection with a breach of this Agreement by NSPI excepting only to the extent caused by the negligence or wilful misconduct of EfficiencyOne or EfficiencyOne's directors, officers, servants, agents or employees.

14.4 The provisions set forth in this Section shall apply and be effective with respect to any claim, cause of action, or legal theory whatsoever including without limitation, claims based upon breach of contract, failure to meet performance guarantees, tort (including negligence) and strict liability.

14.5 EfficiencyOne shall defend, indemnify and hold harmless NSPI from any claim, suit, cause of action, judgment, cost or expense (including legal fees) based on a claim by a third party that any intellectual property which is part of the EECA or supply or performance of EfficiencyOne's obligations under this Agreement infringes any patent, copyright, trade secret or other intellectual property right, provided the EfficiencyOne is promptly notified of such claim and is given complete authority for defense of same. EfficiencyOne shall pay all damages, costs and expenses resulting from such a claim, including legal fees and settlement costs, but shall not be responsible for any cost, expense or compromise incurred by NSPI without EfficiencyOne's prior consent.

15. LIMIT OF LIABILITY

15.1 Neither Party shall be liable to the other Party for any Consequential Losses with respect to the performance or non-performance under this Agreement or for any actions undertaken in connection with or related to this Agreement.

15.2 EfficiencyOne's total liability to NSPI with respect to the performance or non-performance under this Agreement or for any actions undertaken in connection with or related to this Agreement shall be limited to the greater of the sum of two million dollars ($2,000,000) or the proceeds of the applicable insurance policies taken out by

EfficiencyOne under this Agreement ("**EfficiencyOne Limit of Liability**") provided that the EfficiencyOne Limit of Liability shall not apply to:

(a) indemnification of NSPI by EfficiencyOne under the terms of this Agreement for any third party claims (including but not limited to EfficiencyOne's obligations pursuant to Sections 7.2, 8.2, 11.3, 14.5 and 18.1);

(b) any wilful misconduct or fraud of EfficiencyOne or its employees, agents or representatives; and

(c) any obligation on the part of EfficiencyOne to refund in whole or in part the Contract Price pursuant to this Agreement or the Act.

15.3 NSPI's total liability to EfficiencyOne with respect to the performance or non-performance under this Agreement or for any actions undertaken in connection with or related to this Agreement shall be limited to the sum of two million dollars ($2,000,000) ("**NSPI Limit of Liability**") provided that the NSPI Limit of Liability shall not apply to:

(a) any wilful misconduct or fraud of NSPI or its employees, agents or representatives; and

(b) NSPI's liability for payment of the Contract Price pursuant to the Agreement or the Act.

16. INSURANCE

16.1 EfficiencyOne shall obtain, maintain and pay for, during the entire Term of this Agreement, the following minimum insurance coverage as follows, such insurance as it relates to this Agreement shall be in a form and from an insurer acceptable to NSPI:

(a) General liability insurance shall be in the name of EfficiencyOne and shall name NSPI as an additional insured and shall have limits of not less than five million dollars ($5,000,000) inclusive per occurrence for bodily injury, death, and damage to property including loss of use thereof. Such insurance shall be primary and non-contributing with, and not in excess of, any other insurance available to NSPI.

(b) Environmental impairment insurance with limits of not less than five million dollars ($5,000,000);

(c) Automobile liability insurance in respect of licensed vehicles shall have limits of not less than two million dollars ($2,000,000) inclusive per occurrence for bodily injury, death, and damage to property. For automobiles not owned or operated by or on behalf of EfficiencyOne the insurance shall be in the form of a standard non-owned automobile policy and shall include standard contractual liability endorsement. For automobiles owned or operated by or on behalf of EfficiencyOne the insurance shall be in the form of a standard owner's form automobile policy and shall provide third party liability and accident benefits insurance covering licensed vehicles owned or operated by or on behalf of EfficiencyOne.

(d) Property Insurance covering all loss of or damage to EfficiencyOne's property and equipment of EfficiencyOne or for which EfficiencyOne is legally liable or

responsible used in performance of the EECA for the full replacement value, which insurance shall not allow subrogation claims by the insurer against NSPI.

(e) To the extent that the EECA includes the provision of professional services, professional liability errors and omissions insurance covering all claims arising out of errors and omissions of EfficiencyOne in the performance of professional services as part of the EECA with a limit of two million dollars ($2,000,000). In the event other claims erode EfficiencyOne's professional errors and omissions insurance below two million dollars ($2,000,000), in the annual aggregate, EfficiencyOne agrees to reinstate the limit.

(f) Workers' compensation to the full extent required in Nova Scotia and wherever EfficiencyOne's personnel contracts of employment are made or are expressed to be made.

16.2 If EfficiencyOne fails to effect or keep in force any of the foregoing insurances, NSPI may, without prejudice to any other right or remedy, effect such insurance and pay the premiums due and recover the same as a deduction from any other monies due to EfficiencyOne under this Agreement.

16.3 EfficiencyOne shall be responsible to pay deductible amounts and for determining the deductible amount in respect of each policy. EfficiencyOne shall not violate, nor knowingly permit to be violated, any conditions of the policies maintained according to the provisions of this Section, and it shall be EfficiencyOne's duty and responsibility to impose upon each Subcontractor the same responsibilities and obligations imposed upon EfficiencyOne under such provisions.

16.4 EfficiencyOne agrees to provide proof of insurance to NSPI on an annual basis. Such proof shall be in the form of a certificate of insurance signed by EfficiencyOne's insurance broker.

17. INTELLECTUAL PROPERTY

17.1 NSPI acknowledges that all branding, trade and business marks of EfficiencyOne used in the course of provision of EECA pursuant to this Agreement, (the "EfficiencyOne Brands") are, and shall remain, the sole and exclusive property of EfficiencyOne and shall not be used by NSPI without EfficiencyOne's express consent. Upon termination of this Agreement, NSPI shall immediately upon instruction from EfficiencyOne return or destroy, as instructed by EfficiencyOne, the EfficiencyOne Brands.

17.2 Any trademarks, brands, logos or other branding or trade or business marks used in NSPI's business ("**NSPI Brands**") shall remain the sole and exclusive property of NSPI and shall not be used by EfficiencyOne for any purpose except in connection and as necessary for the provision of the EECA. Upon termination of this Agreement, EfficiencyOne shall immediately upon instruction from NSPI return or destroy, as instructed by NSPI, the NSPI Brands.

18. LIENS AND CLAIMS

18.1 EfficiencyOne shall indemnify and hold harmless NSPI, NSPI's parent and their subsidiaries and affiliates (collectively the "**Lien Indemnitees**" or singularly "**Lien Indemnitee**") and defend each of them from and against any and all losses and costs arising out of any and all claims for payment, liens, attachment or any other process,

filed against any property of the Lien Indemnitees by or in respect of a Subcontractor of any tier or any other party providing work, materials in respect of the EECA or any part thereof (referred to in this Section as "**Liens or Claims**"), including solicitor and client fees and expenses incurred by NSPI in discharging any such Liens or Claims or similar encumbrances.

18.2 EfficiencyOne shall discharge promptly any Liens or Claims. If EfficiencyOne does not promptly satisfactorily discharge such Liens or Claims, NSPI at its sole option may (i) require EfficiencyOne to pay, within five (5) Business Days after request by NSPI, or (ii) subject to any requirements of the *Builders' Lien Act* of Nova Scotia, offset against any holdback or other amounts due or to become due to EfficiencyOne, all costs and expenses incurred by NSPI or other Lien Indemnitee in causing the release of, paying or settling such Liens or Claims. EfficiencyOne shall have the right to contest any such Liens or Claims, provided it first provides to NSPI a bond or other assurance of payment reasonably satisfactory to NSPI in the amount of such Liens or Claims and in form and substance reasonably satisfactory to NSPI. In no circumstance whatsoever shall NSPI be liable for a greater amount than the amount payable by NSPI to EfficiencyOne.

19. DISPUTE RESOLUTION

19.1 In the event of a dispute in connection with this Agreement, a senior representative of EfficiencyOne and a senior representative of NSPI shall promptly meet to discuss and resolve the dispute and the Parties shall have thirty (30) days to resolve the dispute (or ten (10) days if either Party notifies the other Party that the matter requires urgent resolution).

19.2 Unless the parties agree otherwise, in the event resolution cannot be achieved in accordance with Section 19.1 of this Agreement, then such dispute or difference shall be referred to the UARB in accordance with Section 79P of the Act.

19.3 Notwithstanding any dispute, EfficiencyOne shall diligently carry out the EECA, and shall not suspend, impair, interfere with, restrict or discourage the prompt completion of any portion of the EECA, unless specifically authorized to do so by the UARB. .

20. DEFAULT AND TERMINATION

20.1 This Agreement may be terminated immediately by either Party, in whole or in part, upon the happening of one or more of the following events:

(a) EfficiencyOne's Franchise is terminated and the Agreement has not been assigned by the Minister; or

(b) The UARB approves the termination of the Agreement.

In the event of a termination pursuant to this Section 20.1, neither Party shall be entitled to any compensation or damages for any Consequential Losses as a result of such termination. Immediately upon receipt of such termination notice, EfficiencyOne will discontinue all EECA under this Agreement and will only finish such portions of the EECA as may be necessary to preserve and protect the EECA already in progress. Such termination does not relieve either Party from any of their respective obligations under this Agreement for EECA provided up to the date of termination. Any claim for payment by EfficiencyOne must be asserted within thirty (30) days from the date of such termination.

20.2 Notwithstanding any other provision in this Agreement, in the event this Agreement is terminated in accordance with Section 20.1(a), EfficiencyOne shall:

(a) Immediately return all monies paid on account of the Contract Price which amounts have not been legitimately incurred or subject to contractual commitments for expenditure which cannot otherwise be mitigated to NSPI; and

(b) Provide to NSPI all reasonable required termination assistance to allow the EECA provided under this Agreement to continue and to facilitate the orderly transition of the EECA to NSPI or any third party as directed by NSPI, provided that EfficiencyOne shall be entitled to commercially reasonable payment for such transition services on a time and material basis.

20.3 The Parties acknowledge that this Agreement is subject to the general supervision of the UARB.

20.4 A Party shall be determined to be in default of its obligations under this Agreement if (each a "**Event of Default**"):

(a) it is in breach of any material term or condition of this Agreement, which breach is not cured by the Party within thirty (30) days after written notice from the other Party;

(b) it assigns this Agreement other than as permitted by the Act and/or the UARB;

(c) any representation or warranty made by either Party shall prove to be untrue when made in any material respect;

(d) there is a sale, transfer or relinquishment, voluntary or involuntary, by operation of law or otherwise, of legal control of the business of either Party except for a transfer to a related corporation or a transfer resulting from a merger, acquisition, amalgamation or reorganization, or, in the case of EfficiencyOne, a change in the Membership of the corporation;

(e) Either Party sells, transfers or assigns all or substantially all of its assets;

(f) a petition in bankruptcy is filed with respect to either Party; or

(g) any proceeding is commenced under any bankruptcy or insolvency legislation or under any other federal, state or provincial law relating to insolvency or bankruptcy, the adjudication of either Party as a bankrupt, the appointment by any competent court having jurisdiction of a temporary or permanent receiver, trustee or other officer having similar powers over either Party its business or assets, or the making of any assignment by either Party for the benefit of its creditors.

20.5 If a breach notified pursuant to Sections 20.3(a) cannot be corrected within the period required therein, the defaulting Party shall not be in breach or violation if it:

(a) commences and diligently and continuously carries out the correction of the breach or violation within the specified time;

(b) provides to the non-defaulting Party, and the UARB an acceptable plan for such correction; and

(c) corrects the breach or violation in accordance with such plan.

20.6 Upon the occurrence of an Event of Default, the non-defaulting Party may apply to the UARB to terminate this Agreement in whole or in part.

21. NOTIFICATIONS

21.1 All notices to be given to either Party under this Agreement shall be written and addressed to the NSPI and to EfficiencyOne as follows:

To NSPI:

Nova Scotia Power Incorporated
1223 Lower Water Street
PO Box 910
Halifax, NS B3J 3S8
Attention: Corporate Secretary
Facsimile: (902) 428-6171

To EfficiencyOne:

EfficiencyOne
230 Brownlow Avenue
Suite 300
Dartmouth, NS B3B 0G5
Attention: CEO
Facsimile: (902) 470-3599

21.2 All notices may be sent by facsimile, a nationally recognized overnight courier service, first class mail or hand delivered. Notice shall be given when received by the addressee on a Business Day. In the absence of proof of the actual receipt date, the following presumptions will apply:

(a) Notices sent by facsimile shall be presumed to have been received upon the sending Party's receipt of its facsimile machine's confirmation of successful transmission. If the day on which such facsimile is received is not a Business Day or is after five p.m. (local time for the recipient) on a Business Day, then such facsimile shall be deemed to have been received on the next following Business Day.

(b) Notice by overnight courier shall be presumed to have been received on the next Business Day after it was sent.

(c) Notice by first class mail shall be presumed delivered five (5) Business Days after mailing.

21.3 Either Party may modify its address for notices by advance written notice to the other Party.

22. AUDIT AND INSPECTION

22.1 EfficiencyOne shall, during the Term and for a period of thirty-six (36) months thereafter, keep accurate records of all EECA supplied to NSPI, as necessary to determine that the EECA was provided in accordance with the terms and conditions of this Agreement.

22.2 NSPI shall have the right to apply to the UARB to request access to any of the records referred to in 22.1.

22.3 NSPI shall have the right to apply to the UARB to inspect or observe the EECA at all times, whether using its own forces or those of a designated third party. EfficiencyOne shall facilitate such inspections and provide sufficient, safe and proper facilities at all times for inspection of the EECA.

23. ASSIGNMENT

23.1 Neither Party shall assign all or any portion of this Agreement without the prior written approval of the UARB and/or the Minister as the situation requires.

24. SHARING OF DATA AND INFORMATION

24.1 EfficiencyOne shall work co-operatively with NSPI to provide NSPI with information and data from time to time in order to assist NSPI with planning and load forecasting as may be reasonably required by NSPI. For greater certainty, such information and data shall be consistent with the past practices of the Parties.

24.2 In the event of a dispute regarding any request for information by NSPI, NSPI shall have the right to apply to the UARB to request access to the information and data referred to in 24.1.

25. COORDINATION MEETINGS AND REPORTS

25.1 During the Term of this Agreement, EfficiencyOne shall prepare and deliver to the UARB and NSPI a quarterly report (the "**Quarterly Report**") in a form acceptable to the UARB.

25.2 EfficiencyOne shall prepare and deliver to the UARB and NSPI an annual report (the "**Report**") in a form acceptable to the UARB. For greater certainty, the Report shall summarize and provide details as to the EECA and milestones achieved in the prior year, contain a discussion and analysis of major discrepancies relative to the EECA Plan's intent and forecasts, EfficiencyOne's financial statement for the previous year with respect to the EECA, evaluation reports and a summary of planned versus actual savings and costs for each metric.

25.2 The Parties agree that ongoing coordination and regular communication between NSPI and EfficiencyOne is important in order to ensure effective planning. To that end, the Parties shall meet quarterly or as otherwise agreed upon to discuss the provision of the EECA.

26. GENERAL

26.1 This Agreement shall only be renewed in accordance with the provisions of the Act.

26.2 This Agreement shall extend to, be binding upon and enure to the benefit of the respective successors and permitted assigns of the Parties hereto.

26.3 EfficiencyOne will be an independent contractor. EfficiencyOne shall not act as an agent for NSPI, bind NSPI to any obligation with a third party, nor hold itself out as having authority to bind or obligate NSPI. None of the persons engaged by EfficiencyOne or any of its Subcontractors in the performance of the EECA will be considered employees of NSPI.

26.4 This Agreement shall be deemed to have been made in and shall be governed by, construed and interpreted in accordance with the laws of the Province of Nova Scotia and the laws of Canada, as applicable therein. Where the provisions of this Agreement or the Act permit or require a matter to be referred to or proceeded with before a court, or in any other case where the Parties bring a matter in respect of this Agreement before a court, the Parties irrevocably attorn to the jurisdiction of the Supreme Court of Nova Scotia.

26.5 No consent or waiver, express or implied, by any Party to this Agreement of any breach or default by any other Party in the performance of its obligations under this Agreement or of any of the terms, covenants or conditions of this Agreement shall be deemed or construed to be a consent or waiver of any subsequent or continuing breach or default in such Party's performance.

26.6 Time shall be of the essence for purposes of this Agreement.

26.7 This Agreement, upon approval by the UARB, shall represent the entire Agreement between the Parties with respect to the subject matter hereto and shall not be modified, varied or amended except by an instrument in writing signed by the Parties and approved by the UARB or as ordered or directed, by the UARB at any time.

26.8 Should any provision of the Agreement be declared by a judicial or other competent authority to be unenforceable, the remaining provisions of the Agreement shall remain in full force and effect.

26.9 The Parties acknowledge that this Agreement and all related documents shall be in English.

26.10 This Agreement may be executed by the Parties in counterparts, each of which when so executed and delivered shall be deemed to be an original and when taken together shall be deemed to be one and the same instrument. The electronic delivery, including, without limitation, by email or facsimile transmission, of any signed original of this Agreement shall be the same as the delivery of an original.

27. SURVIVAL

27.1 Subject to the provisions of the Act, all provisions of this Agreement which by their express terms or nature are continuing shall survive the expiration or termination of this Agreement, including, without limitation, this provision, and the provisions relating to the EECA Plan (s. 3.2), EfficiencyOne's covenants (s.9), confidentiality (s. 11), indemnity

(s.14), intellectual property (s. 17), notification (s. 21) and general provisions (s. 26) as well as any provisions which are required to determine, or which exclude or limit, any liability or which are otherwise required to give effect to or interpret any such provisions which are continuing.

[Remainder of page intentionally left blank]

IN WITNESS THEREOF, the Parties have duly executed this Agreement, in duplicate, as of the date set forth above.

NOVA SCOTIA POWER INCORPORATED

Per: _____
Name:
Title:

Per: _____
Name:
Title:

_____
Witness

_____
Witness

EFFICIENCYONE

Per: _____
Name:
Title:

Per: _____
Name:
Title:

_____
Witness

_____
Witness

SCHEDULE A

ELECTRICITY EFFICIENCY AND CONSERVATION ACTIVITIES

[THE PARTIES HAVE NOT REACHED AGREEMENT ON THIS SCHEDULE.]

SCHEDULE B

COMPENSATION

[THE PARTIES HAVE NOT REACHED AGREEMENT ON THIS SCHEDULE.]

SCHEDULE C

PERFORMANCE STANDARDS

[As approved by the UARB]

SCHEDULE D

CONFIDENTIALITY AND NONDISCLOSURE AGREEMENT

THIS CONFIDENTIALITY AGREEMENT made this day of _____, 2015

Between:

EfficiencyOne, hereinafter “EfficiencyOne”

Party of the First Part

And

Nova Scotia Power Incorporated, hereinafter “NSPI”

Party of the Second Part

Whereas the Parties have entered into a Supply Agreement for Electricity Efficiency and Conservation Activities made effective as of January 1, 2016 (“Supply Agreement”) whereby Efficiency One is to provide EECA (as that term is defined in the Supply Agreement) to NSPI;

And whereas in accordance with the Supply Agreement, and the Electricity Efficiency and Conservation Act (Nova Scotia) and the Public Utilities Act (Nova Scotia) (together hereinafter referred to as the “Legislation”), and as may be directed by the Nova Scotia Utility and Review Board, and as may be further agreed between the Parties, the Parties will be receiving, reviewing, and analyzing Confidential Information from each other;

And whereas the Parties wish to clarify the manner in which any Confidential Information disclosed by one Party (“Disclosing Party”) to the other is to be treated by the recipient of the Confidential Information (“Recipient”);

In consideration of the agreements of the Parties set forth below, and other good and valuable consideration, the receipt and sufficiency of which are hereby acknowledged, the Parties agree as follows:

Confidential Information

1. The Parties agree that for the purpose of this Agreement "Confidential Information" means all information, regardless of the form in which it is communicated or maintained and prepared by the Disclosing Party, and is disclosed directly or indirectly to the Recipient, pursuant to the Supply Agreement, the Legislation, as directed by the Nova Scotia Utility and Review Board or as otherwise agreed between the Parties. Confidential Information includes, but is not limited to the following: all reports analyses, notes, memoranda, correspondence, spreadsheets, drawings, survey plans, maps, contracts, commercial arrangements, intellectual property, trade secrets, corporate strategies, business plans or other information that is based on, contain or reflect any Confidential Information, material, whether printed or electronic, which has been designated by the Disclosing Party as confidential information, including proprietary information and other commercially sensitive information. This includes but is not limited to information which has been or may be filed with the Nova Scotia Utility and Review Board ("the Board") in confidence in answer to Information Requests and any further material that may be filed with the Board in confidence whether in response to future Information Requests or otherwise, and whether printed or electronic. Confidential Information shall also include any explanation or other information provided by either Party to the Recipient concerning the foregoing and which has been identified by the Party providing the information as confidential at the time it is initially provided, whether printed or electronic. Confidential Information may also include any password or other information necessary to access electronic copies of Confidential Information.

Permitted Scope of Use

2. The Recipient may use the Confidential Information solely for the purposes of providing or receiving EECA, as the case may be, in accordance with the Legislation and the Supply Agreement and for no other reason or purpose.

No Obligation to Disclose

3. This Agreement does not obligate either Party to disclose any Confidential Information to the other.

Protection of Confidential Information

4. The Recipient shall hold the Confidential Information in strict confidence and shall strictly protect the Confidential Information from all harm, loss, theft, reproduction and unauthorized access, employing at least the same degree of care that the Recipient employs to protect its own confidential information of a similar nature, but in any event, not less than reasonable care. The Recipient shall ensure that such Confidential Information is not disclosed, published,

released, transferred or otherwise made available in any form to, for the use or benefit of, any person except as provided in this Agreement.

Acknowledgements

5. The Recipient acknowledges that the Confidential Information is confidential and a trade secret and is owned by the Disclosing Party and is highly valuable and material to the interests, business and affairs of the Disclosing Party and that any unauthorized disclosure thereof by the Recipient would be detrimental to the Disclosing Party.

Permitted Disclosures

6. The Recipient shall be permitted to disclose relevant aspects of the Confidential Information to its employees and professional advisors to the extent that such disclosure is reasonably necessary for the performance of its duties and obligations; provided, however, that prior to such disclosure the Recipient shall inform such persons and parties of the confidential nature of the Confidential Information and each such person or party signs the undertaking attached to this Confidentiality Agreement. The Recipient shall inform the Disclosing Party of the name of each person to whom it has disclosed the Confidential Information in accordance with this provision and shall provide to the Disclosing Party the signed undertaking. The Recipient shall be fully responsible for ensuring that any such persons to whom it discloses the Confidential Information complies with the confidentiality obligations contained in this Agreement and shall be liable for any breach of this Agreement by such persons.

7. The non-disclosure obligations in this Agreement shall not restrict any disclosure by the Recipient pursuant to any applicable law or an order of any court of competent jurisdiction or regulatory body with regulatory responsibilities over the Recipient, provided that the Recipient shall provide the Disclosing Party with prompt prior written notice of its obligation to disclose so that the Disclosing Party may seek a protective order or other appropriate remedy concerning the disclosure of its Confidential Information and/or waive compliance with the confidentiality provisions of this Agreement. In addition, the Recipient shall take reasonable steps, to the extent permitted by law, to remove from the Confidential Information that is required to be disclosed, any information that is commercially sensitive to the Disclosing Party. In the event of an order for disclosure by a court of competent jurisdiction or regulatory body with regulatory responsibilities over the Recipient, the Recipient shall first notify the Disclosing Party of such order and allow the Disclosing Party not less than ten (10) days to remove any such information that is commercially sensitive.

Term

8. The term of this Agreement shall commence on the effective date of the Supply Agreement unless superceded by another form of writing, and notwithstanding the return of any Confidential Information or any other event, shall continue in full

force and effect for a period of FIVE (5) years from the effective date of this Agreement.

Equitable Remedy

9. The Recipient acknowledges that any unauthorized use of the Confidential Information or any breach of its obligations under this Agreement will result in irreparable harm to the Disclosing Party which cannot be adequately compensated for by damages. Neither the Recipient, nor any term in this Agreement, shall interfere with, delay, or prevent the Disclosing Party from seeking an interim and interlocutory equitable remedy to enforce any provision of this Agreement. The Recipient agrees not to oppose an application for equitable relief by the Disclosing Party in such circumstances. Any such relief or remedy shall not be exclusive, but shall be in addition to all other available legal or equitable remedies. The Recipient agrees that the provisions of this Section are fair and reasonable in the commercial circumstances of this Agreement. This Article shall survive the termination of this Agreement.

Return of Information

10. On the earlier of either thirty (30) days following the termination of the Supply Agreement or at the written request of the Disclosing Party (and unless superceded by another form of writing), the Recipient shall return or destroy (at the Disclosing Party's direction) and delete from all electronic devices all Confidential Information provided to it, including all copies (and all notes and documents prepared by the Recipient that may incorporate same) and still in the Recipient's possession (and otherwise under its control or in the possession of other persons to whom it has been provided as permitted hereunder) and, if requested by the Disclosing Party, shall provide written confirmation to the Disclosing Party to that effect. Notwithstanding the forgoing, the Recipient shall be entitled to retain the Confidential Information in one legal file copy that may be retained solely for the determination of its legal obligations under this Agreement.

Residual Information

11. The Recipient or its designate or any other person having access to the Confidential Information pursuant to this Agreement shall not, during and after the termination of this Agreement, use in its business any Residual Information. "Residual Information" means the ideas, know-how and techniques that would be retained in the unaided memory of an ordinary person skilled in the art, not intent on appropriating the proprietary information of the disclosing party, as a result of such person's access to, use, review, evaluation, or testing of the Confidential Information of the disclosing party for the purposes described herein. An employee's memory is unaided if the employee has not intentionally memorized the Confidential Information for the purpose of retaining and subsequently using or disclosing it.

Limited Rights

12. The Recipient agrees that no rights are granted to Recipient other than the limited rights to use the Confidential Information on the terms of this Agreement. For certainty, no license is granted under this Agreement (directly or indirectly) under any patent, discovery, copyright, or other intellectual or industrial property right now or in the future.

Indemnity

13. The Recipient shall indemnify and hold the Disclosing Party harmless from any and all loss, liability, cost or expense (including, without limitation, solicitor's costs on a solicitor and client basis and all other costs of defence) caused in whole or in part by the Recipient's breach of any provision of this Agreement. This Article shall survive the termination of this Agreement.

Governing Law

14. This Agreement is governed and shall be construed in accordance with the laws of the Province of Nova Scotia.

General Provisions

15. This Agreement is binding on the Parties, their administrators, successors, executors and assigns.

Executed and delivered this ____ day of _____, 2015.

EfficiencyOne	Nova Scotia Power Incorporated
By: _____	By: _____
Name:	Name:
Title:	Title:

SCHEDULE "A" to CONFIDENTIALITY AGREEMENT

UNDERTAKING

I _____, HAVE READ AND AGREE TO ABIDE AND AM BOUND BY THE TERMS AND CONDITIONS SET OUT IN THE CONFIDENTIALITY AGREEMENT DATED THE ____DAY OF _____ BETWEEN EFFICIENCYONE AND NOVA SCOTIA POWER INCORPORATED.

Dated the day of 2014.

_____ _____

Witness Name:

Recipient Designate

SCHEDULE E

APPROVED EECA PLAN

[As approved by the UARB]