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Request IR-01:

Please describe how EfficiencyOne proposes to recover the costs of its proposed programs.

a. Over what time period would costs be recovered?

b. How would costs be allocated to different rate classes?

c. Please describe the current process for recovering EfficiencyOne's DSM expenses.

d. Refer to page 30 of NS Power's evidence, regarding its proposal to recover DSM expenses through the FAM charge. Please describe how this change would impact program budgeting and operations, if at all.

Response IR-01:

a) Since 2015 the cost recovery methodology and time period has been the responsibility of NS Power subject to approval by the Nova Scotia Utility and Review Board. EfficiencyOne expects this responsibility to remain with NS Power for the recovery of 2020-2022 DSM Resource Plan costs. The cost recovery methodology and time period for this plan period has not been approved at this time.

b) Prior to 2015, EfficiencyOne's cost allocation methodology included a true up of collections and actual spending by rate class. This true up resulted in the Balance Adjustment that was included in the annual Demand Side Management Cost Recovery Rider (DCRR) which was applied to customer bills and collected by NS Power and remitted to EfficiencyOne. Effective January 1, 2015 the DCRR no longer existed and DSM costs were incorporated within NS Power's non-fuel costs. As a result of this change EfficiencyOne no longer performs the cost allocation exercise as NS Power was directed

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1 by the NSUARB per the 2016-2018 DSM Resource Plan Order to file its proposed
2 accounting treatment for the 2015 programs and the 2016-2018 DSM programs.

3
4 EfficiencyOne reports spending by rate class on an annual basis as part of its Annual
5 Progress Report. This information is provided to help inform NS Power's cost recovery by
6 rate class.

7
8 c) Please refer to part b) of this IR response.

9
10 d) EfficiencyOne would not expect a change to the cost recovery mechanism to impact
11 program budgeting and operations.

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Request IR-02:

Please refer to EfficiencyOne's evidence, page 11, lines 11 to 25.

- a. Have there been any changes to the energy landscape in Nova Scotia since 2014 that would likely impact avoided costs?**
- b. Would EfficiencyOne expect an updated integrated resource plan to correspond to an increase or decrease in Plan benefits? Why or why not?**

Response IR-02:

- a) EfficiencyOne acknowledges there may have been changes to the energy landscape in Nova Scotia since 2014 that would impact avoided costs. Until a new Integrated Resource Plan (IRP) is completed and undergoes rigorous stakeholder and regulatory review, EfficiencyOne is unable to comment on how those changes may impact avoided costs.
- b) As an output of the IRP, which considers changes to the energy landscape, EfficiencyOne expects a new set of avoided costs to result from the 2020 IRP. Avoided costs would be impacted by the scope of the IRP as well as the assumptions and input data used for the 2020 IRP exercise. EfficiencyOne appreciates the rigor, complexities, and significant effort that is required to conduct a robust long-term IRP and as such recognizes that it would be imprudent to presume an outcome in advance of conducting the analysis.

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Request IR-03:

Please refer to EfficiencyOne’s evidence, page 16, lines 26 to 30. What constrains EfficiencyOne from “turning [DSM] on or off on a short-term basis” (e.g., contractual or operational constraints)? Please provide examples.

Response IR-03:

EfficiencyOne typically has multi-year contractual agreements with its Delivery Agents, and these often have renewal options for an additional one to two years. Examples include agreements for the following program components:

- Home Energy Assessment (HEA) – 7 Delivery Agent Agreements;
- Efficient Products Installation (RDI) - 3 Delivery Agent Agreements;
- Instant Savings – 1 Delivery Agent Agreement;
- Business Energy Rebates – 14 Distributor Agreements; and
- Small Business Energy Solutions – 5 Small Business Energy Auditor Agreements.

There are also specialized trades or services within the DSM supply community that are in short supply and a practice of turning DSM on or off, on a short-term basis, would exacerbate the issue.

Examples of specialized trades or services would include registered Energy Advisors for services in EfficiencyOne’s Residential sector. Another example of specialized services relates to EfficiencyOne’s Appliance Retirement service, where ARCA Canada established a province-wide network for appliance pickup, including investing in a facility to manage decommissioning and recycling of the inefficient appliances. Their technicians are trained to identify hazardous components in all makes and models of appliances, since several dangerous substances can be found in old appliances, including PCB fluid in capacitors, mercury-containing components and batteries. Also, their technicians involved in refrigerant evacuation are trained in the proper handling of refrigerants that contain ozone-depleting substances.

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Since inception, EfficiencyOne has been working to educate Nova Scotians on the benefits of energy efficiency, thus creating a demand for energy efficient products. Table 1 below demonstrates the growth in the energy efficiency sector in Nova Scotia in response to growing demand.

Table 1: Growth in the Nova Scotia Energy Efficiency Sector, 2011 – 2016

	2011	2016	Increase
Direct Sales	\$191,500,000	\$233,100,000	22%
Employment	1,179	1,424	21%
Direct Income	\$62,200,000	\$83,500,000	34%

Source: Canmac Economics 2018

If DSM was to be turned “on and off”, this capacity would have to 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. Ramping up DSM and the associated capacity quickly, rather than gradually, could result in steep rate increases.

Turning off DSM would result in an erosion of an energy-efficient culture. EfficiencyOne would have to reeducate Nova Scotians on the importance and benefits of energy efficiency. This would reverse the impact EfficiencyOne has made in transforming the market and would require a greater investment in marketing and outreach to rectify. Should EfficiencyOne provide fluctuating DSM levels and related messaging, confidence from the market would be diminished.

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Request IR-04:

Please refer to EfficiencyOne's evidence, page 34, line 11 to page 35, line 2.

- a. Please describe EfficiencyOne's process for identifying pilots and criteria for determining whether to proceed with pilots.**
- b. Does EfficiencyOne expect to modify its programs during the plan period to take advantage of installed AMI? If so, when and how? If not, why not?**

Response IR-04:

a) All EfficiencyOne staff are encouraged to consider ideas for new pilots. Sometimes new measures are piloted within existing programs, and sometimes pilots are identified that revolve around various new measures or processes. Once identified, EfficiencyOne staff follow both a Measure Addition Process and an Incentive Setting Process.

The Measure Addition Process involves a review of the merits of the researched technical information for the new measure/offering. This includes a jurisdictional scan, a review of the base and efficient case assumptions, and potential markets, which then help establish the potential for energy savings. The intention is to properly vet potential measures/offerings prior to piloting. Often, this involves discussions with the Evaluator. This helps ensure that once offered, energy savings assumptions have a solid grounding and actual energy savings should be achieved (i.e., per third-party evaluations) as planned.

The Incentive Setting Process considers various inputs to inform an incentive level for the new measure/offering. This also includes a jurisdictional scan, consideration of any related customer or market research, consideration of the customer and decision type, along with various inputs obtained from the Measure Addition Process.

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1
2 Various items inform whether a certain measure/offering is piloted. This includes
3 reviewing items such as the impact to existing budgets, considerations of energy savings
4 diversification, cost-effectiveness of the measure/offering, and anticipated contribution
5 towards energy savings or demand targets. If both processes are completed successfully,
6 EfficiencyOne staff make a final decision on whether or not to pilot a new
7 measure/offering.

- 8
9 b) It is the intent of EfficiencyOne to use AMI data, where appropriate, to expand and evolve
10 the delivery of DSM services. The details of how programs will be modified during the
11 plan period have not been finalized and will depend, in part, on the timing of access to AMI
12 data. Examples of how AMI might be used include customizing efficiency
13 recommendations to homes and businesses to align with their usage profile, demand
14 reduction initiatives, building optimization, behavior-based initiatives, measurement of
15 savings, and other potential uses. EfficiencyOne will determine the most appropriate uses
16 and prioritize based on several factors including evidence of savings potential and cost-
17 effectiveness. Insights and lessons learned from other jurisdictions will help guide
18 EfficiencyOne in this respect.

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Request IR-05:

Please refer to EfficiencyOne's evidence, page 35, lines 4 to 25.

a. Please provide reports, documents, or analyses related to the four cost management strategies.

b. Does EfficiencyOne have a policy on procurement of goods and services? If so, please provide related documentation. If not, why not?

Response IR-05:

a) Please refer to EfficiencyOne's response to NS Power IR-15.

b) Please refer to part a) of this IR response.

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Request IR-06:

Please refer to EfficiencyOne’s evidence, page 44. For the purposes of the rate and bill impact analysis, does EfficiencyOne assume that the HST savings are used to reduce collections from ratepayers? If HST savings are not used to reduce collections from ratepayers, what would the rate and bill impacts associated with the preferred and alternate plans be? How do the rate impacts from a scenario in which the HST savings are not used to fund DSM differ from a scenario in which the HST savings are used for funding DSM?

Response IR-06:

No, the Rate and Bill Impact Analysis (RBIA) EfficiencyOne filed as part of its 2020-2022 DSM Plan does not apply the HST refund to reduce collections from ratepayers.

If the HST refund was applied to reduce collections in each year of the Preferred 2020-2022 DSM Plan, the rate impacts would change as presented in Table 1 below. This analysis was conducted in response to this IR using the rate class allocation in Figure 3 of EfficiencyOne’s Evidence. One third of the HST refund for each class was subtracted from the modelled program cost recovery amounts for each of the three years of the Plan. The HST refund for the 1-part RTP class were included with Large Industrial. The GRLF and Shore Power HST refund was not included.

Table 1: 2020-2022 and 2020-2035 Average Rate Impact (if HST refunds were applied to reduce rates in 2020-2022)

Rate Class	2020-2022 Average Rate Impact		2020-2035 Average Rate Impact	
	As filed	HST used to reduce cost recovery	As filed	HST used to reduce cost recovery
Residential	3.0%	2.7%	0.8%	0.7%
Small General	4.1%	2.9%	1.1%	0.9%

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General	5.5%	5.0%	1.3%	1.2%
Large General	6.9%	6.6%	1.5%	1.5%
Small Industrial	7.6%	7.1%	1.7%	1.6%
Medium Industrial	3.2%	3.0%	0.8%	0.7%
Large Industrial	3.9%	3.7%	1.0%	1.0%
Municipal	3.9%	3.7%	1.0%	1.0%

If the HST refund was used to fund additional DSM over 2020-2022 instead of being used to reduce rates in 2020-2022, the resulting energy savings, demand savings and participation would be higher than what was included in the Preferred Plan. Such a scenario was not modelled by EfficiencyOne in its DSM Plan (it included a Preferred and Alternate option, neither of which assumed that additional DSM would be purchased with the HST refund). An additional investment of this amount would increase the total 3-year investment by 11%, so it is reasonable to expect that it could have had a material impact on the measure mix within the Plan, if it were fully modeled by Navigant. However, as an approximation used only for this IR response, EfficiencyOne has assumed that all energy savings, demand savings, and participation figures scale up by 11%, and expenses remain the same (since these costs would not need to be recovered through rates). The resulting rate impacts of this analysis are presented in Table 2 below:

Table 2: 2020-2022 and 2020-2035 Average Rate Impacts (if HST refunds were used to fund additional DSM in 2020-2022)

Rate Class	2020-2022 Average Rate Impact		2020-2035 Average Rate Impact	
	As filed	HST used to increase amount of DSM	As filed	HST used to increase amount of DSM
Residential	3.0%	3.0%	0.8%	0.8%
Small General	4.1%	4.1%	1.1%	1.1%

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General	5.5%	5.6%	1.3%	1.3%
Large General	6.9%	6.9%	1.5%	1.5%
Small Industrial	7.6%	7.6%	1.7%	1.7%
Medium Industrial	3.2%	3.2%	0.8%	0.8%
Large Industrial	3.9%	3.9%	1.0%	1.0%
Municipal	3.9%	3.9%	1.0%	1.0%

- 1
- 2 The impacts in this scenario are almost the same as those originally filed, since the avoided costs
- 3 and lost revenues roughly cancel out in every class. Program cost recovery is essentially the only
- 4 driver of rate impacts, and did not change in this scenario relative to the original filing.

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Request IR-07:

Refer to EfficiencyOne’s evidence, page 57, line 1 to page 58, line 2. When does EfficiencyOne propose to address the GHG and CO2 issues with the DSMAG?

Response IR-07:

EfficiencyOne proposes to address avoided CO₂ issues with the DSMAG in two stages. First, EfficiencyOne would share a memorandum with the DSMAG outlining its proposed approach to calculating avoided GHGs in the latter part of 2019, with the intent to come to consensus on the approach. EfficiencyOne would then propose a means to quantify CO₂ in cost effectiveness testing, in Q4 of 2019. While cost-effectiveness screening is only used in plan development, and the next opportunity would be for the 2023-2025 plan development process, EfficiencyOne recognizes that reaching a conclusion on how to value DSM CO₂ reductions is an important consideration as the CO₂ policy landscape in Nova Scotia evolves in the coming years.

Please also refer to EfficiencyOne’s response to CA IR-12 for further details on incorporating the value of CO₂ emissions reductions in cost-effectiveness testing.

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Request IR-08:

Refer to EfficiencyOne’s evidence, page 60, lines 9 to 12. Are water savings included in a) the Preferred Plan and b) the Alternate Plan? If yes, for each plan please indicate how these benefits are calculated, including algorithms and formulas, assumptions, and data sources. If no, please explain why reductions in water use are not included as benefits. Please provide any and all related reports, documents or workpapers associated with these benefits.

Response IR-08:

Yes, water savings are included in both the Preferred Plan and the Alternate Scenario, although EfficiencyOne has inadvertently underestimated water benefits for residential through the application of an incorrect conversion factor, affecting both residential water savings amounts (m³) and the assumed avoided cost proxy (retail volumetric rates used reflect costs translated to gallons, instead of cubic meters). Where water benefits now represent 0.0002% of total Plan benefits, and all of EfficiencyOne’s Programs are currently cost-effective under current assumptions, EfficiencyOne is not seeking to further modify the Preferred and Alternate models.

Water savings were calculated using the methodologies provided in Attachment 1 of this IR response (corrected values), to be filed electronically. The intended avoided costs proxy to be used were Halifax Water rates, in effect as of April 1, 2016 (reflecting only volumetric charges of \$0.976/m³ for water, and \$1.753/m³ for wastewater)¹ adjusted for 2% annual inflation.² Please note that determinations of final benefits occurred within Navigant’s PROCess model (i.e., determination of Net Present Value benefits by measure, program, and portfolio), using NS Power’s 2019 WACC rate of 6.84%.

¹ <https://halifaxwater.ca/rates-charges>

² <https://www.bankofcanada.ca/core-functions/monetary-policy/inflation/>

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Request IR-09:

Refer to EfficiencyOne’s evidence, page 60, lines 9 to 12. Are benefits for non-electric energy savings, such as propane, oil, and gas, included in a) the Preferred Plan and b) the Alternate Plan? If yes, for each plan please indicate how these benefits are calculated, including algorithms and formulas, assumptions, and data sources. If no, please explain why reductions in non-electric energy use are not included as benefits. Please provide any and all related reports, documents or workpapers associated with these benefits.

Response IR-09:

Neither the Preferred Plan nor the Alternate Scenario contain benefits related to natural gas, propane, or oil savings. This is because EfficiencyOne’s DSM activities have the aim of reducing electrical energy and demand and, as such, targets baseline equipment that operates using electricity.

EfficiencyOne has modelled negative benefits for certain Business, Non-Profit and Institutional prescriptive measures, associated with fuel-switching from electricity to natural gas (largely Commercial Kitchen measures). For five measures, estimates of natural gas impacts were based on estimated natural gas consumption as found in Attachment 1 of this IR response, filed electronically. Attachment 2 of this IR response (filed electronically) provides additional detail for these measures, as well as the calculations for a sixth measure that relied upon a methodology for the calculation of hot water heater energy consumption based on engineering principles, as developed for the purposes of calculating electricity reductions and natural gas impacts associated with this measure.

Please note that for this sixth measure, the conversion factor from kWh to MJ of energy consumption was entered in error within the model inputs. Attachment 2 reflects the corrected values. This error is not expected to have any material impact on the cost-effectiveness of the

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- 1 Efficient Product Rebates Program, given the very low modelled participation of this measure
- 2 (75 units).

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Request IR-10:

Please refer to Table 2 on page 13 of Attachment A of the 2020 through 2022 DSM Plan, and Table 1 on page 3 of Attachment A of the 2019 DSM Plan (M08604).

- a. Considering the actual performance of the 2018 portfolio and the year-to-date performance of the 2019 portfolio, does EfficiencyOne consider the increase in investment levels between 2019 and 2020 to be a steep ramp up?**
- b. Please explain why EfficiencyOne proposes to increase investment levels by \$7.8 million between 2019 and 2020, but by only \$2 million between 2020 and 2022.**
- c. Did EfficiencyOne consider a smoother ramp up across the four years? If not, why not?**

Response IR-10:

- a) The \$7.8 million increase between 2019 and 2020 is required to make a reasonable step increase in first year energy savings from 1.1% of generation to 1.3% of generation. The *Electricity Plan Implementation (2015) Act* set a 2019 DSM investment amount of not greater than \$34,050,000. Efforts to diversify the DSM portfolio taken in the 2019 Plan, resulted in an increased overall unit cost and a reduction in the level of first year energy savings associated with the \$34 million investment level. The 2020-2022 DSM Plan aims to reverse this decline by taking a step increase in 2020, recognizing that the step increase between 2019 and 2020 is larger than between the remaining three years. This adjustment was necessary to directionally move closer to the level of DSM in the 2014 Integrated Resource Plan.

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1 Although the first-year energy savings across 2020, 2021 and 2022 are relatively flat,
2 EfficiencyOne can adjust between these years. Proposed Performance Targets for the
3 DSM Plan are cumulative for the three-year plan period of 2020-2022. This provides
4 EfficiencyOne the flexibility to make limited adjustments between any two years within
5 the plan period if a modified ramp up is required.
6

7 b) Please refer to part a) of this IR response.
8

9 c) Please refer to part a) of this IR response.

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Request IR-11:

Refer to Tables 9, 12, 14, 18, 21, and 24 in Appendix A of the 2020 through 2022 DSM Plan.

a. Are the performance indicators listed in the Tables for first year energy savings, peak demand savings, and lifetime energy savings in the table equivalent to the performance targets described on page 94 of Appendix A? If not, what are the values of the performance targets for i) cumulative annual energy savings, ii) cumulative annual system-peak demand savings, and iii) cumulative lifetime energy savings for each of the programs? Please provide the targets by program for the Preferred Plan and the Alternate Plan.

b. Has EfficiencyOne developed a “stretch” alternate scenario to explore a more ambitious course than the Preferred Scenario? If not, why not? If yes, please provide the following information for the stretch scenario:

- i. Investment (\$ million)**
- ii. Lifetime benefits (\$ million)**
- iii. First-year energy savings (GWh)**
- iv. Lifetime energy savings (GWh)**
- v. Weighted-average measure life (years)**
- vi. Peak demand savings (MW)**
- vii. Total Resource Cost Test (TRC)**
- viii. Program Administrator Cost Test (PAC)**

Response IR-11:

a) The first year energy savings, peak demand savings, and lifetime energy savings performance indicators listed in Tables 9, 12, 14, 18, 21 and 24 in total are equal to the performance targets listed on page 94 of Appendix A. The metrics are the same however

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1 the performance indicators in the tables are presented at the program level while the
2 Performance Targets are measured at the portfolio level.

- 3
- 4 b) On October 7, 2015, the Nova Scotia Utility and Review Board (NSUARB) ordered
5 EfficiencyOne to provide one or more alternate scenarios of DSM budgets for the
6 NSUARB to consider in future DSM Applications. Early in the planning process,
7 EfficiencyOne considered the number of alternates to include in its 2020-2022 DSM
8 Resource Plan Application. Having regard to the cost and time involved in the
9 preparation of a fully modeled DSM Plan, the decision was made to focus on one fully
10 developed Alternate Scenario. EfficiencyOne understood that the Alternate Scenario
11 included in the Application was intended to represent a viable and deliverable DSM Plan,
12 incorporating all of the requisite considerations that would inform the EfficiencyOne
13 Preferred Plan and be developed using the same rigor as the Preferred Plan.
14 EfficiencyOne's understanding was that the Alternate Scenario must also be at a lower
15 investment level than the Preferred Plan. Based on this understanding EfficiencyOne did
16 not prepare an Alternate Scenario with first year energy savings or an investment level
17 that is higher than the Preferred Plan. However, EfficiencyOne does maintain that
18 additional DSM benefits are readily attainable in Nova Scotia should there be a desire to
19 increase investment levels to attain these.

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Request IR-12:

Please provide a break out of Investment, Incremental Annual Net Energy Savings at the Generator, Lifetime Net Energy Savings at the Generator, Incremental Annual Net Demand Savings at the Generator, First Year Unit Cost, Lifetime Unit Cost, Incremental Avoided CO₂ Emissions, and Lifetime benefits by year and by end use for each program, sector and in total for:

a. 2020 through 2022 planned values for the Preferred Plan.

b. 2020 through 2022 planned values for the Alternate Plan.

c. 2018 actuals.

Response IR-12:

a) Please refer to Attachment 1 of this IR response, filed electronically.

b) Please refer to Attachment 1 of this IR response, filed electronically.

c) Please refer to Attachment 1 of this IR response, filed electronically. Please note that EfficiencyOne does not have evaluated 2018 actual results by end-use. Results are summarized by program and sector.

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Request IR-13:

Please refer to Appendix A. Please describe any changes to any of following for each program and subprogram since the 2019 Plan:

- a. Incentive design, basis, and/or formulas**
- b. Focus on early retirement or replace on burnout**
- c. Covered measures or measure types**
- d. Customer eligibility requirements**
- e. Target customer segments and market segments**
- f. Market barriers and how the program designs address those barriers**
- g. Marketing strategies**

Response IR-13:

- a) Incentive levels are reviewed regularly and may be adjusted due to many factors (e.g., product costs, evaluation results, market conditions, jurisdiction scans, market research, etc.). Incentive changes since the 2019 DSM Plan include the following:
 - Small New Construction pilot is a new offering under the Custom Incentives program. Incentives will be offered for three performance levels: 50 percent better than code, 75 percent better than code and net-zero energy.
 - Green Heat will include a mid-stream delivery approach for cold climate ductless heat pumps instant rebates, rather than after purchase application.

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- There is no longer additional savings for bundling measures in Home Energy Assessment. Feedback from participants and market research stated the previous bundling approach was unclear. The rebate structure was revised to offer more clarity to participants. There is now only one incentive level per measure. All incentives remained within the previous incentive ranges, with the exception of heat pump water heaters. Under the previous rebate structure, the incentive ranged between \$250 to \$350 per measure. The incentive has since been increased to \$400 per measure following the incentive review, which included a savings evaluation, cost analysis, and jurisdictional scan. Beginning in 2020, Home Energy Assessment will also include increased financial support for deep energy retrofits (e.g., increasing insulation and energy efficient space and water heating).
- New Home Construction (NHC) is adding a third, and higher, rebate to the incentive structure. Participants can receive a \$7,000 rebate if they achieve:
 - o 65 percent better than building code for homes less than or equal to 1,200 ft squared;
 - o 75 percent better than code for homes greater than 1,200 ft squared; or
 - o Canadian Home Builder's Association (CHBA) net-zero ready label, CHBA net-zero label or Passive House certification.

Section a) above outlines changes to incentives for existing measures. New measures and program components are discussed in the following section. Of note, A-lamp LEDs were removed from the Instant Savings and Business Energy program components in alignment with the 2019 DSM Plan.

- b-c) Efficiency characterized measures in the ProCESS model as either Retirement (RET) or replace-on-burnout / new (ROB/NEW) and will use this language in its response below.

Residential Efficient Products Rebates

Appliance Retirement

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1 The 2020-2022 DSM Plan includes six additional measures: Clothes dryer, Clothes
2 Washer, Range/stove, Dishwasher, refrigerator, and freezer replacements. These new
3 measures and all existing measures are RET.

4
5 Instant Savings

6 The Instant Savings program component added four new measures in the 2020-2022
7 DSM Plan: heat pump dryer (ventless), hybrid heat pump dryer, ENERGY STAR Dryer,
8 and Electronically Commutated Motor Circulator Pump. These measures are
9 characterized as ROB/NEW. However, because these are high-cost measures, they are
10 anticipated to have relatively low uptake and therefore do not comprise a significant
11 portion of anticipated spending or savings in the program component.

12
13 **Existing Residential**

14 Affordable Multi-family Housing and Non-Profit Organizations (AMFH)

15 The AMFH program component exists as a pilot in 2019 and is a new program
16 component in 2020-2022 DSM Plan. It is modelled as a single custom measure in the
17 same way the Custom program component is modelled. AMFH is characterized as
18 ROB/NEW; though in practice it will observe a mix of decision types due to the varied
19 needs of participants.

20
21 Efficient Products Installation

22 EfficiencyOne does not anticipate any material changes to the Efficient Products
23 Installation component in 2020-2022 DSM Plan from 2019.

24
25 First Nations Home Energy Efficiency

26 The First Nations Home Energy Efficiency program component exists as a pilot in 2019
27 and is a new program component in 2020-2022 DSM Plan. It comprises primarily RET
28 measures. While the component is new, all measures are offered in existing programs in

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2019 except for clothes washers and dryers, which are only offered in the First Nations
Home Energy Efficiency Pilot in 2019.

Green Heat

The Green Heat program component contains four new measures: central Electric
Thermal Storage (ETS), room ETS, Drain Water Heat Recovery (DWHR), and domestic
hot water (DHW) timers. The DWHR measure is new for Green Heat but is currently
offered in the Home Energy Assessment program component. All Green Heat measures
except DHW timers are characterized as RET.

Home Energy Assessment

The Home Energy Assessment (HEA) program component contains two new measures:
central ETS and room ETS. All HEA measures are characterized as RET.

New Residential

New Home Construction

EfficiencyOne does not anticipate any material changes to the NHC component in 2020-
2022 DSM Plan from 2019.

BNI Efficient Products Rebates

Business Energy Rebates

The Business Energy Rebates program component will introduce three new measures:
large commercial/industrial ETS, medium commercial ETS, small commercial ETS.
These are characterized as ROB/NEW. Other than ETS measures, no changes are planned
to the core measure offerings from 2019.

Custom Incentives

Custom

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1 The Custom program component will have two new enhancements for 2020-2022 DSM
2 Plan: demand reduction and small new construction. The Custom program component
3 will observe a mix of decision types; however, increased efforts in the new construction
4 space will increase the number of projects characterized as ROB/NEW.

5
6 Energy Management Information Systems (EMIS)

7 EfficiencyOne does not anticipate any material changes to the EMIS component in 2020-
8 2022 DSM Plan from 2019.

9
10 Strategic Energy Management (SEM)

11 EfficiencyOne does not anticipate any material changes to the SEM component in 2020-
12 2022 DSM Plan from 2019.

13
14 **Direct Installation**

15 Small Business Energy Solutions

16 The Small Business Energy Solutions program component will introduce two new
17 measures: medium commercial ETS, small commercial ETS. These are characterized as
18 ROB/NEW. EfficiencyOne has excluded general use lamps (A, G types), decorative
19 lamps, and MR16 and PAR28 from its 2020-2022 DSM Plan model, anticipating that
20 these lamps, characterized as RET, will be phased out.

- 21
22 d-e) Changes to eligibility or target market from the 2019 DSM Plan include the following:
23 • Small new construction projects are now eligible under the Custom Incentives program.
24 • The Existing Residential program now has services specifically for homes in First
25 Nations communities and affordable rental units.
26
27 f) Please refer to EfficiencyOne's response to NS Power IR-13¹.

¹ M09096, 2020-2022 DSM Plan - E1 Responses to NS Power IR Requests 1-69, Exhibit E-3, March 29, 2019.

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- 1
- 2 g) Changes to the marketing strategy from the 2019 DSM Plan include the following:
- 3 • Updates to customer profiles and messaging to continuously improve the effectiveness
- 4 and reach of marketing campaigns;
- 5 • Increased use of data analytics and market research to improve customer targeting and
- 6 retention.
- 7 • Increasing the size and diversity of the Efficiency Trade Network and developing new
- 8 partnerships to engage more customers.
- 9 • Increased focus on non-lighting savings and non-energy benefits in customer success
- 10 stories and other messaging.
- 11 • EfficiencyOne will implement more cross-promotion among its programs.

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Request IR-14:

Please refer to Appendix A. For each of the programs included in the 2020-2022 Plan, please provide the annual costs broken out in detail, using the cost tracking categories used by EfficiencyOne or the following cost categories for the Preferred Plan and the Alternate Plan:

- a. General administration and program development;**
- b. Customer incentive costs, including rebates, grants, energy audits, direct install labor costs, technical assessments and financing interest buy down costs;**
- c. Marketing, sales, call centers, website;**
- d. Training;**
- e. Inspections and quality control;**
- f. Evaluation, monitoring, measurement, and verification;**
- g. Participant cost**

Response IR-14:

- a) Please refer to Tables 1 and 2 below for the Preferred Plan and Alternate Scenario with costs broken out in EfficiencyOne's cost categories. The costs are broken out based on historical percentages and may be subject to change with implementation of the Plan.

EfficiencyOne – EfficiencyOne Application for approval of a Supply Agreement for Electricity Efficiency and Conservation Activities between E1 and Nova Scotia Power Inc. (DSM 2020-2022) M09096 (E-ENS-R-19)
E1 Responses to Synapse

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1 Table 1: 2020-2022 Preferred DSM Resource Plan

2020 Preferred DSM Resource Plan (\$ Millions)								
Cost Categories Used by EfficiencyOne	Residential Efficient Products Rebates	Existing Residential	New Residential	Efficient Product Rebates	Custom Incentives	Direct Installation	Enabling Strategies	Total
Incentives	2.30	7.90	2.10	6.10	4.60	2.20	-	25.20
Evaluation and verification	0.14	0.33	0.07	0.12	0.44	0.22	0.06	1.38
Program support	0.06	0.13	0.03	0.05	0.18	0.09	1.14	1.67
Information technology	0.09	0.21	0.04	0.08	0.28	0.14	0.09	0.93
Marketing, outreach, education and research	0.24	0.56	0.12	0.20	0.75	0.37	0.75	3.00
Meetings and travel	0.02	0.04	0.01	0.01	0.05	0.02	0.01	0.16
Office and insurance	0.03	0.06	0.01	0.02	0.08	0.04	0.02	0.27
Professional fees and consulting	0.06	0.14	0.03	0.05	0.18	0.09	0.26	0.81
Rent	0.06	0.14	0.03	0.05	0.19	0.10	0.08	0.65
Salaries and benefits	0.69	1.63	0.35	0.59	2.18	1.09	1.08	7.62
Training and development	0.02	0.05	0.01	0.02	0.07	0.04	0.02	0.23
Total	3.70	11.20	2.80	7.30	9.00	4.40	3.50	41.90
Total Participant Costs	5.80	46.90	8.00	25.30	18.90	4.20	-	109.10
2021 Preferred DSM Resource Plan (\$ Millions)								
Cost Categories Used by EfficiencyOne	Residential Efficient Products Rebates	Existing Residential	New Residential	Efficient Product Rebates	Custom Incentives	Direct Installation	Enabling Strategies	Total
Incentives	2.20	8.10	2.30	6.20	4.70	2.30	-	25.80
Evaluation and verification	0.13	0.34	0.07	0.13	0.46	0.23	0.07	1.43
Program support	0.05	0.14	0.03	0.05	0.18	0.09	1.30	1.85
Information technology	0.08	0.22	0.04	0.08	0.29	0.15	0.10	0.97
Marketing, outreach, education and research	0.22	0.58	0.12	0.22	0.78	0.39	0.85	3.17
Meetings and travel	0.01	0.04	0.01	0.01	0.05	0.03	0.01	0.16
Office and insurance	0.02	0.06	0.01	0.02	0.09	0.04	0.03	0.28
Professional fees and consulting	0.05	0.14	0.03	0.05	0.19	0.10	0.29	0.86
Rent	0.06	0.15	0.03	0.06	0.20	0.10	0.09	0.68
Salaries and benefits	0.64	1.68	0.35	0.64	2.28	1.14	1.23	7.97
Training and development	0.02	0.05	0.01	0.02	0.07	0.04	0.02	0.24
Total	3.50	11.50	3.00	7.50	9.30	4.60	4.00	43.30
Total Participant Costs	5.80	47.90	8.40	26.70	19.50	4.80	-	113.10
2022 Preferred DSM Resource Plan (\$ Millions)								
Cost Categories Used by EfficiencyOne	Residential Efficient Products Rebates	Existing Residential	New Residential	Efficient Product Rebates	Custom Incentives	Direct Installation	Enabling Strategies	Total
Incentives	2.20	7.90	2.40	6.50	4.80	2.50	-	26.30
Evaluation and verification	0.11	0.33	0.08	0.13	0.47	0.24	0.07	1.43
Program support	0.04	0.13	0.03	0.05	0.19	0.10	1.30	1.85
Information technology	0.07	0.21	0.05	0.08	0.30	0.15	0.10	0.97
Marketing, outreach, education and research	0.19	0.56	0.14	0.22	0.80	0.41	0.85	3.17
Meetings and travel	0.01	0.04	0.01	0.01	0.05	0.03	0.01	0.16
Office and insurance	0.02	0.06	0.02	0.02	0.09	0.05	0.03	0.28
Professional fees and consulting	0.05	0.14	0.03	0.05	0.20	0.10	0.29	0.86
Rent	0.05	0.14	0.03	0.06	0.20	0.10	0.09	0.68
Salaries and benefits	0.54	1.63	0.40	0.64	2.33	1.19	1.23	7.97
Training and development	0.02	0.05	0.01	0.02	0.08	0.04	0.02	0.24
Total	3.30	11.20	3.20	7.80	9.50	4.90	4.00	43.90
Total Participant Costs	6.00	47.50	8.70	27.80	20.10	5.30	-	115.40

2

EfficiencyOne – EfficiencyOne Application for approval of a Supply Agreement for Electricity Efficiency and Conservation Activities between E1 and Nova Scotia Power Inc. (DSM 2020-2022) M09096 (E-ENS-R-19)
E1 Responses to Synapse

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1 Table 2: 2020-2022 Alternate DSM Resource Scenario

2020 Alternate DSM Resource Scenario (\$ Millions)								
Cost Categories Used by EfficiencyOne	Residential Efficient Products Rebates	Existing Residential	New Residential	Efficient Product Rebates	Custom Incentives	Direct Installation	Enabling Strategies	Total
Incentives	2.00	6.30	1.90	5.30	4.10	1.90	-	21.50
Evaluation and verification	0.13	0.28	0.06	0.11	0.39	0.19	0.06	1.21
Program support	0.05	0.11	0.02	0.04	0.16	0.08	0.98	1.44
Information technology	0.08	0.18	0.04	0.07	0.25	0.12	0.08	0.81
Marketing, outreach, education and research	0.22	0.48	0.10	0.19	0.66	0.32	0.64	2.62
Meetings and travel	0.01	0.03	0.01	0.01	0.04	0.02	0.01	0.14
Office and insurance	0.02	0.05	0.01	0.02	0.07	0.04	0.02	0.24
Professional fees and consulting	0.05	0.12	0.03	0.05	0.16	0.08	0.22	0.70
Rent	0.06	0.12	0.03	0.05	0.17	0.08	0.07	0.57
Salaries and benefits	0.64	1.39	0.30	0.54	1.93	0.94	0.92	6.67
Training and development	0.02	0.04	0.01	0.02	0.06	0.03	0.01	0.20
Total	3.30	9.10	2.50	6.40	8.00	3.80	3.00	36.10
Total Participant Costs	5.20	41.20	7.10	22.40	16.90	3.60		96.40
2021 Alternate DSM Resource Scenario (\$ Millions)								
Cost Categories Used by EfficiencyOne	Residential Efficient Products Rebates	Existing Residential	New Residential	Efficient Product Rebates	Custom Incentives	Direct Installation	Enabling Strategies	Total
Incentives	2.00	6.40	2.00	5.40	4.20	1.90	-	21.90
Evaluation and verification	0.11	0.29	0.07	0.11	0.41	0.21	0.06	1.26
Program support	0.04	0.12	0.03	0.04	0.16	0.08	1.11	1.59
Information technology	0.07	0.18	0.04	0.07	0.26	0.13	0.09	0.85
Marketing, outreach, education and research	0.19	0.49	0.12	0.19	0.70	0.36	0.73	2.77
Meetings and travel	0.01	0.03	0.01	0.01	0.05	0.02	0.01	0.14
Office and insurance	0.02	0.05	0.01	0.02	0.08	0.04	0.02	0.25
Professional fees and consulting	0.05	0.12	0.03	0.05	0.17	0.09	0.25	0.75
Rent	0.05	0.13	0.03	0.05	0.18	0.09	0.07	0.59
Salaries and benefits	0.54	1.44	0.35	0.54	2.03	1.04	1.05	6.99
Training and development	0.02	0.05	0.01	0.02	0.07	0.03	0.01	0.21
Total	3.10	9.30	2.70	6.50	8.30	4.00	3.40	37.30
Total Participant Costs	5.20	41.90	7.50	23.50	17.40	4.10		99.60
2022 Alternate DSM Resource Scenario (\$ Millions)								
Cost Categories Used by EfficiencyOne	Residential Efficient Products Rebates	Existing Residential	New Residential	Efficient Product Rebates	Custom Incentives	Direct Installation	Enabling Strategies	Total
Incentives	2.00	6.10	2.20	5.60	4.30	2.00	-	22.20
Evaluation and verification	0.10	0.28	0.06	0.12	0.42	0.22	0.06	1.26
Program support	0.04	0.11	0.02	0.05	0.17	0.09	1.11	1.59
Information technology	0.06	0.18	0.04	0.08	0.27	0.14	0.09	0.85
Marketing, outreach, education and research	0.17	0.48	0.10	0.20	0.72	0.37	0.73	2.77
Meetings and travel	0.01	0.03	0.01	0.01	0.05	0.02	0.01	0.14
Office and insurance	0.02	0.05	0.01	0.02	0.08	0.04	0.02	0.25
Professional fees and consulting	0.04	0.12	0.03	0.05	0.18	0.09	0.25	0.75
Rent	0.04	0.12	0.03	0.05	0.18	0.10	0.07	0.59
Salaries and benefits	0.50	1.39	0.30	0.59	2.08	1.09	1.05	6.99
Training and development	0.02	0.04	0.01	0.02	0.07	0.04	0.01	0.21
Total	3.00	8.90	2.80	6.80	8.50	4.20	3.40	37.60
Total Participant Costs	5.40	41.50	7.80	24.40	18.00	4.50		101.60

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- 1 b) Please refer to part a) of this IR response.
2
3 c) Please refer to part a) of this IR response.
4
5 d) Please refer to part a) of this IR response.
6
7 e) Please refer to part a) of this IR response.
8
9 f) Please refer to part a) of this IR response.
10
11 g) Please refer to part a) of this IR response.

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Request IR-15:

Refer to Chapter 6 of Appendix A on Enabling Strategies.

a. Page 80, rows 16 through 18 of Attachment A, state, “these activities will: support the evolution of DSM programs and future DSM Resource Plans via research and development initiatives.” Are the full costs EfficiencyOne expects to incur related to the development and filing of the subsequent DSM resource plan included in Development and Research? If not, which budget category are those costs allocated to? Please provide the planned investment related to the development and filing of the subsequent plan in the Preferred Plan and the Alternate Plan.

b. Please provide a table including the planned investment and planned savings (if any) broken out by each program year and Enabling Strategies category (Education and Outreach, Development and Research, and Other Enabling Strategies) in the Preferred Plan and the Alternate Plan.

Response IR-15:

a) EfficiencyOne has included the costs to develop and file the 2023-2025 DSM Resource Plan within the Development and Research and Other Enabling Strategies categories. These costs are expected to be recognized in both 2021 and 2022. Costs related to the modelling as well as research associated with the development of the future DSM Resource Plan are included in Development and Research. Other costs associated with the regulatory process such as stakeholder outreach, Nova Scotia Utility and Review Board consultant costs, and legal support are included as Other Enabling Strategies under the Regulatory Affairs category.

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EfficiencyOne's historical costs related to the development and filing of a DSM plan have been approximately \$1.5 million. EfficiencyOne would estimate a similar level of costs for the next DSM Resource Plan, with this cost being allocated between 2021 and 2022 respectively.

- b) EfficiencyOne's Enabling Strategies do not have any associated savings. Please refer to the tables below for a comparison of the Preferred Plan and Alternate Scenario investment levels. EfficiencyOne identified through this IR response the investment levels in the Alternate Scenario for Education and Outreach and Other Enabling Strategies in the years 2021 and 2022 had been reversed. These are corrected in the tables below.

Table 1: 2020-2022 Preferred DSM Resource Plan Enabling Strategies Investments

**2020-2022 Preferred DSM Resource Plan
Enabling Strategies**

	2020 Investment (\$ millions)	2021 Investment (\$ millions)	2022 Investment (\$ millions)
Education and Outreach	0.9	1.0	1.0
Development and Research	0.9	1.0	1.0
Other Enabling Strategies	1.8	2.0	2.0
Total Enabling Strategies	3.6	4.0	4.0

Table 2: 2020-2022 Alternate DSM Resource Scenario Enabling Strategies Investments

**2020-2022 Alternate DSM Resource Scenario
Enabling Strategies**

	2020 Investment (\$ millions)	2021 Investment (\$ millions)	2022 Investment (\$ millions)
Education and Outreach	0.8	0.9	0.9
Development and Research	0.8	0.9	0.9
Other Enabling Strategies	1.5	1.8	1.8
Total Enabling Strategies	3.1	3.6	3.6

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Request IR-16:

Referring to rows 20 through 27 on page 81 and rows 1-15 on page 82 of Appendix A, for each of the following new initiatives, please indicate when more information will be available regarding the roll out, when it is projected to start, when results will be available, and what criteria will be used for assessing success. Please also describe any limitations or obstacles that may interfere with implementation. Also, please elaborate on any differences between the Preferred Plan and the Alternate Plan if applicable.

- a. Researching and testing service delivery approaches**
- b. Exploring opportunities to help businesses manage and reduce demand costs**
- c. Exploring net-zero (or near net zero) options for existing residential**
- d. Exploring new service delivery approaches for homes and businesses**
- e. Researching and testing the use of Advanced Metering Infrastructure (AMI)**
- f. Developing more customized offering based on electricity patterns and load shapes**
- g. Determining potential for cost reduction**
- h. Continuing support of the Locational-DSM Pilot**

Response IR-16:

- a) EfficiencyOne plans to research and test service delivery approaches to encourage dynamic energy management and control at commercial building sites. More information on this

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initiative will be available at the end of 2019. EfficiencyOne will begin research upon approval of the 2020 – 2022 DSM Plan. Following this research, EfficiencyOne expects to launch the service in 2020 and will begin monitoring and evaluating performance. A full-year of results will be available in 2021. Metrics such as energy savings, unit cost, participation, and customer satisfaction will be used to evaluate the success of the initiative.

b) EfficiencyOne plans to explore opportunities to help businesses manage and reduce demand costs. This could include using interval data for large businesses to identify system-peak demand reduction opportunities and promoting building optimization software. More information on this initiative will be available in 2020. EfficiencyOne will begin research upon approval of the 2020 – 2022 DSM Plan. Following this research, EfficiencyOne expects to launch the service in late 2020 and will begin monitoring and evaluating performance. A full-year of results will be available by the end of 2021. Metrics such as energy savings, demand savings, unit cost, participation and customer satisfaction will be used to evaluate the success of the initiative.

c) EfficiencyOne is currently promoting net-zero, or near net-zero, options under its New Residential program. Findings from these efforts with new homes will be used to help inform this offering for the Existing Residential program. More information on this initiative will be available in 2020. EfficiencyOne expects to launch the service in 2020. Results are expected in 2021. Metrics such as energy savings, unit cost, participation and customer satisfaction will be used to evaluate the success of the initiative.

d) EfficiencyOne is continuously exploring new service delivery approaches for homes and businesses. This could include a whole-home approach to service delivery, where a participant can engage in multiple programs at once, rather than on a program-by-program basis. Research into a whole-home approach to service delivery has commenced and is expected to be complete in 2019. More information on this initiative will be available at the end of 2019. EfficiencyOne expects to launch the service in 2020 and will begin

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monitoring and evaluating performance. A full-year of results will be available in 2021. Metrics such as energy savings, unit cost, participation and customer satisfaction will be used to evaluate the success of the initiative.

e) EfficiencyOne keeps abreast of AMI usage in other jurisdictions through secondary research and conversations with utilities with experience using AMI. Lessons learned from other jurisdictions will inform uses and priorities, as will potential for energy savings and implementation costs. Please refer to EfficiencyOne's response to Synapse-IR-04 for potential uses of AMI. Timing of new initiatives is dependent on the availability of data. EfficiencyOne will use the DSM Advisory Group (DSMAG) (as directed by the Nova Scotia Utility and Review Board) to update Stakeholders on the timing of new initiatives, as well as any significant issues that are relevant for Stakeholders. Measures of success will be tied to the specific uses, such as demand reduction, savings attributed to new initiatives, increased participation, increased customer engagement, and other measures appropriate for the intended outcome. Obstacles to success include the timing of AMI data access, which hinges, in part, on Nova Scotia Power's ability to install a significant portion of advanced meter infrastructure in 2020.

f) EfficiencyOne is currently using electricity patterns to estimate heat type for NS Power customers, which in turn has helped to better target audiences for appropriate offers in direct marketing campaigns. Further research is underway to analyze electricity usage patterns, combined with detailed data on homes that have completed a home energy audit, to estimate customized efficiency recommendations for residential homes who have not completed an energy audit. Initial results should be available in 2019, but the initiative is intended to span two years (in anticipation of AMI data for more accurate predictions). In-field testing is scheduled to commence in 2020. Measures of success for this research will be the accuracy of the estimated efficiency recommendations for a sample of homes for whom the results of energy audits are known (i.e., compare estimated recommendations versus actual recommendations from the on-site energy audit). In addition, the in-field

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tests will measure the impacts of customized recommendations on customer engagement and program enrollment. EfficiencyOne is also anticipating the receipt of interval data for large industrial customers in 2019, which will be used throughout 2020-2022 to identify opportunities for energy efficiency improvements by examining usage patterns by day-of-week and time-of-day. More information regarding rollout is expected in Q2 of 2020. Measures of success of this research include an increase in investment in efficiency upgrades, building optimization by targeted businesses, and a resultant reduction in demand.

g) The research described in section f) of this IR response may have implications for reduced costs of administering the Home Energy Assessment program component. If the research can achieve sufficient levels of accuracy in estimating the efficiency of a home (or group of homes) compared to traditional on-site energy audits, it could result in fewer on-site audits needed to qualify homes for efficiency recommendations. Similarly, there is potential that energy usage data could be used to compliment traditional methods of savings evaluation. EfficiencyOne's evaluator applies usage-based evaluation on certain measures (for example heat pumps), and EfficiencyOne will continue to explore ways to apply these methods for applicant screening to reduce evaluation risk. Refer to section f) of this IR response regarding timing.

h) EfficiencyOne is currently performing detailed design with respect to the Locational-DSM pilot. The Pilot launch date remains July 2, 2019, consistent with information shared with the DSMAG. Results from the pilot are expected in Q1 of 2021, following Pilot evaluation. A draft detailed design of the pilot is expected to be shared with the DSMAG, via email, on May 29, 2019. As part of this release of detailed design information, detailed quantitative objectives will be shared with the DSMAG. Challenges have been experienced in designing the Locational DSM pilot – these are largely attributable to delays in obtaining distribution system information from NS Power. Such information is critical to the design,

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- 1 particularly the detailed design, of the pilot. No difference in pilot operation are
- 2 contemplated between the Alternate Scenario and Preferred DSM Resource Plan.

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Request IR-17:

Please refer page 81 of Appendix A. Please provide descriptions of the technologies or approaches that may be implemented as pilots during the Plan period to:

- a. Make delivery of savings easier**
- b. Use customer energy usage data**
- c. Enhance service delivery**

Response IR-17:

a) Making the delivery of savings easier will occur by providing increased support to certain customer groups, by streamlining processes to access rebates, and expanding the technologies eligible for incentives. Following are the approaches or technologies that are included as new offerings in the 2020-2022 DSM Plan:

- Offer appliance replacements to non-low-income residential customers for a fee. This involves an in-house service where existing old inefficient appliances are replaced with new energy efficient models.
- Introduce the Affordable Multifamily Housing and Non-Profit Organizations program component. This provides increased support to these customers in achieving energy savings.
- Expand the First Nations Energy Efficiency pilot into a program component. This provides increased support to these customers in achieving energy savings.
- Introduce mid-stream incentives for heat pumps via the Green Heat program component. This will provide instant rebates on qualifying equipment, rather than requiring customers to submit applications.

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- 1 • Provide incentives for electric thermal storage to residential customers. This will
- 2 be a new offering (via Green Heat and Home Energy Assessment) and expands
- 3 options for homeowners.
- 4 • Increase financial support and work with related trades to increase uptake on
- 5 residential domestic hot water measures, such as drain water heat recovery, heat
- 6 pump water heaters. and timers for electric domestic hot water tanks.
- 7 • Offer new project management support in Home Energy Assessment, along with
- 8 increased incentives for achieving deeper energy savings, for customers interested
- 9 in getting closer to net-zero energy use in their homes.
- 10 • Introduce incentives for efficient clothes dryers under the Instant Savings program
- 11 component.
- 12 • Place greater focus and support for demand reduction measures in the Custom
- 13 Incentives program.
- 14 • Offer a new service and incentive for smaller new commercial buildings.
- 15 • Provide additional support to small business customers by encouraging the use of
- 16 the “facilitated path” in the Small Business Energy Solutions program component,
- 17 which has higher energy savings than the “self-directed” path.
- 18 • Offer new demand reduction incentives (electric thermal storage) to small
- 19 businesses through the Small Business Energy Solutions program component, as
- 20 well as to other customers via the Business Energy Rebates program component.
- 21
- 22 b) Efforts to use findings from customer energy use data are planned to include:
- 23
- 24 • Explore opportunities to help businesses manage and reduce demand costs. (e.g.,
- 25 using interval data for large businesses to identify system-peak demand reduction
- 26 opportunities, and promoting building optimization software).
- 27 • Explore new service delivery approaches for homes and business (e.g., a whole-
- 28 home/business approach as opposed to a ‘program-by-program’ approach).

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- 1 • Research and test the use of Advanced Metering Infrastructure (AMI) data. For
2 additional details on AMI, refer to Synapse IR-04.
3
4 c) Please refer to part a) of this IR response.

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Request IR-18:

Please refer to Appendix A, pages 82 to 84, regarding the Efficiency Trade Network. How often does EfficiencyOne communicate with members? Who sponsors the training sessions? What topics are covered in training sessions?

Response IR-18:

The Efficiency Trade Network (ETN) communicates with members through a bi-monthly newsletter, regular direct member meetings, emails, and phone conversations for various topics that include program changes, members updates, and general responses to member inquiries. Training sessions and events are sponsored by DSM funding and are generally offset by a portion of co-pay provided by members who wish to attend the event. Training sessions include topics that are suggested by ETN members or identified through program requirements. An annual survey is conducted to gather overall satisfaction of the ETN, as well as specific member feedback which includes questions related to types of training desired. Some examples of training offered to members include:

- Certified Energy Manager Training Program;
- Certified Measurement and Verification Professional Training Program;
- Selling Energy Efficiency Training;
- Solar Sales Training; and
- ENS Program Education Sessions.

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Request IR-19:

Please refer to Appendix A. To what extent has early replacement been included in the 2020-2022 Plan? Which programs are designed to achieve early replacement? Please elaborate on any differences between the Preferred Plan and the Alternate Plan if applicable.

Response IR-19:

Early replacement measures have been modelled in various programs within EfficiencyOne's portfolio, as part of the modelling and development process associated with both the Preferred Plan and Alternate Scenario. Column D of the Preferred Plan Technical Tables¹ and Alternate Scenario Technical Tables² provide the decision type for a given modelled measure. The value "RET" indicates an early replacement measure. Table 1 below provides summary details for the extent of early replacement measures in both cases.

Table 1: Early Replacement Activity (2020-2022)

Early-Replacement Activity (2020-2022)	First-Year Energy Savings (GWh)	Lifetime Energy Savings (GWh)	First-Year Demand Savings (MW)	Investment (\$M)
Preferred	142.6	2016.7	55.1	42.81
Alternate	126.8	1788.9	47.5	36.32

Differences in the levels in early replacement activity between the Preferred Plan and Alternate Scenario are reflective of broader adjustments to global and program-based levels of activity between the two, as opposed to any particular focus on adjusting the level of early replacement,

¹ M09096, E-1, Application, Filed February 28, 2019, at Appendix A, Attachment 1.

² M09096, E-3(vii), NSPI IR-30 Attachment 2, Filed March 29, 2019.

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either in relative or absolute terms. The levels of early replacement between the two plans mirror the overall levels of activity.

EfficiencyOne considers the following Program Components to possess the primary focus of early replacement:

- Appliance Retirement (although no true replacement measures are installed)
- Efficient Products Installation
- First Nations Home Energy Efficiency
- Green Heat
- Home Energy Assessment
- Instant Savings

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Request IR-20:

Please refer to lines 14-15 on page 8 of 103 of Appendix A to NSPI's evidence, regarding naturally occurring energy efficiency. Please provide EfficiencyOne's definition for free-ridership, including clarification as to whether naturally occurring energy efficiency is included.

Response IR-20:

EfficiencyOne uses the following definition of free-ridership as taken from EfficiencyOne's independent program evaluations:

Free-ridership: Percentage of gross savings attributable to participants who would have implemented the same or similar energy efficiency measures, with no change in timing, in the absence of the program.¹

This definition includes naturally occurring energy efficiency.

¹ M09096, 2018 DSM Evaluation Reports Final Report, March 27, 2019, page iv.

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Request IR-21:

Refer to Table 6 on page 19 and Table 12 on page 53 of Appendix A to NSPI's evidence.

a. Does EfficiencyOne plan to include fuel switching measures in the 2020-2022 Plan?

b. If the answer to Question part a) above is yes, please indicate:

- i. which programs include these measures**
- ii. what the measures are**
- iii. what fuels EfficiencyOne anticipates the measures will replace**
- iv. Avoided fuel consumption**
- v. EfficiencyOne's proposed incentives**
- vi. Eligibility requirements**
- vii. Number of participants anticipated to switch**
- viii. Increased electricity consumption and revenues due to fuel switching**
- ix. Whether the expected increased revenues are included in its RBIA**

c. If the answer to Question part a) above is no, have fuel switching measures been considered? If no, why not?

d. Please provide any and all related reports, documents or workpapers associated with these measures. Please elaborate on any differences between the Preferred Plan and the Alternate Plan if applicable.

Response IR-21:

- a) EfficiencyOne included fuel-switching measures in the 2020-2022 DSM Plan through the Existing Residential Program, such as wood and pellet burning equipment to offset electric

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1 heat. In the Efficient Product Rebates program, EfficiencyOne has rebates on certain
2 natural gas kitchen equipment and natural gas water heaters.

3
4 Fuel Switching may also occur through the Custom Retrofit service of the Custom
5 Incentives program, provided the project passes TRC and PAC cost-effectiveness tests,
6 results in a net reduction in GHG emissions and there are no other environmental concerns.
7 There have been low instances of such projects and these projects were not modeled in the
8 2020-2022 DSM Plan.

9
10 Please see Attachment 1 of this IR response for more information on the fuel switching
11 measures included in the 2020-2022 DSM Plan. All measures listed in the attachment
12 would replace electricity. Therefore, there is no increased electricity consumption due to
13 fuel switching. The impacts of these measures would be included in the Rate and Bill
14 Impact Analysis.

15
16 To be eligible for the residential measures under the Existing Residential program, homes
17 must be existing single-family homes used year-round in the province of Nova Scotia;
18 including detached homes, row houses, duplexes, individual condo units, and mobile
19 homes. The business measures listed under the Efficient Products Rebates program are
20 available to businesses looking to replace their existing electric kitchen equipment with
21 natural gas kitchen equipment.

22
23 b) Please refer to part a) of this IR response.

24
25 c) Please refer to part a) of this IR response.

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- 1 d) Please refer to the 2018 Existing Residential Program Evaluation Report and 2018 Efficient
2 Products Rebates Evaluation Report¹ for further information on measures referenced in
3 part a) of this IR response. The Preferred Plan models greater participation in these
4 measures than compared to the Alternate Scenario.

¹ M09096, 2018 DSM Evaluation Reports Final Report, March 27, 2019.

Measure Name	Program Name	Program Component	Incentives	2020			2021			2022		
				Participation	Energy Savings (kWh)	Coinc. Demand Savings (kW)	Participation	Energy Savings (kWh)	Coinc. Demand Savings (kW)	Participation	Energy Savings (kWh)	Coinc. Demand Savings (kW)
Electric Combination Oven with Gas	Efficient Product Rebates	Business Energy Rebates	\$ 2,000	1	22,369.97	3.47	1	22,745.97	3.53	3	46,246.78	7.18
Electric Convection Oven with Gas	Efficient Product Rebates	Business Energy Rebates	\$ 2,000	5	59,021.87	9.16	5	60,013.91	9.32	10	122,019.45	18.94
Electric Fryer Replacement with Gas	Efficient Product Rebates	Business Energy Rebates	\$ 2,000	0	-	-	0	-	-	5	92,023.05	10.72
Electric Griddle Replacement with Gas	Efficient Product Rebates	Business Energy Rebates	\$ 2,500	0	-	-	4	59,029.77	9.16	6	100,015.43	15.53
Electric Steam Cooker Replacement with Gas	Efficient Product Rebates	Business Energy Rebates	\$ 1,800	0	-	-	0	-	-	5	89,038.08	13.82
Electric to Natural Gas - Water Heater	Efficient Product Rebates	Business Energy Rebates	\$ 1,000	12	75,204.95	20.56	25	152,937.99	41.80	38	233,213.54	63.75
Wood Boiler/Furnace	Existing Residential	Green Heat	\$ 3,500	2	25,021.13	13.88	2	25,084.29	13.92	2	25,147.77	13.95
Wood Stove	Existing Residential	Green Heat	\$ 1,000	45	402,343.24	157.47	45	403,358.87	157.87	46	404,379.65	158.27
Pellet Boiler/Furnace	Existing Residential	Green Heat	\$ 3,500	2	24,012.45	13.52	2	24,073.06	13.55	2	24,133.99	13.59
Pellet Stove	Existing Residential	Green Heat	\$ 1,000	18	148,103.54	69.70	18	148,477.40	69.87	18	148,853.15	70.05
Solar Air heating	Existing Residential	Green Heat	\$ 300	1	952.39	-	1	954.79	-	1	957.21	-
Solar Domestic Hot Water	Existing Residential	Green Heat	\$ 800	7	19,615.10	-	7	19,664.61	-	7	19,714.38	-
Solar Domestic Hot Water	Existing Residential	Home Energy Assessment	\$ 1,502	2	5,575.21	-	3	7,606.47	-	2	5,568.05	-

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Request IR-22:

Please refer to Appendix A, pages 86 to 87.

- a. Does EfficiencyOne plan to conduct any studies other than impact evaluations over the period of the 2020-2022 Plan?**
- b. Please provide an evaluation plan, indicating the type of study (e.g., process evaluation, saturation/baseline, participation, benchmarking, potential), schedule for conducting it, focus (e.g., sector, program, end use), need for the study, and rationale for the proposed timing.**

Response IR-22:

- a) EfficiencyOne proposes to take a similar approach to the evaluation of DSM programs in 2020-2022 as in 2016-2019. EfficiencyOne anticipates that the independent evaluation consultant will conduct program process and program market evaluations in addition to program impact evaluations over the period of the 2020-2022 plan, as required.
- b) Following the filing of the annual DSM Evaluation Reports and Verification Study report, EfficiencyOne works with the evaluation consultant to finalize the evaluation plan for the following year. The evaluation plan is informed by the recommendations made in the Evaluation Reports and the Verification Study report. Therefore, the annual evaluation plans for 2020, 2021 and 2022 have not been developed.

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Request IR-23:

Please refer to Table 11 of Appendix A and EfficiencyOne’s response to NSPI’s IR-22.

a. Please describe how low-income participation is calculated in Table 11.

b. How are low-income multifamily buildings and units defined and verified?

Response IR-23:

a) Table 11 summarizes low-income participation in the Existing Residential program, which comprises First Nations Home Energy Efficiency, Affordable Multi-Family Housing and Non-Profit Organizations, Efficient Products Installation, Green Heat, and Home Energy Assessment.

EfficiencyOne assumed there is no low-income participation in the Green Heat and Home Energy Assessment program components, which is consistent with the assumptions made in EfficiencyOne’s quarterly and annual reports to the Nova Scotia Utility and Review Board.

EfficiencyOne works with First Nations communities to identify participants who are most in need when selecting which households receive support. For this reason, EfficiencyOne has assumed participation in this program component is low-income.

EfficiencyOne assumes all participation in the Affordable Multi-Family Housing program component is low-income.

For the Efficient Products Installation service, low-income participation was estimated by applying the proportion of low-income participation in the Existing Residential program

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1 in 2017 to the total number of products installed in the 2020-2022 DSM plan. This
2 proportion is 42 percent.

- 3
- 4 b) In the Affordable Multi-Family Housing and Non-Profit Organizations program
5 component, Affordable Multi-Family buildings must be a single, self-contained building
6 with four or more self-contained units that are rented at or below a rent threshold. This
7 rent threshold is based on 2018 Canadian Mortgage and Housing Corporation data and
8 varies by community in the province.

9

10 Prior to participating in this program component, landlords must review and sign the
11 Affordable Multifamily Housing Operating Agreement stating that at least 50 percent,
12 and no less than four units in the building, must be rented at or below the rent threshold.
13 The agreement outlines the rent threshold by community.

14

15 Income data on tenants is not currently collected. For rental rate verification, program
16 participants under the terms of the Affordable Multifamily Housing Operating Agreement
17 must disclose rental rate information as requested by EfficiencyOne.

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Request IR-24:

Please refer to Attachment 1 of EfficiencyOne’s response to NSPI IR-30.

- a. Please refer to the “Per Unit Program Administrative Cost” input (Column L). Please describe what is included in the administrative cost input. Are all costs associated evaluation, measurement, verification and program delivery captured through this input? If not, why not?**
- b. Please refer to calculations for the “Net Total Resource Benefit-Cost Ratio (TRC)” (Column U) and the “Total Avoided Cost Benefits” (Column AK). Please explain why these formulas are calculated using the “Per Unit Present Value Non-Energy Benefits” (Variable “H”) rather than the “Total Per Unit Present Value Benefits” (Variable “J”).**

Response IR-24:

- a) The only costs that are not included in Column L, Per Unit Program Administrative Cost, are direct incentive costs and enabling strategies. All other administrator costs are reflected in this column, including direct install costs; evaluation and verification; program support; marketing, salaries, benefits, training, and information technology.
- b) Please note, column AK in EfficiencyOne (NSPI) RIR-31, attachment 1 is “TRC (Ratio)” and not “Total Avoided Cost Benefits” as presented in the question. “Per Unit Present Value Non-Energy Benefits” is “Variable I”, not “Variable H” as presented in the question.
- “Net Total Resource Benefit-Cost Ratio (TRC)” (Column U) and “TRC (Ratio)” (Column AK) both use “Per Unit Present Value Avoided Cost Benefits (\$)” (Variable “H”) and not “Per Unit Present Value Non-Energy Benefits” (“Variable I”).

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1

2

EfficiencyOne notes that non-Energy benefits were not considered as an avoided cost

3

stream in the 2020-2022 Resource Plan. Therefore, “Per unit Present Value Avoided Costs

4

Benefits” (column Q) is the only applicable benefit column to the TRC calculation. Column

5

Q and “Total Per Unit Present Value Benefits” (column S) are identical.

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Request IR-25:

Please refer to Appendix A pages 14 through 16 and Appendix C pages 2 through 4. Throughout the 3 Plan years, planned savings between the Preferred Plan and the Alternate Plan differ by 10 percent to 17 percent for the three residential programs, however planned savings between the two plans differ by 20 percent to 28 percent for low-income participants. Please explain why low-income customers see a proportionally higher reduction in savings in the Alternate Plan.

Response IR-25:

Table 1 below presents the difference in first year energy savings from low-income participation between the Preferred Plan and Alternate Scenario.

Table 1: 2020-2022 Low-Income First Year Energy Savings

2020-2022 Low Income First Year Energy Savings (GWh)				
	Preferred Plan	Alternate Scenario	Difference	% Change
Existing Programs	34.2	30.6	3.7	-11%
Affordable Multi-Family Housing & Non-Profit Organizations	4.8	2.4	2.4	-50%
First Nations Home Energy Efficiency	2.9	1.9	1.0	-33%
TOTAL	41.9	34.9	7.0	-17%

Energy savings associated with the Affordable Multi-Family Housing & Non-Profit Organizations and First Nations Home Energy Efficiency program components see a proportionally higher reduction in savings in the Alternate Scenario because they were reduced to a greater level than

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1 the other program components in the Alternate Scenario. These two program components have a
2 higher unit cost than EfficiencyOne's existing programs and as a result, generate fewer energy
3 savings. EfficiencyOne made the decision to increase the investment in both of these slightly as
4 compared to the level of investment from the 2019 pilots but not at the same level of the Preferred
5 Plan.

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Request IR-26:

Refer to Page 9 of 37 of Appendix B, which states: “measures installed in 2022 (the last year of the DSM delivery period) have an average measure life of approximately 14 years at the portfolio level, so the avoided costs period is 2020-2035.”

a. How does E1 assume energy savings decay over time in its analysis? Does it assume different measure life values by program or by measure?

b. What is the maximum measure life?

c. What is the minimum measure life?

d. What is the median measure life?

e. What is the average measure life, by program?

f. Does EfficiencyOne expect the analysis to substantially underestimate or overestimate the avoided costs because it does not include avoided costs after 2035? Please explain why.

Response IR-26:

a) The model uses a ‘rectangular’ shape of lifetime savings, when savings are plotted against time.

For the calculation of avoided costs, a portfolio-level weighted average measure life is calculated for each year of DSM programming, and it is assumed that all measures

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installed in that year produce savings over this timeframe that are equivalent to those
in the first year.

For the calculation of lost revenues, a rate class-level weighted average measure life is
calculated for each rate class, for each year of DSM programming, and it is assumed
that all measures installed in that year produce savings over this timeframe that are
equivalent to those in the first year.

b) The maximum measure life is 36 years, for the New Residential – Whole Home tier 3
measure.

c) The minimum measure life is 2.9 years, for projects in the Energy Management
Information Systems and Strategic Energy Management program components.

d) The median measure life is 14.9 years, calculated using all measures in all programs.

e) Please see Table 1 below for weighted-average measure lives by program and by year.
These figures were calculated by dividing program-level lifetime energy savings (summed
from measure-level lifetime savings) by program-level first-year energy savings.

Table 1: Weighted-Average Measure Life by Program and Year

Program	Weighted-average measure life (years)		
	2020	2021	2022
Efficient Product Rebates (Residential)	7.2	6.8	6.9
Existing Residential	14.7	15.1	15.0
New Residential	30.1	30.1	30.1
Efficient Product Rebates (BNI)	14.3	14.4	14.4
Custom Incentives	13.8	13.8	13.8
Direct Installation	13.4	13.4	13.4

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- 1
- 2 f) The analysis does not use avoided costs beyond 2035 because it uses a ‘rectangular’ shape
- 3 of lifetime savings, which results in the last modeled impacts occurring in 2035. This
- 4 method accounts for the total lifetime savings, but attributes them to different years than
- 5 would occur using measure-level measure lives. EfficiencyOne has not conducted any
- 6 analysis to estimate what the impact would be of using any other means of modelling
- 7 lifetime impacts.

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Request IR-27:

Refer to Page 1 of 37 of Appendix B, which states: “The analysis examines DSM effects in isolation of utility effects such as the specific timing of infrastructure upgrades or general rate applications, or the creation of rate stability periods.”

- a. How might utility effects affect the rate and bill impacts as estimated in these analyses? Would they have an upward or downward effect?**
- b. Which specific utility effects are most likely to happen during the current RBIA period, and have substantial impacts on the results of the RBIA?**
- c. Can EfficiencyOne conduct sensitivities that include a sample of utility effects? Does EfficiencyOne expect that such a sensitivity would provide useful information? Why or why not?**

Response IR-27:

- a) EfficiencyOne has not conducted any analysis to examine what effect non-DSM factors may have on rates.
- b) Please refer to part a) of this IR response. The rate stability period will end at the end of 2019, after which NS Power may file a general rate application. Such an application would affect rates but would not affect the results of the RBIA as the analysis does not consider these other utility effects.
- c) EfficiencyOne’s position is that it should only be responsible to estimate the rate and bill impacts caused by electricity DSM activities that it conducts. If a similar analysis is desired to examine the impacts of utility effects, EfficiencyOne considers NS Power to be in a

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1 better position to perform that analysis. If utility-system effects were included in
2 EfficiencyOne's analysis as sensitivities, in particular effects that directly impact rates such
3 as general rate applications or rate stability periods, the resulting rate and bill impacts could
4 easily be misinterpreted as being attributed to DSM when they are in fact caused by
5 underlying utility activities.

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Request IR-28:

Refer to Footnote 2 on Page 3 of 37 of Appendix B, which states that the analysis “assumes an average consumer discount rate of 3 percent.” What is the discount rate based on?

Response IR-28:

This discount rate approximates the average consumer mortgage interest rate, i.e., the average rate at which customer bill savings may be invested. Its only use in the analysis is to estimate the net present value of lifetime NS Power customer bill savings resulting from the Plan (\$477 million in 2020 dollars for the Preferred Plan, and \$423 million for the Alternate Scenario).

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Request IR-29:

Refer to Page 6 of 37 of Appendix B, which states that the “annual avoided [energy] costs in this model are from the 2014 IRP.”

a. Does EfficiencyOne expect current avoided energy costs to be different from the avoided costs included in the 2014 IRP? If so, please explain the basis for this expectation.

b. In what direction does EfficiencyOne expect current avoided energy costs to be different from the avoided costs included in the 2014 IRP?

c. What magnitude does EfficiencyOne expect current avoided energy costs to be different from the avoided costs included in the 2014 IRP?

d. Has EfficiencyOne considered how a difference in the avoided energy costs would impact the results of the RBIA? If so, please describe any related analysis or results. If not, why not?

Response IR-29:

a) Please refer to EfficiencyOne’s response to Synapse IR-02.

b) Please refer to part a) of this IR response.

c) Please refer to part a) of this IR response.

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d) In its 2017 RBIA Report, EfficiencyOne included a sensitivity analysis of avoided energy costs in Appendix D¹, which examined scenarios where the avoided costs rates were altered by +/- 25%. The model has evolved since this time with the changes described in Appendix B of the 2020-2022 DSM Resource Plan Application, including a switch from levelized to annual avoided energy costs, so these impacts may not be indicative of how the current model would react to the same sensitivity adjustments.

Table B: Key Output Sensitivity to Changes in Avoided Cost of Energy

Rate Class	Rate Impact			Participant Bill Impact			Non-Participant Bill Impact		
	Low (-25%)	Base	High (+25%)	Low (-25%)	Base	High (+25%)	Low (-25%)	Base	High (+25%)
Residential	1.6%	0.3%	-1.1%	-5.7%	-6.8%	-7.9%	1.5%	0.2%	-1.0%
Small General	2.4%	0.9%	-0.6%	-7.4%	-8.6%	-9.7%	2.2%	0.8%	-0.5%
General	2.0%	0.6%	-0.8%	-3.8%	-5.1%	-6.4%	1.7%	0.3%	-1.1%
Large General	1.8%	0.6%	-0.6%	-2.8%	-4.0%	-5.2%	1.5%	0.3%	-1.0%
Small Industrial	2.0%	0.6%	-0.7%	-4.3%	-5.5%	-6.8%	1.6%	0.3%	-1.1%
Medium Industrial	1.4%	0.2%	-1.0%	-1.2%	-2.3%	-3.5%	1.1%	-0.1%	-1.3%
Large Industrial	1.4%	0.0%	-1.5%	-1.2%	-2.5%	-3.9%	1.2%	-0.3%	-1.7%

¹ M08372, EfficiencyOne, *2017 Rate and Bill Impact Analysis* (31 Oct. 2017), at App. D.

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Request IR-30:

Refer to Page 6 of 37 of Appendix B, which states: “EfficiencyOne adopted a recommendation to levelize the annual avoided capacity costs from the 2014 IRP over the RBIA study period.”

- a. Does EfficiencyOne expect current avoided capacity costs to be different from the avoided capacity costs included in the 2014 IRP? If so, please explain the basis for this expectation.**
- b. In what direction does EfficiencyOne expect current avoided capacity costs to be different from the avoided costs included in the 2014 IRP?**
- c. What magnitude does EfficiencyOne expect current avoided capacity costs to be different from the avoided costs included in the 2014 IRP?**
- d. Has EfficiencyOne considered how a difference in the avoided capacity costs would impact the results of the RBIA? If so, please describe any related analysis or results. If not, why not?**

Response IR-30:

- a) Please refer to EfficiencyOne’s response to Synapse IR-02.**
- b) Please see part a) of this IR response.**
- c) Please see part a) of this IR response.**

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d) In its 2017 RBIA Report, EfficiencyOne included a sensitivity analysis of avoided capacity costs in Appendix D¹, which examined scenarios where the avoided costs rates were altered by +/- 25%. The model has evolved since this time with the changes described in Appendix B of the 2020-2022 Plan Application, so these impacts may not be indicative of how the current model would react to the same sensitivity adjustments.

Table A: Key Output Sensitivity to Changes in Avoided Cost of Capacity

Rate Class	Rate Impact			Participant Bill Impact			Non-Participant Bill Impact		
	Low (-25%)	Base	High (+25%)	Low (-25%)	Base	High (+25%)	Low (-25%)	Base	High (+25%)
Residential	0.7%	0.3%	-0.1%	-6.5%	-6.8%	-7.1%	0.6%	0.2%	-0.1%
Small General	1.4%	0.9%	0.5%	-8.2%	-8.6%	-8.9%	1.2%	0.8%	0.4%
General	1.0%	0.6%	0.2%	-4.7%	-5.1%	-5.4%	0.7%	0.3%	-0.1%
Large General	1.0%	0.6%	0.2%	-3.7%	-4.0%	-4.3%	0.6%	0.3%	-0.1%
Small Industrial	1.0%	0.6%	0.2%	-5.2%	-5.5%	-5.9%	0.7%	0.3%	-0.1%
Medium Industrial	0.6%	0.2%	-0.1%	-2.0%	-2.3%	-2.6%	0.2%	-0.1%	-0.5%
Large Industrial	0.4%	0.0%	-0.5%	-2.1%	-2.5%	-2.9%	0.2%	-0.3%	-0.7%

¹ M08372, EfficiencyOne, 2017 Rate and Bill Impact Analysis (31 Oct. 2017), at App. D.

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Request IR-31:

Refer to Page 6 of 37 of Appendix B, which states that EfficiencyOne applies “a conservative escalation rate of 2.0 percent per year” to its avoided transmission and distribution costs. What is this escalation rate based on?

Response IR-31:

Avoided transmission and distribution costs were provided by NS Power in October 2018 for three years: 2014, 2016 and 2017 (please refer to EfficiencyOne’s response to SBA IR-13). Looking at the 3-year escalation from the 2014 values to the 2017 values, the average avoided transmission cost escalation rate was 50% per year, and the average avoided distribution cost escalation rate was 16%. EfficiencyOne determined that since these escalation rates were calculated over such a short timeframe, they may not be representative of the true long-term escalation in load-growth-related transmission and distribution investments and determined it appropriate to use 2%. This escalation rate reflects the Bank of Canada’s current inflation target rate.¹

¹ <https://www.bankofcanada.ca/core-functions/monetary-policy/inflation/>

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Request IR-32:

Refer to Page 10 of 37 of Appendix B, Table 1. Are the values in dollars per MW per year for the following avoided costs: (a) capacity, (b) transmission, and (c) distribution? If not, please identify the units.

Response IR-32:

Yes, the \$/MW values are applied to each year of DSM savings. For example, a DSM program year with a weighted-average measure life of 14 years would have these values applied to the system-coincident peak demand reduction in each of those 14 years.

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Request IR-33:

Refer to Page 10 of 37 of Appendix B, which states: “There remains considerable uncertainty regarding the avoided T&D cost estimates; it has been suggested that the actual avoided T&D values may be in the range of thirty to one hundred times the values provided by NS Power.”

a. Please provide all data sources and documentation on the actual avoided T&D values that EfficiencyOne is aware of.

Response IR-33:

a) Attachment 1 of this IR response includes two documents provided by NS Power on 7 October 2016. This is the original source of avoided T&D estimates used by EfficiencyOne.

A presentation was provided by NS Power to the Demand Side Management Advisory Group (DSMAG), dated 24 October 2018, regarding revisions that it proposed EfficiencyOne make to its Rate and Bill Impact Analysis prior to the 2020-2022 DSM Plan filing. Slide 16 of this presentation presents updated avoided T&D estimates. This presentation is provided in NS Power’s Evidence in this matter.

On 21 January 2019, EfficiencyOne circulated a memo to the DSMAG that included a response to NS Power’s proposed enhancements from its 24 October 2018 presentation and proposed actions forward for these and other issues. Attachment 2 of this IR response is a letter of comment from Paul Chernick of Resource Insight Inc., representing the Consumer Advocate, in response to EfficiencyOne’s 21 January 2019 memo. On

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- 1 page 3 of 4, in the “New Issue 2” section, Mr. Chernick discusses potential issues with
2 NS Power’s derivation of its avoided T&D cost estimates.



PO Box 910 • Halifax, Nova Scotia • Canada • B3J 2W5

October 7, 2016

Emily Mason
Manager of Regulatory Affairs and Planning
Efficiency Nova Scotia
230 Brownlow Avenue, Suite 300
Dartmouth, NS B3B 0G5

Re: Initial estimate of T&D avoided costs for historic Rate and Bill Impact Analysis (M07543 – 2016-2018 DSM Deferred Matters)

Dear Ms. Mason:

This letter is in response to EfficiencyOne's letter to the NSUARB on September 13, 2016 with regards to M07543 – EfficiencyOne 2016-2018 DSM deferred matters, in particular to the historic looking Rate and Bill Impact Analysis model (RBIM) EfficiencyOne will be filing at the end of October.

NS Power committed to sharing initial estimates for T&D avoided costs in early October in order for EfficiencyOne to include these estimates in the historic looking RBIM.

Based on our initial review of the annual capital expenditures for transmission and distribution avoided costs are estimated as below:

Transmission	\$8,365.06 /MW
Distribution	\$3,524.35 /MW

The methodology for estimating these avoided costs is described in appendix A of this letter.

Yours truly,

Jennifer Parker
Director, Customer Solutions

Cc:

Mark Robertson
Matthew Davidson

Initial Estimate of T&D Avoided Costs

ACE Plans¹ and associated Board decisions for the past eight years were utilized to determine which Transmission and Distribution (T&D) capital investments were related to load growth, as opposed to sustaining and maintenance work.

Load growth related investments include reconductoring, voltage conversions, substation construction, distribution system expansion, and other related activities. In the instance that an investment was carried over into a subsequent year, the amount of carry-over was subtracted from the preceding year's investments. Additionally, items that were not approved or indicated as being deferred were removed from any calculations.

The completed analysis included;

- o Review of available ACE plan data for the period from 2008 - 2015
- o Identification of load growth related items
- o Confirmation of project approval status
- o Identification of transmission or distribution status
- o Attributing of project costs to the appropriate year, taking carry over into account
- o Comparison of growth related costs to total transmission / distribution spend

Historic system peak information used in the analysis was obtained from Figure 2 of the 2016 10 Year System Outlook² Report (Coincidental Peak Demand with Future DSM Program Effects). The forecasted values were not utilized for this analysis.

Initial estimates of T&D Load Growth are as follows:

- Transmission \$8,365.06 /MW
- Distribution \$3,524.35 /MW

¹ https://nsuarb.novascotia.ca/sites/default/files/nsuarb-225787-v1-communications_plan_-_ace_plan_faq_-_final_version_-_j_2.pdf

² <http://oasis.nspower.ca/site/media/oasis/20160630%20NSPI%20to%20UARB%2010%20Year%20System%20Outlook%20Report.pdf>

Resource Insight Inc.
MEMORANDUM

To: Efficiency Nova Scotia
DSM AG

From: Paul Chernick

Date: February 11, 2019

Subject: Comments on RBIA Enhancements

ENS Issue 1a: annual avoided fuel costs

Annual avoided costs are appropriate.

ENS Issue 1b: marginal avoided fuel costs versus cost change from no DSM

The fuel benefit of DSM is the change in costs from the without-DSM case to the with-DSM case. Marginal fuel costs are quite slippery for a utility (including NS Power) with major commitment costs; the value of a 1 kW reduction (in \$/MWh) may be much smaller than the value of a 50 MW reduction with full re-optimization of dispatch.

NS Power has encountered considerable difficulty in defining marginal fuel costs for Port Hawkesbury Paper, even after the fact.

ENS Issue 1c: timeframe for levelization of avoided costs

The avoided capacity costs should be estimated annually for the benefits of seasonal and annual mothballing of resources, incremental firm exports, or avoided firm imports, until the DSM allows the permanent retirement of a unit and/or delay of a generator addition. The latter costs should be levelized in real terms.

ENS Issue 1d: further breakdown of lost revenues and avoided costs into those arising from fuel and fixed rate components

I agree that NS Power needs to provide more explanation of its approach.

ENS Issue 1e: better class allocation ratios for lost revenues and avoided costs

I agree that NS Power needs to provide more explanation of its approach.

The final methodology should reflect, for example, that the COSS will assign the residential class more of the cost of a dollar of lost revenue from residential or

small-commercial DSM than a dollar of lost revenue from industrial DSM or any DSM within an MEU.

ENS Issue 1f: modelling of billed demand reductions

Reductions in billed demand are likely to differ from reductions in contribution to system peak. Any measure that reduces minutes of equipment usage, rather than the electric consumption per minute, should be assumed to have no effect on billing demand and hence no lost revenue from the demand charge. This would include the effects of occupancy sensors, set-back thermostats, building-shell measures (insulation, window treatments), the effect of reduced internal load on cooling, and any other measures that reduce equipment running time.

Customer billing loads occur in every month, while the annual system peak occurs on only one day a year. A significant number of customer peaks will occur on weekends (especially for houses of worship, multi-family housing, and entertainment venues), even though the system peaks on a weekday.

Even if DSM reduces billing demand on what would have been the customer's monthly peak, it may have much less effect on another high-load hour, which then sets the customer's billing demand. The lost demand revenues result from the difference between the original peak and the peak on another hour with the modified load curve.

Estimating lost demand revenues will require more work and more data from NS Power.

ENS Issue 1g: Energy and demand cost escalation rate

The 2.7% escalation rate seems appropriate.

DSMAG Issue 2: Treatment of Municipal Electric Utilities

Treating the municipal utilities as customers in Rate 24 seems reasonable. Reduced energy usage by the MEU customers would reduce NS Power revenues at the Rate 24 tariff rates.

DSMAG Issue 3: Expand the participation assumptions section within the report

I remain concerned that NS Power has not made more progress in developing the RBIA model, considering NS Power's concern about rate pressure from the DSM programs.

New Issue 1: Which avoided costs to use when avoided cost estimates change

The choice of appropriate avoided costs depends on the purpose of the analysis. For prospective analyses, the avoided costs should reflect the best available information at the time that the DSM plan is being developed and screened.

For retrospective analyses, the Board may prefer to see the estimated benefits for savings in 2019, for example, from the perspective of the information available in 2020. Or the Board may want to know the benefits of the 2025–2035 savings from the investments made in 2019, given avoided costs estimated in 2024. The Board should decide what cost-benefit comparisons it wishes to review. There is no uniquely relevant perspective for retrospective analyses.

New Issue 2: Avoided costs for 2020-2022 DSM Plan RBIA

Using the 2014 IRP avoided generation costs in 2019 analyses for the 2020–2022 DSM Plan is regrettable, but it is not clear that NS Power can be induced to address the many outstanding problems in the avoided costs prior to the next IRP.

Efficiency Nova Scotia should not use the avoided T&D values proposed by NS Power. It is not clear whether NS Power included all the load-related projects, how it aligned the spending and load growth, and whether the distribution loads were adjusted to exclude any growth by transmission customers or discounted to reflect growth by customers served at primary voltages.

While NS Power has not provided the derivation of its values, it appears to have divided the T&D investments related to load growth by the entire NS Power load. For example, for 2016, dividing about \$9M in load-related T&D (NSP presentation, p. 17) by 2,111 MW of peak load would produce about \$4,500/MW. NS Power reports about \$3,500/MW for that value (NSP presentation, p. 16); I cannot determine why NSP's data do not support its results. But even if NSP could explain these differences, it seems to have divided by the wrong load level. The \$9M in load-related projects resulted from about 96 MW of load growth from 2013 to 2014, or an average of about 26 MW from 2013–2016. Dividing the growth-related investment by the load growth would result in avoided costs for this component of \$94,000 to \$346,000/MW, thirty to one hundred times NSP's estimate.

New Issue 3: Line losses

The treatment of line losses proposed by Efficiency Nova Scotia is correct.

New Issue 4: Expiry of customers

The Efficiency Nova Scotia proposal is reasonable in the near term. Eventually, Efficiency Nova Scotia should age out measures at their average lives. For

simplicity, Efficiency Nova Scotia might group measure lives into a few bins (e.g., 5, 10 and 20 years).

Counting the number of participants is less meaningful, since a participant may experience energy savings of under 1% or as much as 20% or more. Adding together customers who received one LED lamp and customers who received major equipment replacement and building shell measures is not likely to produce valuable data. That said, it is useful to have some idea of the percentage of customers in each class who have benefited from the DSM portfolio.

New Issue 5: Weighted average versus arithmetic average effects

Weighted averages are generally appropriate.

New Issue 6: Clarifying rate impacts in NS Power's DSMAG Presentation

Both annual rate changes and cumulative changes are useful parameters.

NON-CONFIDENTIAL

Request IR-34:

Refer to Section 3.7.1 (No-DSM Scenario Rates) on Page 11 of 37 of Appendix B.

- a. How was the “approximate Program Cost Recovery amount” calculated for 2019?**
- b. On what is the “demand rate escalation factor of 2.7 percent” based?**
- c. Is the 2.7 escalation factor adjusted for inflation rates?**

Response IR-34:

a) The approximate Program Cost recovery amounts for 2019, in each rate class, can be found on each class ‘Rates’ tab in the models, filed electronically as part of the 2020-2022 DSM Resource Plan Application, in column M. They were calculated by dividing the estimated 2019 DSM investment by class by the estimated 2019 with-DSM class energy consumption. The 2019 DSM investment by class amounts were taken from the 2019 DSM Plan Rate and Bill Impact Analysis (RBIA), where they can be found on the ‘Inputs’ tab for each class.

b) This figure was originally agreed to by EfficiencyOne and NS Power for the purpose of modeling DSM impacts in the 2014 Integrated Resource Plan. EfficiencyOne reviewed the figure in 2017 and found historical (2011-2016) NS Power rate escalation to be roughly 3-4% per year, and forecast US-average electricity rate escalation over 2020-2040 to be roughly 2.5% per year. Based on these findings EfficiencyOne did not alter the assumption of 2.7%. In 2018, NS Power recommended using the rate of inflation instead of the assumed 2.7%. When preparing the 2020-2022 DSM Plan RBIA, EfficiencyOne found the most recent Bank of Canada Consumer Price Index inflation rate to coincidentally be 2.7%, so that figure was retained.

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2 c) Please refer to part b) of this IR response. The figure was the most recent inflation rate at
3 the time the analysis was prepared.

NON-CONFIDENTIAL

Request IR-35:

Refer to Page 12 of 37 of Appendix B, which states that “the planned investments within each program component were allocated to rate classes according to the distribution of actual 2017 expenditures by rate class.”

a. Please explain why 2018 expenditure data are not used.

b. When will 2018 expenditure data become available?

Response IR-35:

a) The analysis was prepared before 2018 data were available.

b) EfficiencyOne’s 2018 DSM Annual Progress Report, filed 29 March 2019¹, contains 2018 expenditure data by rate class.

¹ EfficiencyOne, ENS 2018 DSM Annual Progress Report, M09096, Exhibit E-1, March 29, 2019.

NON-CONFIDENTIAL

Request IR-36:

Refer to Page 13 of 37 of Appendix B, which states: “EfficiencyOne allocated the 2020-2022 energy and system-peak demand savings modelled by Navigant at the program component level to rate classes according to the distribution of actual 2017 energy and system-peak demand savings within each program component.” When will the actual 2018 energy and system-peak demand savings become available?

Response IR-36:

EfficiencyOne’s 2018 DSM Annual Progress Report¹, filed 29 March 2019, contains 2018 energy and system-peak demand savings by rate class.

¹ EfficiencyOne, ENS 2018 DSM Annual Progress Report, M09096, Exhibit E-1, March 29, 2019.

NON-CONFIDENTIAL

Request IR-37:

Refer to Page 15 of 37 of Appendix B, which states: “EfficiencyOne has estimated 2020-2022 participation figures based on actual participation records from 2017 (the most recent year for which EfficiencyOne has integrated participant records with previous years).” When will participation records from 2018 be integrated with previous years?

Response IR-37:

EfficiencyOne normally integrates participation records with previous years over the July-September timeframe of the following year, in preparation for the historical Rate and Bill Impact Analysis (RBIA) filed each October. In preparation of its 2019 historical RBIA, EfficiencyOne will integrate 2018 records with previous years over July-September 2019.

NON-CONFIDENTIAL

Request IR-38:

Refer to Page 19 of 37 of Appendix B, which states: “Note that these 2020-2022 impacts, in the range of three to seven percent, are calculated relative to a scenario where there are no DSM costs; these impacts are not additional to 2019 rates which include DSM costs.” Please also provide impacts relative to 2019 rates which include DSM costs.

Response IR-38:

As stated in the 2016 Consensus Agreement, “The Parties agree that EfficiencyOne’s Rate and Bill Impact Analysis will provide the average, long-term effects of DSM, and NS Power’s rate impact analysis will provide the actual annual short-term rate effects of DSM”.¹ Predicting precisely how rates will change in the short term requires information that only NS Power can calculate, for example, what exact amounts of DSM cost recovery are currently in rates, and what amounts would be in rates for each year of the DSM Plan. The information requested in this IR would typically be included in NS Power’s short-term rate impact analysis.

EfficiencyOne included an approximation of the short-term impacts at the portfolio-level in Section 4.1, pages 19-20, Appendix B (please see Figure 4 and the paragraph preceding it) to gain initial insight in advance of NS Power filing its short term rate analysis. A general finding of EfficiencyOne’s Rate and Bill Impact Analysis is that the impacts of avoided costs and the reallocation of reduced fixed revenues roughly cancel out, therefore considering only the program cost recovery amounts provides an approximation of the total rate impacts. This estimate shows that the increase from 2016-2019 approved DSM expenditures, which are understood to be in current rates, to the 2020-2022 Preferred Plan average annual expenditure is approximate 0.1 cents per kWh (an average of all rate classes).

¹ M06733, *June 30, 2016 Consensus Agreement* (22 July 2016), signed by EfficiencyOne, NS Power, Consumer Advocate, Small Business Advocate, Industrial Group, Municipal Electric Utilities of Nova Scotia, Affordable Energy Coalition, and Ecology Action Centre, at p.3, item 8b.

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Request IR-39:

Please refer to Page 1 of Appendix B. Why does EfficiencyOne exclude Unmetered customers from the analysis?

Response IR-39:

Unmetered customers do not pay \$/kWh rates like metered customers, so they do not have rate and bill impacts that can be calculated in the same manner as metered classes. Since they do not pay \$/kWh rates they also have a limited motivation to participate in DSM programs to reduce their consumption and incrementally reduce their bills.

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Request IR-40:

Refer to the Appendix B workbooks, “Attribution” tab. Why does the model estimate total lost revenues and total avoided costs for all customers together, and then reallocate these lost revenues and avoided costs to each rate class based on historical revenue shares by rate class?

Response IR-40:

Prior to EfficiencyOne’s 2016 historical Rate and Bill Impact Analysis (RBIA), the model calculated avoided capacity costs within each rate class and kept those savings within each rate class. This early version of the model did not account for the reallocation of fixed costs. In 2016, following discussions with the Demand Side Management Advisory Group, EfficiencyOne added the ability to account for the reallocation of fixed costs, which required the addition of avoided energy costs. At that time, EfficiencyOne revised the model to calculate avoided costs at the portfolio level, to calculate the fixed cost reallocation amounts at the class level and sum them to the portfolio level, and to reallocate both avoided costs and fixed revenues back to classes using a fixed set of allocation percentages. This change was recommended by EfficiencyOne’s RBIA modeling consultant, Elenchus Research Associates, after they reviewed two rounds of stakeholder feedback on potential RBIA enhancements.

The method is intended to approximate the reallocations that might occur through a Cost-of-Service Study, without replicating the full complexity of such a study within the RBIA model.

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Request IR-41:

Refer to the Appendix B workbooks, “R-Savings” tab. Why does the model assume an average measure life as the shape of the decay schedule, rather than a realistic, gradual decay of savings from day 1 and extending beyond the average measure life?

Response IR-41:

The DSM measures installed by EfficiencyOne have a range of assumed measure lives, so any grouping of these measures (e.g., program, rate class, portfolio) has a different weighted-average measure life. The model uses a weighted-average measure life at the portfolio level for the calculation of avoided costs and at the rate class level for the calculation of lost revenues. This produces ‘rectangular’ decay shapes when savings are plotted against time.

The use of weighted-average measure lives is a common means in the industry to describe the lifetime impacts of different initiatives. EfficiencyOne has historically used weighted-average measure lives in its RBIA since the analysis is compiled using reported first-year and lifetime program savings by rate class as opposed to measure-level information which would contain the additional granularity required to develop a more sophisticated decay rate.

EfficiencyOne has considered making such a revision to the RBIA but considers the level of effort necessary to make the change to be unwarranted. Developing and using decay rates in the RBIA model is possible but would require significant changes to the means in which EfficiencyOne compiles input information for the analysis, as well as significant overhauls to the structure of the model.

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Request IR-42:

Refer to Page 33 of NS Power’s evidence, which states: “As proposed by NS Power in its comments on the 2016 RBIA report, the effect of fuel cost savings should be determined and shown separately from fixed cost savings or losses. This means that the difference between the lost revenues and avoided costs should be further broken down by the fuel and fixed components for each class. This would improve the accuracy of the RBIA results, reflecting the fact that cost causation varies between rate classes for fuel consumption and their use of fixed infrastructure.” What is the impact of this proposal on the complexity of the modeling? Does EfficiencyOne have other concerns regarding this proposal?

Response IR-42:

EfficiencyOne, when looking at the uses of the RBIA model, considers the balance between the level of modelling accuracy and the impact on costs related to preparation and review as well the effect this will have on the model outputs.

EfficiencyOne’s forward-looking RBIA is used by the NSUARB and stakeholders to consider the rate impacts of potential DSM investment decisions at a high level; it is not used to set rates. EfficiencyOne’s historical RBIA, filed each year, is not directly related to any investment decisions, and serves only to update the NSUARB and stakeholders in the years between.

Regarding NS Power’s proposal to further break down the difference between lost revenues and avoided costs by the fuel and fixed components for each class, EfficiencyOne has the following concerns about such an approach:

1. That it may add unnecessary complexity to already complex analysis, making it more difficult to interpret and increasing ratepayer costs associated with preparing and reviewing the analysis, without providing enough new information as to impact DSM investment decisions; and

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2. That it may require EfficiencyOne to perform and file an analysis with the NSUARB that
includes rate-setting calculations which have already been performed by NS Power.

EfficiencyOne expressed concerns regarding NS Power’s proposal in a memo sent to stakeholders
on 21 January 2019 regarding the proposed enhancements to the RBIA model for the 2020-2022
DSM Plan, included as Attachment 1 to this IR response, pages 8-10.



Proposed enhancements to EfficiencyOne Rate and Bill Impact Model

21 January 2019

2019 RBIA Updates

Purpose

Propose enhancements to EfficiencyOne's Rate and Bill Impact Analysis (RBIA) model and report.

Overview

1. Describe issues assigned to EfficiencyOne and the DSMAG from the 2017 RBIA Summary of Actions, with proposed actions for each.
2. Describe other new issues raised by NS Power and EfficiencyOne since 2017, with proposed actions for each.

Source Information for this Discussion

- 2016 Consensus Agreement
- Stakeholder comments, EfficiencyOne replies, and UARB letters re: EfficiencyOne's 2017 and 2018 historical RBIA filings
- Additional suggestions from NS Power in October 2018
 - DSMAG presentation
 - Revised version of EfficiencyOne's 2017 RBIA model
- New Issues #1 and #6 are introduced here for the first time

2017 Summary of Actions

2017 Summary of Actions (from EfficiencyOne reply comments)

Actions for ENS

1. Work with NS Power to explore issues, including:
 - a. use of annual avoided fuel costs;
 - b. use of marginal avoided fuel costs instead of those made relative to a no-DSM scenario;
 - c. timeframe for levelization of avoided costs;
 - d. further breakdown of lost revenues and avoided costs into those arising from fuel and fixed rate components;
 - e. development of better class allocation ratios for lost revenues and avoided costs;
 - f. modelling of billed demand reductions; and
 - g. the energy and demand cost escalation rate.
2. Continue to discuss the value of a broad participation study with Synapse.
3. Expand the participation assumptions section within the report.
4. Provide a more complete explanation of changes to estimated rate and bill impacts relative to the previous year's report.
5. Consolidate model inputs which are common to all classes on a separate Excel tab.
6. Investigate potential model errors noted by Resource Insight and remediate where necessary.

Actions for the DSM Advisory Group

1. Review and discuss results of ENS and NS Power collaboration on issues listed above, as well as any other outstanding issues or questions.
2. Discuss treatment of Municipal Electric Utilities as customers of NS Power within the RBIA model.
3. Discuss development and first usage of NS Power rate impact model.

New Issues

New Issue #1 – Which avoided costs to use when avoided cost estimates change

New Issue #2 – Source of avoided costs for 2020-2022 DSM Plan RBIA

New Issue #3 – Line losses

New Issue #4 – Expiry of customers

New Issue #5 – Average Bill Impact graphs should reflect weighed average as opposed to arithmetic average effects

New Issue #6 – Clarifying rate impacts in NS Power's DSMAG Presentation

2017_ENS_1a) Use of annual avoided fuel costs

Issue

- Should the model use annual or levelized avoided fuel costs?

Considerations

- 2016 Consensus Agreement indicated that levelized costs would be used
- NS Power has proposed that annual fuel costs be used
- Main risk of using annual avoided costs in the model is that it will introduce greater volatility in output data:
 - Some volatility will be caused by DSM (e.g. avoided generating unit); however the exact timing is not particularly useful in determining average, long-term impacts of DSM
 - Some volatility will not be caused by DSM, which cannot be explained by EfficiencyOne (e.g. fuel cost fluctuation)
- Rates escalate across years in the model (i.e. estimated fuel cost recovery mechanism is not levelized)

Proposed action

- Switch to annual avoided fuel costs instead of levelized avoided fuel costs

2017_ENS_1b) Use of marginal avoided fuel costs instead of those made relative to a no-DSM scenario

Issue

- Should marginal fuel costs be used in place of IRP avoided fuel costs?

Considerations

- Marginal fuel costs are similar, but not the same as IRP avoided fuel costs:
 - **Marginal fuel costs** (in \$/MWh) represent the incremental fuel cost savings that would be realized by reducing the actual energy load by a marginal amount. This is done by identifying which generating unit is “on the margin” and calculating its average fuel cost per MWh.
 - **IRP avoided fuel costs** (also in \$/MWh) are estimated via IRP modeling of different levels of DSM savings (Difference in Revenue Requirements method). The annual fuel-related revenue requirements in each year are compared between the relevant no-DSM scenario and each of the DSM scenarios (Base, Mid, etc.), producing a different set of avoided costs for each DSM scenario that is accurate for the level of savings modeled in the analysis (or thereabouts).
- NS Power’s proposal to use marginal fuel costs may have been mischaracterized in the 2017 Summary of Actions; upon detailed review of NS Power’s proposed revisions to EfficiencyOne’s model, it seems the proposal is to use marginal fuel costs as a means to estimate future rates as part of NS Power’s proposed means of estimating rate impacts (not in place of IRP avoided fuel costs due to DSM)

Proposed action

- End discussion on using marginal costs in place of IRP avoided costs as it seems this was a mischaracterization of NS Power’s proposal
- Discuss use of marginal fuel costs in the context of NS Power’s proposed means of estimating rates

2017_ENS_1c) Timeframe for levelization of avoided costs

Issue

- Where avoided costs are levelized, over what timeframe should they be levelized? (i.e. which years of annual avoided costs should be included in the levelization equation?)

Considerations

- Historically EfficiencyOne has used the levelized values provided by NS Power from each IRP, which were levelized over the study period of the IRP
- EfficiencyOne is in possession of the annual avoided capacity costs from the 2014 IRP
- A levelization could be performed across the period for which the avoided costs are to be applied
- Re: Confidentiality, EfficiencyOne would perform these levelizations offline, and include only the levelized values in the RBIA model (filed publicly); NS Power would need to continue to provide EfficiencyOne with annual values from each IRP

Proposed action

- Levelize the capacity costs over the period for which they are applied
- Use the same method for transmission and distribution costs if they are modeled in an IRP

2017_ENS_1d) Further breakdown of lost revenues and avoided costs into those arising from fuel and fixed rate components

Issue

- Should EfficiencyOne adopt NS Power's proposed means of estimating the fixed cost adjustment?

Considerations

- EfficiencyOne held a series of stakeholder consultations in 2016 to develop a stakeholder-supported means of estimating the fixed cost adjustment
 - NS Power did not make recommendations on how this could be achieved within EfficiencyOne's model; it instead proposed that EfficiencyOne use a short-term rate impact model that NS Power was developing
 - Synapse, Resource Insight and Drazen Consulting all proposed the same general method, which did not rely on detailed knowledge of fixed costs by rate class
 - NS Power agreed that the Synapse/RI/Drazen method was transparent and aligned with their preferred approach
- In its comments on the 2017 and 2018 RBIA's, NS Power provided versions of EfficiencyOne's RBIA models that it had altered to use a proposed new approach to breaking down lost revenues and avoided costs into fuel and fixed components
 - These methods rely on estimates of the fixed cost components of rates that NS Power had not provided at the time the DSMAG was advising EfficiencyOne on developing a method of estimating the fixed cost adjustment
 - Had this information been available at the time, it may have affected the chosen method of estimating the fixed cost adjustment

2017_ENS_1d) Further breakdown of lost revenues and avoided costs into those arising from fuel and fixed rate components

Considerations - continued

- While NS Power's methodology may in fact be sound and could potentially be adopted in the future, the information provided by NS Power (mainly the altered versions of EfficiencyOne's models) is not sufficient to justify a switch to this method. Some further discussion with NS Power is warranted, including at minimum:
 - Transparently explaining the methods to EfficiencyOne and the DSMAG;
 - Identifying the sources and calculation methodologies of each new piece of input data, including when and how they will be updated;
 - Identifying which, if any, values NS Power considers confidential (considering EfficiencyOne files the model publicly);
 - Confirming that NS Power would provide this data on an ongoing basis;
 - Working together to determine if the proposed method could be made any simpler or easier to comprehend;
 - Working together to determine if elements of this method that don't pertain to DSM could be conducted by NS Power, with results provided to EfficiencyOne to use as model inputs, instead of requiring EfficiencyOne to make and file assumptions and calculations about ratemaking which are not related to DSM;
 - Evaluating whether the impacts to model outputs are significant enough to warrant an increase in model complexity;
 - Ensuring the DSMAG fully understands and supports the proposed methods, considering the group helped to develop the existing methods.

Proposed action

- Continue using the existing method
- Discuss the proposal in greater detail with NS Power for possible adoption in future RBIA's

2017_ENS_1e) Development of better class allocation ratios for lost revenues and avoided costs

Issue

- Should EfficiencyOne adopt NS Power's proposed means of allocating lost revenues and avoided costs to rate classes?

Considerations

- The model currently uses a single set of rate class allocation ratios, developed for a single year (2013), but applied to all years under the assumption that class consumption and number of customers will not change significantly over the term of the analysis
- No clear guidance on the ideal model complexity in this regard:
 - Some stakeholders contend it should reflect the Cost of Service Study methods to be as accurate as possible
 - EfficiencyOne's modeling consultant Elenchus has contended that a COSS-level of complexity is unnecessary considering the analysis only provides long-term average impacts for informational purposes (i.e. it is not used to actually set rates)
- This issue is very closely tied to the previous issue as they are both parts of the same methodology proposed by NS Power, and requires further discussion, including at minimum:
 - Transparently explaining the methods to EfficiencyOne and the DSMAG;
 - Identifying the sources and calculation methodologies of each new piece of input data, including when and how they will be updated;
 - Identifying which, if any, values NS Power considers confidential (considering EfficiencyOne files the model publicly);
 - Confirming that NS Power would provide this data on an ongoing basis;
 - Working to see if the proposed method could be made any simpler or easier to comprehend;
 - Working to see if elements of this method that don't pertain to DSM could be conducted by NS Power, with results provided to EfficiencyOne to use as model inputs, instead of requiring EfficiencyOne to make and file assumptions and calculations about ratemaking which are not related to DSM;
 - Evaluating whether the impacts to model outputs are significant enough to warrant an increase in model complexity;
 - Ensuring the DSMAG fully understands and supports the proposed methods.

Proposed action

- Continue using the existing method
- Discuss the proposal in greater detail with NS Power for possible adoption in future RBIs

2017_ENS_1f) Modeling of billed demand reductions

Issue

- How to estimate reductions in billed demand, for the purpose of calculating lost demand-based revenues?

Considerations

- Evaluated demand savings are measured at the time of the overall system peak
- Customers are charged based on their individual system peak, which is not related to the overall system peak
- Underlying issue: customer demand charges do not necessarily correlate to customer contributions to system demand costs
 - Different commercial rate design could mitigate or eliminate the need to estimate customer-coincident demand reductions (new AMI rates?)
- Current method assumes that, by class, the ratio of total customer peaks to system peak is the same as the ratio between customer peak reductions and system peak reductions
- Better assumptions could potentially be developed using AMI data

Proposed Action

- Continue using the existing method as it is still the only practical option
- Wait and see if:
 - New rate designs (post-AMI) change the relationship between customer peak demand and system-coincident peak demand
 - EfficiencyOne develops the capability to quantify peak savings through customer AMI data (this field of DSM savings quantification is still in its early development)

2017_ENS_1g) The energy and demand cost escalation rate

Issue

- How should we assume energy and demand rates change beyond the period in which they are known?

Considerations

- 2014 IRP assumption was 2.7% increase per year – this was agreed to by EfficiencyOne and NS Power for the purpose of modeling DSM impacts
- Historical rate escalation in NS (2011-2016) was roughly 3-4% per year
- Forecast US-average electricity rate escalation over 2020-2040 is roughly 2.5% per year (U.S. Energy Information Administration)
- NS Power suggested using the rate of inflation
 - Bank of Canada Consumer Price Index Inflation
<https://www.bankofcanada.ca/rates/indicators/capacity-and-inflation-pressures/inflation/historical-data/>
 - Rising since mid 2016
 - Most recent data point is 2.7% for 2018-Q3

Proposed Action

- Continue using 2.7% per year

2017_DSMAG_1) Review and discuss results of ENS and NS Power collaboration on issues listed above, as well as any other outstanding issues or questions

- EfficiencyOne invited comments from stakeholders after NS Power's October 2018 DSMAG presentation
 - No comments were received
- EfficiencyOne is now inviting comments from stakeholders on its proposed actions included in this presentation
 - Due 31 January 2019

2017_DSMAG_2) Discuss treatment of Municipal Electric Utilities as customers of NS Power within the RBIA model

Issue

- How should Municipal Electric Utilities (MEUs) be treated within the RBIA model?

Considerations

- Focus of the analysis has historically been on all major NS Power rate classes; not every rate class in NS
- MEUs are modeled as NS Power Rate Class 24 (6 MEUs are the only members of that class)
- The RBIA is conducted as a requirement of DSM Supply Agreements which are agreements between EfficiencyOne and NS Power
- Representative for MEUs has not requested a different treatment of MEUs in the RBIA (this issue was raised by a different stakeholder)

Proposed Action

- Continue modeling impacts to NS Power Rate Class 24
- Revisit issue if MEUs are ever in a position where they have Supply Agreements with EfficiencyOne and desire to understand rate and bill impacts for their own customers

2017_DSMAG_3) Discuss treatment and first usage of NS Power rate impact model

Issue

- The DSMAG has not had the opportunity to address this issue as NS Power has not provided any information about this model

Considerations

- In 2016, while developing a method to account for the fixed cost adjustment, NS Power shared an early, incomplete version of its model with the DSMAG; however it was shared in the context of suggesting that EfficiencyOne use that model instead of its own
- Throughout 2016, 2017 and 2018 EfficiencyOne has repeatedly requested that NS Power develop its UARB-ordered rate impact model with involvement from the DSMAG, specifically to avoid a situation where all assumptions and methodologies in this model need to be evaluated and discussed by stakeholders at the same time as the next three-year DSM Plan is being evaluated
- In the 2016 Consensus Agreement, NS Power agreed that “the DSM Advisory Group will be engaged in the development of the assumptions to be included in NS Power’s rate impact analysis prior to the filing of future DSM Resource Plans. This will include, but is not limited to, defining the duration of the analysis period.”
- During this timeframe NS Power spent considerable effort preparing two altered versions of EfficiencyOne’s model (after the 2017 and 2018 filings), which it proposed that EfficiencyOne adopt and use for EfficiencyOne’s RBIA filings
- During this timeframe NS Power did not provide any information to EfficiencyOne or the DSMAG about its own UARB-ordered rate impact model

Proposed Action

- Await information from NS Power on its rate impact model

NEW_1) Which avoided costs to use when avoided cost estimates change

Issue

- Application of avoided costs in the model is inconsistent with cost justification used for DSM Plan approvals

Considerations

- We currently have long-term avoided cost estimates from the 2009 IRP Update and 2014 IRP; will soon have a new set from the 2020 IRP
- Historically, the RBIA has applied the same avoided cost rates to all DSM savings in a given year (regardless of what year of DSM programming caused those savings):
 - All DSM savings between 2011 and 2014 use 2009 IRP avoided costs
 - All DSM savings in 2015 and after use 2014 IRP avoided costs, including the lifetime savings from 2011-2014 programs which were already locked into the no-DSM scenario of the 2014 IRP
- This is handled properly in DSM Plan approvals (we don't go back and redo the cost-justification of old DSM Plans once we have new avoided costs estimates, because the new avoided cost rates are only valid for incremental DSM in addition to what has already been delivered)

Proposed action

- In each program year, use the set of avoided costs that was used for the cost-justification of that program year:
 - All lifetime savings from 2011-2014 will use 2009 IRP avoided costs
 - All lifetime savings from 2015-2022 will use 2014 IRP avoided costs
 - All lifetime savings from 2023 until the next IRP will use 2020 IRP avoided costs
- This change is not required for the 2020-2022 DSM Plan RBIA as all years of that analysis will use the same set of avoided costs (from the 2014 IRP), but will be made prior to the 2019 Historical RBIA

NEW_2) Source of avoided costs for 2020-2022 DSM Plan RBIA

Issue

Which sets of avoided costs should be used for the 2020-2022 DSM Plan RBIA?

Considerations

- The analysis will only include DSM proposed in the DSM Plan application (2020-2022 program years)
- The UARB directed NS Power to update avoided costs as required by EfficiencyOne for use in preparation of the 2020-2022 DSM Resource Plan
- Synapse recommended using avoided costs it developed from the Generation Optimization matter
- NS Power recommended continuing to use avoided energy and capacity costs from the 2014 IRP and provided updated avoided transmission and distribution costs
- EfficiencyOne supported NS Power's recommendation in its Reply Comments on the 2018 RBIA matter

Proposed action

- Use 2014 IRP avoided energy and capacity costs
- Use avoided transmission and distribution costs provided by NS Power in Oct. 2018

NEW_3) Line losses

Issue

How should the model use “at meter” and “at generator” savings?

Considerations

- Savings reported by EfficiencyOne are “at generator”
- “At generator” savings can be converted to “at meter” by subtracting line losses
- Historically the model has used a single set of savings, which were “at generator”

Proposed action

- Use “at generator” savings to determine avoided costs
- Use “at meter” savings to determine lost revenues and customer bill impacts

NEW_4) Expiry of customers

Issue

How should the model perform cumulative participant counts?

Considerations

- Historically, the model has calculated a running annual total of cumulative unique participants, without any expiry of participants
- However, savings for each class do expire at the end of the weighted-average measure life
- NS Power suggested aligning the number of participants with the energy savings that are active in each year (i.e. allowing participant counts to expire with savings, according to weighted-average measure lives)
- Since only “unique” participants are counted, allowing participant expiry would mean that a participant from an early program year (e.g. 2011) whose savings have expired (e.g. in 2019), would not be counted again if they participated in 2020 or afterwards
 - This would underestimate the number of unique participants with savings in 2020 and thereby overstate the per-participant bill savings
- Current method is conservative on per-participant bill savings and correctly presents cumulative participation graphs (this is more desirable than understating cumulative participation and overstating participant bill savings)
- Tracking savings per participant is made easier through the use of NS Power account data; however participant data collected before this data was received cannot in all cases be retroactively mapped to NS Power accounts
- We are only now at the point in time where some early savings are starting to expire (i.e. this is not yet an issue for the vast majority of savings modeled)

Proposed action

- Continue using the current method for now
- Work to associate future participants and their savings with NS Power accounts and premises to enable more sophisticated participation reporting in the future
- Consider dropping early years out of the RBIA each year, to avoid reporting indefinitely on the impacts of decisions made long ago (i.e. for how long should EfficiencyOne report on results of 2011 programs?)

NEW_5) Average Bill Impact graphs should reflect weighted average as opposed to arithmetic average effects

Issue

In some cases an arithmetic average of multi-year bill impacts is used instead of a weighted average

Considerations

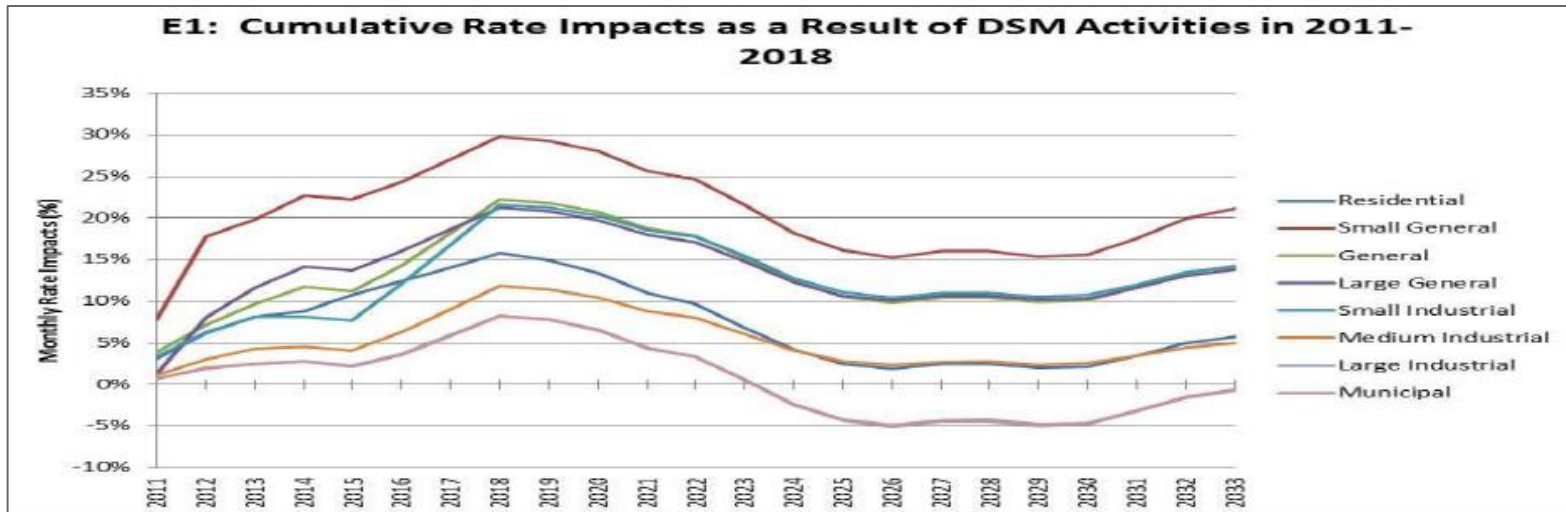
- Bill impact graphs that show multiple rate classes in the same image use an arithmetic average
- Bill impact graphs for each individual class use a weighted average
- This is an error; the weighted average should have been used in all cases

Proposed action

- Use a weighted average of bill impacts for all multi-year averages

NEW_6) Clarifying rate impacts in NS Power's DSMAG Presentation

In its October 2018 RBIA presentation to the DSMAG, NS Power included several “cumulative rate impact” graphs that it generated from its altered version of EfficiencyOne’s 2017 model. An example:



EfficiencyOne wishes to clarify two things:

1. This is not a graph that EfficiencyOne produced, despite the title (NS Power produced the graph using data from EfficiencyOne’s model); and
2. These graphs are misleading and overstate the actual rate impacts, as they sum percentage rate impacts across years
 - E.g. In this graph, a steady 1% rate increase that lasts many years would appear as a 1% increase in year 1, a 2% increase in year 2, a 3% increase in year 3, and so on

Summary of proposed actions

#	Item	Proposed Action
2017_ENS_1a	Use of annual avoided fuel costs	Switch from levelized to annual
2017_ENS_1b	Use of marginal avoided fuel costs instead of those made relative to a no-DSM scenario	No changes required
2017_ENS_1c	Timeframe for levelization of avoided costs	Use the weighted-average measure life instead of the IRP study period
2017_ENS_1d	Further breakdown of lost revenues and avoided costs into those arising from fuel and fixed rate components	No immediate action; requires discussion with NS Power rate experts
2017_ENS_1e	Development of better class allocation ratios for lost revenues and avoided costs	No immediate action; requires discussion with NS Power rate experts
2017_ENS_1f	Modeling of billed demand reductions	Retain existing method for now
2017_ENS_1g	The energy and demand cost escalation rate	Continue using 2.7% per year
2017_ENS_2	Continue to discuss the value of a broad participation study with Synapse	No plans for a “broad participation study” but EfficiencyOne continues to track and estimate participation as necessary for the RBIA and other purposes
2017_ENS_3	Expand the participation assumptions section within the report	This part of the Assumptions appendix was expanded in 2018
2017_ENS_4	Provide a more complete explanation of changes to estimated rate and bill impacts relative to the previous year’s report	EfficiencyOne will highlight changes in assumptions or methods to help explain variances in estimated impacts from one year to the next
2017_ENS_5	Consolidate model inputs which are common to all classes on a separate Excel tab	Most common inputs are entered on the ‘R-Inputs’ tab; Inputs tabs for other classes link back to this tab As time permits and other changes are made to the model, these inputs may be consolidated on a separate Inputs tab

Summary of proposed actions

#	Item	Proposed Action
2017_ENS_6	Investigate potential model errors noted by Resource Insight and remediate where necessary	No changes required (no errors were found)
2017_DSMAG_1	Review and discuss results of ENS and NS Power collaboration on issues listed above, as well as any other outstanding issues or questions	Requested feedback after Oct. 2018 DSMAG presentation by NS Power (none received) Accepting feedback on this document until 31 Jan 2019
2017_DSMAG_2	Discuss treatment of Municipal Electric Utilities as customers of NS Power within the RBIA model	Continue to model MEUs as NS Power class 24
2017_DSMAG_3	Discuss treatment and first usage of NS Power rate impact model	Await information from NS Power on its rate impact model
NEW_1	Which avoided costs to use when avoided cost estimates change	Use the avoided costs that were used to justify each year of DSM programming
NEW_2	Source of avoided costs for 2020-2022 DSM Plan RBIA	Use 2014 IRP avoided energy and capacity costs; updated avoided transmission and distribution costs
NEW_3	Line losses	Add “at meter” savings to model, use for lost revenues and bill savings
NEW_4	Expiry of customers	Continue using existing method for now
NEW_5	Average Bill Impact graphs should reflect weighed average as opposed to arithmetic average effects	Use weighted averages in all cases
NEW_6	Clarifying rate impacts in NS Power’s DSMAG Presentation	Clarified in this presentation

Invitation for feedback

A potential change in the required filing date for the 2020-2022 DSM Plan has necessitated the use of an accelerated development schedule and the cancellation of the January 2019 DSMAG meeting on RBIA and Locational DSM.

EfficiencyOne invites feedback on this document up to 31 January 2019.

EfficiencyOne will continue to accept feedback and make improvements to its RBIA model as they pertain to future applications of the model, the next of which will be the 2019 Historical RBIA filed in October 2019.



Thank you

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Request IR-43:

Please refer to the Direct Testimony of David Hill, PhD, Appendix D, page 24 line 17 to page 25 line 12, regarding the historical benefits that lighting efficiency has had in terms of enabling offerings to low income customers and as an entry point for programs. Given the proposed reduction in lighting savings as a proportion of EfficiencyOne's portfolio, has EfficiencyOne adopted its outreach, marketing, and program delivery strategies to ensure that hard to reach customers are engaged? If so, how? If not, why not?

Response IR-43:

Yes. EfficiencyOne regularly monitors and reviews its outreach, marketing, and program delivery strategies to improve customer engagement. Specifically, EfficiencyOne has adapted its various strategies to engage hard to reach customers in the following ways:

- Developing new partnerships to reach target audiences (e.g., new partnerships with realtors to include promotional material in new homebuyer kits);
- Updating customer profiles and messaging to improve the effectiveness and reach of EfficiencyOne's marketing campaigns and engagement strategies;
- Using data analytics and market research to improve customer targeting;
- Creating more customer success stories featuring non-lighting savings; and
- Increasing the size and diversity of the Efficiency Trade Network to engage harder to reach customers.

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Request IR-44:

Please refer to the Direct Testimony of David Hill, PhD, Appendix D, page 31 line 18 to 26 and page 32 line 7 to 14. How does bundling connected controls with lighting measures impact the cost of saved energy?

Response IR-44:

The following response has been provided by David Hill.

In general, bundling connected controls with lighting measures increases the expected savings and the expected costs of these savings. Experience at Efficiency Vermont has shown that these two impacts are roughly equal, and in the range of 30 to 40 percent savings, compared to efficient fixtures without networked lighting control. Individual project opportunities and costs can vary, but these serve as guidelines.

The cost of saved energy from the perspective of a program administrator will remain approximately the same if the savings increase by, for example 35 percent, while the cost of the network lighting controls increases by 35 percent. However, this may not hold if the program incentives for the lighting only, and the lighting with network-controlled cases are different. If the incentive paid by the program for the lighting with networked controls measure is higher than the incentive offered for the lighting only measure, then the cost of saved energy from the program administrator perspective would increase.

In this response and my testimony, the term *networked lighting controls* refers to integrated occupancy sensors, trim and task tuning, and daylight sensing controls. Although networked coordination with other building controls and loads is possible, the comments in the testimony

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1 reference the DesignLights Consortium study¹ and Efficiency Vermont experience, both of which
2 address networked lighting controls, in this more limited scope. This is in contrast to broader
3 coordination with other building loads and systems. Over time, we expect a decline in the costs for
4 efficient fixtures, network lighting controls, and broader integration controls with other building
5 systems and loads.

¹ https://www.designlights.org/default/assets/File/Lighting%20Controls/DLC_Advanced-Lighting-Controls_Final-Report_PNNL.pdf

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1 **Request IR-45:**

2
3 **Please refer to the Direct Testimony of David Hill, PhD, Appendix D, page 33 to 36. How is**
4 **the experience in Canada in general and in Nova Scotia in particular likely to differ from the**
5 **projections for the U.S. shown in Figures 19, 20, 21, and 22?**

6
7 Response IR-45:

8
9 The following response has been provided by David Hill.

10
11 Figures 19 through 22 refer respectively to expected trends in non-residential lighting savings,
12 adoption, costs, and remaining savings potential through 2035. The studies these figures reference
13 are for the U.S. market. However, I would not expect a significant difference between the Canadian
14 and U.S. markets, relative to the trends and the potential for LED lighting for the Commercial &
15 Industrial market. Personal communication with one of the cited study's authors¹ by our staff
16 affirmed this expectation.

17
18 Efficient LED commercial lighting technologies (such as recessed and high/low fixtures) are
19 relatively new to the market (compared to bulbs, for instance) in the United States and in Canada.
20 The manufacturers have been increasing their portfolio of products for a wide variety of
21 applications, which has increased the market potential. In both countries, the quality and efficiency
22 of these products have improved while the cost has come down. But it takes time for these new
23 products to reach significant levels of market penetration for both the United States and Canada.
24 Because the supply chain and distribution channels in both countries for efficient lighting products
25 are largely the same, we expect trends in the costs, adoption, and potential savings between the
26 markets to be similar in nature, if not in lockstep with each other. Note that additional factors such
27 as any new adoption of more stringent lighting codes and standards by Canada or provincial

¹ Dan Mellinger, Energy Futures Group, personal communication with Jay Pilliod, May 3, 2019.

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- 1 governments might affect these expectations. Markets will also develop at varying paces, and so
- 2 continued market monitoring and updates are important for good portfolio and program design.

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Request IR-46:

Please refer to the Direct Testimony of David Hill, PhD, Appendix D, page 37. Please characterize the cost of saved energy by end use for Efficiency Vermont's portfolio, by year, for as many years for which actual DSM results and projections from DSM plans are available.

Response IR-46:

The following response has been provided by David Hill.

The Efficiency Vermont portfolio characterization for the Demand Resources Plan (forward - planning through 2037) does not allow for ready and simple comparison of the cost of saved energy down to the end-use and measure levels. The cost of saved energy by major market and major program is more readily provided as illustrated in the summary tables below.

Table 1: IR-46 - Efficiency Vermont: Cost of Saved Energy by Major Market

Total \$/MWh (Incentives and Non-Incentives) by Major Market per 2018-2037 DRP Model						
Year	Business Existing Facilities	Business New Construction	Residential New Construction	Efficient Products	Existing Homes	
2018	\$ 308	\$ 433	\$ 2,093	\$ 243	\$ 483	
2019	\$ 334	\$ 455	\$ 2,255	\$ 257	\$ 476	
2020	\$ 353	\$ 454	\$ 2,202	\$ 309	\$ 468	
2021	\$ 380	\$ 482	\$ 2,165	\$ 427	\$ 496	
2022	\$ 387	\$ 469	\$ 2,557	\$ 435	\$ 510	
2023	\$ 409	\$ 479	\$ 2,634	\$ 465	\$ 527	
2024	\$ 408	\$ 479	\$ 2,614	\$ 453	\$ 534	
2025	\$ 404	\$ 470	\$ 3,187	\$ 476	\$ 535	
2026	\$ 403	\$ 491	\$ 3,250	\$ 489	\$ 540	
2027	\$ 404	\$ 510	\$ 3,379	\$ 494	\$ 550	
2028	\$ 408	\$ 523	\$ 3,735	\$ 479	\$ 558	
2029	\$ 407	\$ 518	\$ 3,789	\$ 486	\$ 571	
2030	\$ 410	\$ 532	\$ 3,920	\$ 488	\$ 575	
2031	\$ 405	\$ 541	\$ 4,282	\$ 497	\$ 576	
2032	\$ 402	\$ 545	\$ 4,413	\$ 503	\$ 576	
2033	\$ 410	\$ 566	\$ 4,174	\$ 484	\$ 572	
2034	\$ 409	\$ 571	\$ 4,420	\$ 492	\$ 575	
2035	\$ 411	\$ 581	\$ 4,603	\$ 494	\$ 579	
2036	\$ 419	\$ 585	\$ 4,578	\$ 493	\$ 577	
2037	\$ 421	\$ 587	\$ 4,827	\$ 496	\$ 580	

EfficiencyOne – EfficiencyOne Application for approval of a Supply Agreement for Electricity Efficiency and Conservation Activities between E1 and Nova Scotia Power Inc. (DSM 2020-2022) M09096 (E-ENS-R-19)
E1 Responses to Synapse

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Table 2: IR-46 - Efficiency Vermont: Cost of Saved Energy by Major Program

Total \$/MWh (Incentives and Non-Incentives) by Major Program per 2018-2037 DRP Model												
Year	Commercial & Industrial			Residential								
	Business Retrofit	Existing Buildings - Equipment Replacement	C&I New Construction	Residential New Construction	Low Income Multi-Family	Low Income Residential New Construction	Efficient Products	Existing Homes	Low Income Single Family Retrofit	Market Rate Multi-Family	Market Rate Multi-Family Retrofit	Low Income Multi-Family Retrofit
2018	\$ 406	\$ 240	\$ 433	\$ 1,683	\$ 2,335	\$ 7,134	\$ 243	\$ 238	\$ 1,657	\$ 1,547	\$ 819	\$ 929
2019	\$ 426	\$ 268	\$ 455	\$ 1,852	\$ 2,361	\$ 7,393	\$ 257	\$ 242	\$ 1,682	\$ 1,587	\$ 854	\$ 730
2020	\$ 437	\$ 287	\$ 454	\$ 1,778	\$ 2,415	\$ 7,921	\$ 309	\$ 246	\$ 1,560	\$ 1,560	\$ 827	\$ 645
2021	\$ 433	\$ 331	\$ 482	\$ 1,740	\$ 2,450	\$ 8,262	\$ 427	\$ 278	\$ 1,696	\$ 1,403	\$ 734	\$ 621
2022	\$ 433	\$ 343	\$ 469	\$ 2,119	\$ 2,781	\$ 8,907	\$ 435	\$ 303	\$ 1,641	\$ 1,373	\$ 769	\$ 691
2023	\$ 448	\$ 367	\$ 479	\$ 2,179	\$ 2,809	\$ 9,158	\$ 465	\$ 335	\$ 1,582	\$ 1,357	\$ 786	\$ 716
2024	\$ 444	\$ 369	\$ 479	\$ 2,153	\$ 2,785	\$ 8,938	\$ 453	\$ 352	\$ 1,587	\$ 1,362	\$ 791	\$ 698
2025	\$ 445	\$ 357	\$ 470	\$ 2,852	\$ 2,731	\$ 8,463	\$ 476	\$ 362	\$ 1,581	\$ 1,436	\$ 868	\$ 671
2026	\$ 443	\$ 355	\$ 491	\$ 2,889	\$ 2,779	\$ 8,891	\$ 489	\$ 367	\$ 1,646	\$ 1,460	\$ 895	\$ 695
2027	\$ 444	\$ 352	\$ 510	\$ 2,917	\$ 3,238	\$ 9,365	\$ 494	\$ 382	\$ 1,720	\$ 1,486	\$ 913	\$ 725
2028	\$ 454	\$ 349	\$ 523	\$ 3,425	\$ 3,167	\$ 8,815	\$ 479	\$ 401	\$ 1,660	\$ 1,415	\$ 889	\$ 720
2029	\$ 451	\$ 348	\$ 518	\$ 3,459	\$ 3,201	\$ 9,080	\$ 486	\$ 413	\$ 1,711	\$ 1,429	\$ 904	\$ 728
2030	\$ 453	\$ 350	\$ 532	\$ 3,619	\$ 3,207	\$ 9,124	\$ 488	\$ 418	\$ 1,710	\$ 1,468	\$ 911	\$ 733
2031	\$ 448	\$ 345	\$ 541	\$ 4,078	\$ 3,213	\$ 9,172	\$ 497	\$ 417	\$ 1,705	\$ 1,493	\$ 935	\$ 736
2032	\$ 446	\$ 341	\$ 545	\$ 4,138	\$ 3,625	\$ 9,247	\$ 503	\$ 420	\$ 1,735	\$ 1,517	\$ 951	\$ 740
2033	\$ 456	\$ 344	\$ 566	\$ 3,842	\$ 3,598	\$ 9,060	\$ 484	\$ 417	\$ 1,721	\$ 1,473	\$ 904	\$ 733
2034	\$ 458	\$ 341	\$ 571	\$ 4,162	\$ 3,582	\$ 8,946	\$ 492	\$ 422	\$ 1,721	\$ 1,500	\$ 930	\$ 730
2035	\$ 457	\$ 347	\$ 581	\$ 4,370	\$ 3,622	\$ 9,225	\$ 494	\$ 423	\$ 1,757	\$ 1,512	\$ 943	\$ 748
2036	\$ 456	\$ 369	\$ 585	\$ 4,353	\$ 3,586	\$ 8,973	\$ 493	\$ 423	\$ 1,726	\$ 1,517	\$ 948	\$ 735
2037	\$ 456	\$ 373	\$ 587	\$ 4,675	\$ 3,611	\$ 9,145	\$ 496	\$ 424	\$ 1,727	\$ 1,542	\$ 963	\$ 744

Allocating costs with granularity down to the measure and end-use levels raise complications because there is no one-to-one mapping of end uses and measures to programs and markets. For example, efficient lighting measures will show up in multiple markets and programs, and the nature of the non-measure costs for each program will vary. The same level of granularity and level of reporting at the major program and market levels is available historically, with the same qualifying statements on why measure and end-use level costs of saved energy are not directly reported.

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Request IR-47:

Please refer to the Direct Evidence of Glenn Reed, Appendix E, pages 7 to 9.

- a. Did Mr. Reed consider climate in the benchmarking analysis? If so, how? If not, why not?**
- b. Did Mr. Reed consider the extent to which the portfolio targets demand reduction in the benchmarking analysis? If so, how? If not, why not?**
- c. Other than by limiting the analysis to savings projections (rather than historical performance), did Mr. Reed consider the extent to which the portfolio targets lighting savings in the benchmarking analysis? If so, how? If not, why not?**
- d. Please characterize, quantitatively to the extent possible, how the chosen program administrators compare with EfficiencyOne in terms of the 10 factors listed on page 8, line 9 through page 9, line 12.**

Response IR-47:

The following response has been provided by Glenn Reed.

- a) No, climate was not considered as part of the benchmarking analysis. The efficiency benchmarking undertaken was performed at the portfolio level. Consideration of climate impacts would have required a much more granular analysis, including measure level savings and budget projections. Further, considering climate impacts would require that a detailed review and comparison of how each program administrator (PA) estimated weather driven measure level savings.

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- 1 b) No, the focus of the benchmarking analysis was on energy, not demand savings. We note
2 that most of the benchmarked jurisdictions are summer peaking, while Nova Scotia
3 Power is winter peaking.
4
- 5 c) As with the response to Part a) above, the benchmarking was done at the portfolio level.
6 Looking at the continued impact of lighting on projected savings for each portfolio would
7 have required at a minimum, an end use analysis of each portfolio's savings and budgets
8 and to properly capture lighting interactive impacts a comparative measure level analysis
9 would have been required.
10
- 11 d) While it is important to understand the caveats and limitations of efficiency program
12 benchmarking, no attempt was made to compare or normalize EfficiencyOne's program
13 savings to those of the other benchmarked program administrators using the factors listed
14 on pages 8 and 9.