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Request IR-01:

Please refer to Table 1 on Pages 4 and 5 of Vermont Energy Investment Corporation's (VEIC) June 14, 2018 Final Measure-Level Non-Energy Benefits Study (the Study), filed as Attachment 4 to EfficiencyOne's application.

a. Please indicate why the Study lists only the Non-Energy Benefits (NEBs) included in Massachusetts' low-income programs, rather than Massachusetts' NEBs portfolio-wide. Please provide Table 1 with an additional column for all NEBs included in Massachusetts' portfolio.

b. Does EfficiencyOne plan to include any information from NSPI in future cost-effectiveness testing regarding avoided generating capacity costs and avoided T&D line losses and capacity costs? If so, what values will EfficiencyOne use? If not, why not?

c. Does EfficiencyOne consider avoided utility costs an area for future considerations or research?

Response IR-01:

a) The following response has been provided by Vermont Energy Investment Corporation (VEIC).

The headings on Table 1 could have been written more clearly. The inclusion of Massachusetts' low-income program NEBs was for illustrative purposes only. In retrospect, the headings should have been titled as follows:

Previously Included in ENS Programs	Included in MA; Recommended for Inclusion in ENS Market Rate Programs	Included for Low Income Programs in MA; Not Included in ENS Programs

b) EfficiencyOne's intention is to use the most up to date avoided costs as provided by NSPI. Currently, these are the avoided costs from the 2014 IRP-Base DSM avoided costs

(shown in Table 1 below), which include avoided cost of energy and avoided cost of capacity. These current avoided costs do not include transmission and distribution avoided costs.

Table 1 - 2014 IRP - Base DSM Avoided Costs of Capacity and Energy

	Avoided Capacity Costs $/kW	Avoided Energy Costs $/MWh
2015	0	64
2016	0	60
2017	0	58
2018	0	55
2019	418	57
2020	196	60
2021	179	62
2022	190	84
2023	207	85
2024	201	86
2025	215	87
2026	202	89
2027	198	93
2028	195	98
2029	195	102
2030	193	108
2031	189	113
2032	188	120
2033	193	113
2034	192	130
2035	196	143
2036	192	150
2037	196	155
2038	197	163
2039	173	169

c) Yes, EfficiencyOne does consider avoided utility costs an area for future consideration and/or research (e.g., the areas of transmission and distribution avoided costs and avoided CO^2 emissions).

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Request IR-02:

Please refer to Page 14 of the Study.

a. How were water and wastewater NEBs calculated prior to the VEIC analysis for Nova Scotia?

b. Were the water and wastewater non-energy benefit values used previously in Nova Scotia compared to the new values based on the Massachusetts TRM?

c. Please provide a comparison of the water and wastewater non-energy benefit values used previously in Nova Scotia with the new values based on the Massachusetts TRM values.

d. Why was the VEIC methodology deemed to be more appropriate than the previously used one?

e. Were there any cases in which the original value was deemed more appropriate for the measure? For each such measure, which value (based on the original value or based on the VEIC methodology) is being proposed in this filing, and why?

Response IR-02:

a) EfficiencyOne, with the assistance of Navigant Consulting, prepared the values used for monetary water savings. Technical water savings amounts (available from ex-ante energy savings methodologies) were multiplied by Halifax Water's current volumetric water and wastewater charges.

b) Yes, the reference TRC values used in VEIC's analysis included EfficiencyOne's previous estimates for water savings. VEIC removed these amounts and replaced them with Massachusetts values as part of their work.

c) Please refer to Table 1 below.

1 Table 1- Comparison of Existing Water NEBs with New Values

Measure Name	Existing ENS Value - Annual ($)	New Massachusetts Adapted Value - Annual ($)
Under Counter Commercial Dishwasher (Low Temp) - COM-Other - BER	$0.00	$130.96
Single-Tank Door Type Dishwasher (Low Temp) - COM-Other - BER	$0.00	$832.93
Single-Tank Conveyor Dishwasher (Low Temp) - COM-Other - BER	$0.00	$672.55
Multi-Tank Conveyor Commercial Dish Washer (Low Temp) - COM-Other - BER	$0.00	$970.02
Under Counter Dishwasher with Booster (High Temp) - COM-Other - BER	$0.00	$55.77
Single Tank Door Dishwasher with Booster (High Temp) - COM-Other - BER	$0.00	$362.14
Single Tank Conveyor Dishwasher with Booster (High Temp) - COM-Other - BER	$0.00	$219.87
Multi Tank Conveyor Dishwasher with Booster (High Temp) - COM-Other - BER	$0.00	$834.22
ENERGY STAR® Ice Making Head - COM Refrigeration - BER	$0.00	$34.32
ENERGY STAR® Remote Condensing Head/Split System Ice Maker - COM Refrigeration - BER	$0.00	$27.18
ENERGY STAR® Self Contained Ice Maker - COM Refrigeration - BER	$0.00	$36.42

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Measure Name	Existing ENS Value - Annual ($)	New Massachusetts Adapted Value - Annual ($)
ENERGY STAR®, CEE Tier 2 or CEE Tier 3 Commercial Clothes Washer - COM-Other - Business Energy Rebates	$51.85	$41.16
Faucet Aerator - COM Other - BES	$0.00	$56.40
Low Flow Showerheads - COM Other - BES	$0.00	$75.41
Low Flow Faucet Aerator, 1.5 GPM - RES-SF - Direct Install	$3.30	$3.43
Low Flow Faucet Aerator, 1.5 GPM - MURB - MURB	$2.11	$3.43
Low Flow (1.25 GPM) showerhead - RES-SF - Direct Install	$13.07	$24.80
Low Flow (1.25 GPM) showerhead - MURB - MURB	$8.37	$24.80

d) EfficiencyOne favoured an approach whereby all Non-Energy Benefit values were adopted from Massachusetts, as opposed to a "patch-work" approach, on the basis of full-adaption providing the objective transference of Massachusetts data.

e) No.

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Request IR-03:

Please refer to the explanation of heating degree days and cooling degree days on Page 16 and 17 of the Study.

a. Why were the heating degree days and cooling degree days combined into a single average conditioning days value for the purpose of comparing Massachusetts and Nova Scotia?

b. Did the study analyze the extent to which cooling degree days in Nova Scotia translate into actual cooling hours, given the low penetration of installed cooling systems? Please provide any relevant studies and information.

c. Is EfficiencyOne incentivizing any measures that focus exclusively on cooling? Please list all applicable measures.

d. Is EfficiencyOne incentivizing any measures that focus exclusively on heating? Please list all applicable measures.

e. How might the methodology of combining total heating and cooling days skew the value of NEBs claimed?

Response IR-03:

a) The following response has been provided by Vermont Energy Investment Corporation (VEIC).

"Thermal Comfort" is not specific to or valued differently between heating or cooling requirements and therefore conditioning days is an appropriate metric for comparison.

b) The following response has been provided by Vermont Energy Investment Corporation (VEIC).

No. A dedicated cooling system is not a requisite for improved cooling thermal comfort.

c) No measures focus exclusively on space-cooling.

d) The following measures focus exclusively on space heating

Program	Program component	Measure
Existing Residential	Green Heat	Wood stove
Existing Residential	Green Heat	Pellet Stove
Existing Residential	Green Heat	Wood boiler/Furnace
Existing Residential	Green Heat	Pellet Boiler/Furnace
Existing Residential	Green Heat	Solar air heating
Existing Residential	Home Energy Assessment	Wood stove
Existing Residential	Home Energy Assessment	Pellet Stove
Existing Residential	Home Energy Assessment	Wood boiler/Furnace
Existing Residential	Home Energy Assessment	Pellet Boiler/Furnace
Existing Residential	Home Energy Assessment	Solar air heating

e) The following response has been provided by Vermont Energy Investment Corporation (VEIC).

The value of comfort is impartial to heating or cooling requirements and thus combining heating and cooling degree days does not result in skewing.

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Request IR-04:

Please refer to Page 20 of the Study.

a. How are low-income customers defined?

b. By program, what percentage of customers eligible for market-rate programs offered by EfficiencyOne qualify as low-income?

c. By program, what percentage of customers participating in market-rate programs offered by EfficiencyOne qualify as low-income?

Response IR-04:

a) EfficiencyOne estimates incidental low-income program participation in market-rate programs using low-income prevalence data provided by Statistics Canada. Low-income prevalence is based on Statistics Canada's before-tax low-income cutoff.

b) For the purpose of estimating incidental low-income participation, EfficiencyOne assumes that customers eligible for market rate programs mirror the ratios presented below. EfficiencyOne does not use different rates for different programs.

Table 1: Low-income prevalence by county, Statistics Canada Community Profiles, 2006

County	% Low Income
Annapolis	14.9
Antigonish	9.7
Cape Breton	18.4
Colchester	12.6
Cumberland	15.9
Digby	13.2
Guysborough	13.2
Halifax	14.3
Hants	9.4
Inverness	8.9
Kings	13.6
Lunenburg	11.2
Pictou	13.4
Queens	13.2
Richmond	9.8
Shelburne	11.8
Victoria	8.1
Yarmouth	13.2
Provincial Average	**13.8**

c) Please see table 2, which summarizes 2017 participation by % of participants estimated to be low-income. Please refer to Attachment 1 of this IR response for an explanation of the process used to estimate low-income participation. These figures represent a combination of incidental low-income participation and direct low-income participation. For example, the Appliance Retirement program includes appliance replacements occurring through the Home Warming program (direct) as well as an estimate of participants that are low-income based on table 1 (incidental).

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Table 2: Percentage of customers in programs offered by EfficiencyOne estimated to be low income (2017)

Residential Programs	% of participation estimated to be low income	Participation unit
Efficient Product Rebates		
Instant Savings[1]	1%	Units Rebated
Appliance Retirement[1,2]	8%	Units Rebated
Existing Residential		
Home Energy Assessments[3]	0%	Housing Units
Green Heating Systems[3]	0%	Housing Units
Efficient Product Installation Service[4]	50%	Housing Units
New Residential		
New Home Construction[3]	0%	Participants
Business, Non-Profit and Institutional (BNI) Programs		
Efficient Product Rebates		
Business Energy Rebates - Mail-In[6,7]	0%	Units Rebated
Business Energy Rebates - Instant[6,8]	8%	Units Rebated
Custom Incentives		
Custom[6,7]	14%	Projects
Energy Management Information Systems[3]	0%	Participants
Strategic Energy Management[3]	0%	Participants
Direct Installation		
Small Business Energy Solutions[6,7]	3%	Projects

1 OBJECTIVE AND BACKGROUND

Efficiency Nova Scotia (ENS) delivers the HomeWarming service to Nova Scotians that primarily use non-electric heating. Since HomeWarming is only offered to low income Nova Scotians, it is considered "dedicated" low income programming.

It is assumed that low income Nova Scotians also participate in other ENS programs in varying proportions. This is "incidental" low income programming. This document presents assumptions used to estimate the incidental participation in each program. The resulting estimates are included in low income impacts presented in Quarterly and Annual Progress Reports. These estimates are provided for informational purposes only as ENS does not have regulated performance targets for low income services. The estimation methodology for each program is based on the best available data for that program.

2 KEY ASSUMPTIONS

County Prevalence (CP) of Low Income Nova Scotians

Census data for Nova Scotia provides the population and percentage of low income residents by county. The percentage of low income Nova Scotians in a certain county is the County Prevalence (CP) for that county.

Overall Prevalence (OP) of Low Income Nova Scotians

From the county-level low income census data, the provincial average percentage of low income residents was calculated to be 14%. This is the Overall Prevalence (OP).

Apartment Prevalence (AP) of Low Income Nova Scotians

Research commissioned by ENS in 2015 reported on the incidence of low income Nova Scotians in apartment buildings. The conclusion was that 53% of 1-unit apartment residents are low income, and 57% of 2-4 unit apartment residents are low income. ENS currently uses the average, 55%, as the Apartment Prevalence (AP).

Energy, Demand, Expenditures, and Participants

The calculations used in this document use the general term "savings". The same calculations are applied to energy savings, peak demand savings, program expenditures, and in most cases, participation numbers, but substituting "savings" for those other parameters.

3 PROGRAM CALCULATIONS

3.1 RESIDENTIAL – EFFICIENT PRODUCT REBATES

3.1.1 INSTANT SAVINGS

Assumption

Low income Nova Scotians are assumed to be 10 per cent as likely to participate as the general population (as estimated by a local low-income expert).

Calculation

Low income savings = (total savings) x (OP) x (10%)

3.1.2 APPLIANCE RETIREMENT

Assumptions

When tracking savings and expenditures, ENS includes appliance *replacements* (which are delivered through the HomeWarming service) within the Appliance Retirement program component, however the low income participation is calculated differently.

Appliance *replacements* are exclusively low income, as they are only available to HomeWarming participants.

For appliance *retirements*, low Income Nova Scotians are assumed to be 10% as likely to participate as the general population (as estimated by a local low-income expert).

Calculation

Low income *replacement* savings = (total *replacement* savings)

Low income *retirement* savings = (total *retirement* savings) x (OP) x (10%)

Low income total savings = (low income replacement savings) + (low income retirement savings)

4 RESIDENTIAL – EXISTING RESIDENTIAL

4.1 HOME ENERGY ASSESSMENT

Assumption

No low income participation.

4.2 GREEN HEATING SYSTEMS

Assumption

No low income participation.

4.3 RESIDENTIAL DIRECT INSTALL - HOUSES

Assumptions

Income disclosure is optional for this program component. Low income participants are tracked where income information is available; otherwise low income Nova Scotians are assumed to participate in proportion to the general population, within each county.

Calculation

Low income savings in county Z from undisclosed income group = (total savings in county Z from undisclosed income group) x (CP for county Z)

Total low income savings = (tracked low income savings) + (total low income savings from undisclosed income groups in all counties)

4.4 RESIDENTIAL DIRECT INSTALL - APARTMENTS

Assumptions

Income disclosure is optional for this program component. Low income participants are tracked where income information is available; otherwise the proportion of low income tenants in participating apartments is assumed to be the same as the proportion of low income tenants in Nova Scotia apartments overall.

Calculation

Total low income savings = (tracked low income savings) + [(total low income savings from undisclosed income group) x (AP)]

5 RESIDENTIAL – NEW RESIDENTIAL

5.1 NEW HOME CONSTRUCTION

Assumption

No low income participation.

6 BNI - EFFICIENT PRODUCT REBATES

6.1 BUSINESS ENERGY REBATES – MAIL-IN

Assumptions

Actual program participants are apartment building owners. Avoided energy benefits are assumed to flow-through to tenants either a) directly, where tenants pay power bills, or b) indirectly, by means of deferred increases in rent.

Calculation

Low income savings = (total savings from apartment buildings) x (AP)

6.2 BUSINESS ENERGY REBATES – INSTANT REBATES

Assumption

Actual program participants are apartment building owners. Avoided energy benefits are assumed to flow-through to tenants either a) directly, where tenants pay power bills, or b) indirectly, by means of deferred increases in rent.

The exact installation location of products receiving Business Energy Rebates – Instant Rebates (BER-IR) is unknown, as it is a point-of-sale rebate program. The proportion of low income BER-IR measures is assumed to be the same as the proportion of low income BER Mail-In (BER-MI) measures.

Calculation

BER-IR low income savings = [(BER-MI low income savings) / (BER-MI total savings)] x BER-IR total savings

7 BNI - CUSTOM INCENTIVES

7.1 CUSTOM

Assumption

Actual program participants are apartment building owners. Avoided energy benefits are assumed to flow-through to tenants either a) directly, where tenants pay power bills, or b) indirectly, by means of deferred increases in rent.

Calculation

Low income savings = (total savings from apartment buildings) x (AP)

7.2 ENERGY MANAGEMENT INFORMATION SYSTEMS

Assumption

No low income participation.

7.3 STRATEGIC ENERGY MANAGEMENT

Assumption

No low income participation.

8 DIRECT INSTALLATION

8.1 SMALL BUSINESS ENERGY SOLUTIONS

Assumption

Actual program participants are apartment building owners. Avoided energy benefits are assumed to flow-through to tenants either a) directly, where tenants pay power bills, or b) indirectly, by means of deferred increases in rent.

Savings from projects in the Affordable Multifamily Housing Pilot are also included in this calculation.

Calculation

Low income savings = [(total savings from apartment buildings) x (AP)] + (total savings from Affordable Multifamily Housing Pilot)

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Request IR-05:

Were there any measures that were previously excluded from EfficiencyOne's portfolio because they were not cost-effective before the inclusion of NEBs, but are now cost-effective?

a. Will any such measures be reinstated into EfficiencyOne's 2019 portfolio? If so, which ones?

b. Will any such measures be incorporated into EfficiencyOne's 2020-2022 Three-Year Plan? If so, which ones?

Response IR-05:

Please refer to EfficiencyOne's response to UARB IR-03a).

a) No.

b) Efficiency Nova Scotia's detailed portfolio development process for the 2020-2022 DSM Resource Plan is currently underway. Continued stakeholder discussion will impact the 2020-2022 DSM plan development. No specific measures have been identified, or targeted, for potential inclusion based upon proposed NEB inclusion in TRC screening.

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Request IR-06:

Please refer to Page 46 of the Study regarding future opportunities.

a. Have any of the additional studies listed been commissioned?

b. If not, what is the timeline to investigate these areas?

c. If so, when does EfficiencyOne expect these studies to be completed? Please provide the scope and design (sampling, data collection, etc.) of the research study.

Response IR-06:

a) EfficiencyOne has not commissioned any of the additional studies identified by VEIC.

b) EfficiencyOne has not initiated planning for these studies.

c) Please refer to a).

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Request IR-07:

The following questions refer to EfficiencyOne's plan for updating NEB values.

a. Does EfficiencyOne plan to monitor any updates to the existing list of Massachusetts NEBs?

b. How often does EfficiencyOne expect NEB values in Massachusetts to be updated?

c. If Massachusetts fails to update NEB values, what actions will EfficiencyOne take to ensure that the values used in Nova Scotia are current and reasonable?

Response IR-07:

a) Yes. EfficiencyOne and VEIC have already proposed a change in the requested approval of NEBs as a result of recent changes brought forth in Massachusetts (for additional detail, please refer to EfficiencyOne's response to Multeese IR-16). EfficiencyOne plans to continue to monitor updates both on an ad-hoc basis, and through the two structured review types, as proposed in the Application.

b) EfficiencyOne anticipates Massachusetts will continue to update NEB values, consistent with the DSM Planning schedule (currently 3-year plans) in Massachusetts.

c) EfficiencyOne will continue to assess the most recent version of the Massachusetts research and compare it against any other research available from industry and found within the NEBs literature.

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Request IR-08:

For each of the following NEBs, please provide 1) definitions consistent with the values recommended by VEIC and 2) a description of the methodology used to calculate the underlying Massachusetts NEB value.

a. **Thermal comfort**
b. **Noise reduction**
c. **Home durability**
d. **Lighting quality and lifetime**
e. **Water and wastewater savings**
f. **Equipment maintenance**
g. **Property value increase**

Response IR-08:

The following response has been provided by Vermont Energy Investment Corporation (VEIC).

As referenced in Appendix A, Massachusetts relied heavily on a 2011 study conducted by NMR Group Inc. and TetraTech.[1] Page 19 of that report includes a summary of the methodology used to calculate the underlying Massachusetts NEB values. NEB values were derived from the existing literature or by developing modified algorithms from the literature. Select NEIs values were estimated with surveys of program participants. Definitions of each NEB are found in section 5 (Participant-Perspective NEIs—Literature Review) of the same study.

[1] NMR Group Inc. / TetraTech 2011. Massachusetts Special and Cross-Sector Studies Area, Residential and Low-Income Non-Energy Impacts (NEI) Evaluation. Prepared for the Massachusetts Program Administrators. http://ma-eeac.org/wordpress/wp-content/uploads/Special-and-Cross-Sector-Studies-Area-Residential-and-Low-Income-Non-Energy-Impacts-Evaluation-Final-Report.pdf

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Request IR-09:

Please refer to the workbook titled "Attachment 4 – Appendix C", cell CK27. For this measure, does a negative NEB signify an additional cost to the customer?

Response IR-09:

The following response has been provided by Vermont Energy Investment Corporation (VEIC).

No, it does not. The negative NEB indicates that VEIC's recommended NEB is lower than EfficiencyOne's previous estimates. In this instance, differences in water savings is the driver of the lower NEB value.