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Request IR-01:

Lines 3-5 on page 1 of 15 requests approval of “measure-level” NEBs.

- a) Please confirm that E1 currently applies the TRC at a program (rather than measure) level.**
- b) If a) is confirmed, please explain how the inclusion of NEB’s at a measure level will be accommodated in the application of the TRC at the program level.**
- c) Assume that the Residential program include only three measures from Table 10 (e.g. the 10.5W LED RES SF, the DHW Pipe Insulation RES SF, and the DHW Tank Wrap RES SF). Please provide a TRC calculation for a program that includes only these measures, showing the TRC with and without the NEBs. For the TRC including the NEBs, please show how the NEB’s are applied at the measure level, and how the TRC is calculated at a program level.**

Response IR-01:

- a) Confirmed. EfficiencyOne’s programs are required to pass the TRC. EfficiencyOne also considers measure level TRC results as part of measure selection.
- b) Program level TRC values represent the ratio of the sum of the measure level benefits and the sum of the measure level costs (considering the quantity of each measure incited in a given year). As such, changes to costs or benefits associated with a measure will impact program level TRC test results.
- c) The following response has been provided Vermont Energy Investment Corporation (VEIC).

Please refer to Attachment 1 of this IR response (a Microsoft Excel file which has been included in the electronic version of this filing) for an illustration of this scenario.

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Request IR-02:

Lines 3-5 on page 1 of 15 state that the request for approval of the proposed NEBs is “within the context of Cost-Effectiveness (CE) testing”.

- a) Please confirm that E1 currently includes TRC and PAC results in its DSM CE testing.**
- b) Please confirm that any proposed DSM program (with the exception of some low income programs) must have both TRC and PAC greater than 1.0.**
- c) Please confirm that the inclusion of NEBs will affect TRC results only, and will have no effect on PAC results.**
- d) For DSM programs that pass the TRC as it is currently used in NS (i.e. without NEBs), what effect will a modified TRC have in terms of the CE of those programs, and in terms of whether or not they might be pursued by E1?**
- e) Please identify DSM programs (or program measures) that E1 has assessed which do not pass the TRC as it is currently used in NS, but which would pass the TRC if the NEBs proposed in this Application were included in the TRC.**
- f) What are E1’s views on providing (in future DSM Plans submitted to the Board) two TRC’s for each proposed program; one TRC as it is currently used in NS, and a second TRC including whatever NEBs may be approved in this proceeding?**
- g) Please confirm that some DSM measures which fail the TRC (as it is currently used in NS) may be included in a program that passes the TRC, because such measures are deemed critical to the program.**

Response IR-02:

- a) Confirmed.**

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b) It is EfficiencyOne's understanding that the TRC test is currently the sole screening test approved for use in Nova Scotia.¹ PAC test results have historically been provided on an information-only basis.

c) Confirmed.

d) For DSM programs that pass the TRC as it is currently used in NS (without NEBs), a modified TRC (inclusive of NEBs), will not affect EfficiencyOne's pursuit of those programs.

e) The only assessment that has been conducted to date, in terms of displaying pre- and post-NEB TRC test results, is the analysis undertaken on the 2016-2018 DSM Plan Portfolio (Attachment 4, Appendix C of the Application). The analysis of these values was a material part of VEIC's scope, and VEIC has not conducted an analysis on other DSM Resource Plans. No Programs were contemplated for the 2016-2018 DSM Resource Plan that meet the requested criteria. There are measure instances that meet these criteria, in at least in one of the Plan years. They are:

- ENERGY STAR® Self Contained Ice Maker – COM-Refrigeration
- LED Lamps-End of Life – COM-lighting – Office
- LED Lamps-End of Life – COM-lighting - School
- LED Refrigeration Strip Lighting-End of Life replacement – COM-Lighting – Other Commercial
- Daylighting Controls – COM-Lighting – All Building Types (4)
- LED Lamps-End of Life-BES – COM-Lighting – Office
- Ground Source Heat Pump – COM-HVAC – All Building Types (4)
- Room A/C Retirement – RES-HVAC/Shell – RES-SF
- Hardwired Dimmer Switch – RES-Lighting – RES-SF

¹ Efficiency Nova Scotia Corporation (Re), 2011 NSUARB 99 (CanLII), s. 87-88.

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- 1 • 12 W LED – RES-Lighting - MURB

2

3 f) EfficiencyOne would provide cost-effectiveness testing results for each proposed

4 program in the format and of the nature as directed by the UARB.

5

6 g) Confirmed.

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Request IR-03:

With respect to the “context of CE testing” referenced in Lines 3-5 on page 1 of 15:

a) How many jurisdictions in the US use a TRC as part of CE testing, and of those how many include NEBs in the TRC?

b) How many jurisdictions in Canada use a TRC as part of CE testing, and of those how many include NEBs in the TRC?

Response IR-03:

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

a) Thirty-eight U.S. States use the TRC as part of CE testing. Thirteen of these states include NEBs. These are Arkansas, California, Colorado, Connecticut, Delaware, Illinois, Kentucky, Maryland, Massachusetts, New York, Oregon, Rhode Island, and Washington D.C.

b) Seven Canadian Provinces use the TRC as part of CE testing. Three of these provinces employ NEBs. These are British Columbia, Manitoba and Ontario.

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Request IR-04:

Lines 4-8 on page 2 of 15 lists four shortcomings of the TRC, as it is currently applied in NS. Please comment on how each of these four is addressed by the inclusion of NEB's in the TRC calculation. If any of the four is not addressed by the inclusion of NEB's, what further work and what additional modification of the TRC, is necessary to address it? Is any of this further work currently being done, either in NS or in other jurisdictions?

Response IR-04:

Bias is the only shortcoming addressed through the addition of NEBs.

The shortcoming of bias is addressed by re-balancing the TRC test through the introduction of NEBs. Including a value for customer benefits (inclusive of NEBs) balances the TRC which currently includes a value of customer costs.

The shortcoming of accuracy is not addressed by the inclusion of NEBs in the TRC. EfficiencyOne is aware of other work on improving the accuracy of the TRC test happening in other jurisdictions. Examples of important recent work include the study of the incremental costs of LED technology in Massachusetts¹, and a large incremental cost study in California.² This California study required three years and \$2 Million to complete, in an effort to inform 2015-2017 Program Activities.

The shortcomings of relevance and consistency with public policy are not addressed by the inclusion of NEBs in the TRC. EfficiencyOne is not currently active in efforts to address these challenges.

¹ CADMUS et al., LED Incremental Cost Study Overall FINAL Report, February 2016, Prepared for The Electric and Gas Program Administrators of Massachusetts Part of the Residential Evaluation Program Area.

² Itron, Inc., 2010-2012 WO017 Ex Ante Measure Cost Study Final Report, May 2014.

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- 1 There are efforts underway to overcome challenges with cost-effectiveness testing. The release of
2 the National Standard Practice manual, which, among other things, provides a new cost-
3 effectiveness test – the Resource Value test – and recommends it for use as a primary screening
4 test.³

³ NESP, National Standard Practice Manual for Assessing Cost-Effectiveness of Energy Efficiency Resources, May 2017, at page 16.

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Request IR-05:

On May 11, 2017 E1 submitted its Incentive Setting Methodology. This was approved by the Board on July 18, 2017. Please specify what effects, if any, the modification of the TRC to include NEBs will have on this methodology, or the results that it produces?

Response IR-05:

The modification to the TRC to include NEBs would not affect the Incentive Setting Methodology. The TRC is included in the decision-making process of whether measures should be considered as part of ENS's portfolio. If measures are included, then the Incentive Setting Methodology would be followed to set an appropriate incentive level.

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Request IR-06:

Re page 7 of 15, Lines 3- 5:

- a) Please explain what is meant by “primary research”, and the process by which it was completed in other jurisdictions.**
- b) What other jurisdictions have “invested heavily” in primary research?**
- c) For those identified in b), how much was invested, and over what timeframe was the research completed?**

Response IR-06:

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

- a) As requested by EfficiencyOne, VEIC focused its work on adapting publicly-available NEB data from research already performed (primary research). The most comprehensive study (Massachusetts Special and Cross-Sector Studies Area, Residential and Low-Income Non-Energy Impacts (NEI) Evaluation. Prepared for the Massachusetts Program Administrators) assessed and derived NEIs from existing literature, from engineering estimates and algorithms, and from program participant surveys. This research has informed regulator-approved non-energy impact values in Massachusetts, Rhode Island and Maryland. Summaries and links to the primary research can be found in Appendix A.
- b) While not necessarily created for a specific jurisdiction, there are over 300 research studies on NEBs. The following list contains a selection of this research:
 - 1. E4TheFuture. Occupant Health Benefits of Residential Energy Efficiency. E4The Future Inc. (2016).

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1 <https://e4thefuture.org/wp-content/uploads/2016/11/Occupant-Health-Benefits-Residential-EE.pdf>

3 Time Frame: 2016

- 4 2. Norton, R., et al. Non-Energy Benefits, the Clean Energy Plan, and Energy Policy for
5 Multi-Family Housing. Green and Healthy Homes Initiative. (2016).

6 https://aceee.org/files/proceedings/2016/data/papers/11_716.pdf

7 Time Frame: 2016

- 8 3. Woolf, T., et al. Best Practices for Screening Energy Efficiency Programs. Synapse
9 Energy Economics Inc. (2012).

10 http://www.synapse-energy.com/sites/default/files/SynapseReport.2012-07.NHPC_EE-Program-Screening.12-040.pdf

12 Time Frame: 2012

- 13 4. Woolf, T., et al. Energy Efficiency Cost-Effectiveness Screening: How to Properly
14 Account for ‘Other Program Impacts’ and Environmental Compliance Costs. Synapse
15 Energy Economics Inc. (2012).

16 http://www.synapse-energy.com/sites/default/files/SynapseReport.2012-11.RAP_EE-CostEffectiveness-Screening.12-014.pdf

18 Time Frame: 2012

- 19 5. Gudbjerg, E., et al. Spreading the Word – An Online Non-Energy Benefit Tool. ECEEE
20 Industrial Summer Study Proceedings. (2014).

21 <https://docplayer.net/41851376-Spreading-the-word-an-online-non-energy-benefit-tool.html>

23 Time Frame: 2014

- 24 6. International Energy Agency. Capturing the Multiple Benefits of Energy Efficiency.
25 (2014).

26 http://www.iea.org/publications/freepublications/publication/Captur_the_MultiplBenef_ofEnergyEficiency.pdf

28 Time Frame: 2014

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- 1 7. Skumatz, L. et al. Lessons Learned and Next Steps in Energy Efficiency Measurement
2 and Attribution: Energy Savings, Net to Gross, Non-Energy Benefits, and Persistence
3 of Energy Efficiency Behavior. California Institute for Energy and Environment,
4 (2009).

5 [https://library.cee1.org/system/files/library/10517/CIEE_Behavior_White_Paper_-](https://library.cee1.org/system/files/library/10517/CIEE_Behavior_White_Paper_-_Skumatz_2009.pdf)
6 [_Skumatz_2009.pdf](https://library.cee1.org/system/files/library/10517/CIEE_Behavior_White_Paper_-_Skumatz_2009.pdf)

7 Time Frame: 2009
8

- 9 c) VEIC does not know how much money was spent on this research. “Invested heavily”
10 refers to the number of studies and resulting volume of data. See the timeframe for each
11 study referenced above.

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Request IR-07:

Re the selection of Massachusetts as the “source jurisdiction”, as referenced at Lines 13- 17 on page 7 of 15:

- a) For whom and by whom was the Massachusetts research completed?**
- b) Are all NEB’s currently used in Massachusetts based on primary research? If not, please identify those that are not and explain how they were determined.**
- c) What methodology was used to gather the primary market data?**
- d) Was primary market data collected on a DSM measure basis or on a DSM program basis?**
- e) For each NEB addressed by the study, what was the range of the data relative to the single values that were determined for each DSM measure or program?**
- f) How was the market data collected for each NEB condensed into a single value for each NEB?**
- g) How much did Massachusetts spend on its primary research and the development of NEBs?**
- h) Over what period of time was the research completed?**
- i) What market sectors were addressed by the primary research?**
- j) Appendix A of Attachment 4 summarizes some of the work done in Massachusetts, together with links to associated reports, but those links do not provide report access. Please provide links which allow access to the reports.**

Response IR-07:

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

- a) The primary research includes the following studies:**

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1. [Massachusetts Special and Cross-Sector Studies Area, Residential and Low-Income Non-Energy Impacts \(NEI\) Evaluation](#). 2011. Prepared for the Massachusetts Program Administrators and completed by NMR Group Inc. and TetraTech.
2. [Commercial and Industrial Non-Energy Impacts Study](#). 2012. Prepared for the Massachusetts Program Administrators and completed by TetraTech.
3. [Commercial and Industrial New Construction Non-Energy Impacts Study](#). 2016. Prepared for the Massachusetts Program Administrators by Tetra Tech and DNV GL.
4. [Massachusetts Special and Cross-Cutting Research Area: Low-Income Single-Family Health- and Safety-Related Non-Energy Impacts Study](#). 2016 Prepared for the Massachusetts Program Administrators and completed by Three3 and NMR Group.

b) No. In Massachusetts, the following NEBs were determined through a literature review or an algorithm derived from the literature ([Massachusetts Special and Cross-Sector Studies Area, Residential and Low-Income Non-Energy Impacts \(NEI\) Evaluation](#). 2011.):

1. Terminations and reconnections
2. Customer calls
3. Collections Notices
4. Safety-related emergency calls
5. Insurance savings
6. Reduced water usage and sewer costs (faucet aerators)
7. Reduced water usage and sewer costs (low flow showerheads)
8. National Security
9. Appliance Recycling – Avoided landfill space
10. Appliance Recycling – Reduced emissions due to recycling plastic and glass, reduced emissions

c) In addition to the literature review and algorithms derived from the literature, researchers in Massachusetts used the following methods to gather data:

1. Algorithm and Program Administrator data

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1 2. Survey

2 3. TRM Report

3 4. Program Administrator data that is quantified elsewhere. For example, increased
4 system reliability due to efficiency is already calculated for the Program Administrators
5 in the [Avoided Energy Supply Costs in New England: 2011 Report](#) (Hornby et al.,
6 2011).

7
8 d) Both. The primary research generally examined the program level rather than at the
9 measure level, with notable exceptions of studies that have examined NEBs associated with
10 appliance programs. While most NEBs are attributable to a program, to the extent possible,
11 the Massachusetts researchers recommended NEB values applicable to individual
12 measures.

13
14 e) Please see Section 3 (Methodology) of the following reports:

- 15 1. [Massachusetts Special and Cross-Sector Studies Area, Residential and Low-Income](#)
16 [Non-Energy Impacts \(NEI\) Evaluation](#).
17 2. [Commercial and Industrial Non-Energy Impacts Study](#).
18 3. [Commercial and Industrial New Construction Non-Energy Impacts Study](#).

19
20 f) Please see Section 3 (Methodology) of the following reports:

- 21 1. [Massachusetts Special and Cross-Sector Studies Area, Residential and Low-Income](#)
22 [Non-Energy Impacts \(NEI\) Evaluation](#).
23 2. [Commercial and Industrial Non-Energy Impacts Study](#).
24 3. [Commercial and Industrial New Construction Non-Energy Impacts Study](#).

25
26 g) VEIC does not know.

27
28 h) Research from the Massachusetts Special and Cross-Sector Studies Area, Residential and
29 Low-Income Non-Energy Impacts (NEI) Evaluation was conducted from mid-2009 until

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1 early 2011. The Massachusetts commercial and industrial NEB research was conducted
2 between 2012 and 2016.

3
4 i) Residential, low-income, and commercial and industrial.

5
6 j) Links to the reports can be found here:

7 1. [http://ma-eeac.org/wordpress/wp-content/uploads/Special-and-Cross-Sector-](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)
8 [Studies-Area-Residential-and-Low-Income-Non-Energy-Impacts-Evaluation-Final-](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)
9 [Report.pdf](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)

10 2. [http://ma-eeac.org/wordpress/wp-content/uploads/Massachusetts-Program-](http://ma-eeac.org/wordpress/wp-content/uploads/Massachusetts-Program-Administrators-Commercial-Industrial-Non-Energy-Impacts-Study.pdf)
11 [Administrators Commercial-Industrial-Non-Energy-Impacts-Study.pdf](http://ma-eeac.org/wordpress/wp-content/uploads/Massachusetts-Program-Administrators-Commercial-Industrial-Non-Energy-Impacts-Study.pdf)

12 3. [https://www.puc.nh.gov/EESE%20Board/Meetings/2017/021017EERSWorkshop](https://www.puc.nh.gov/EESE%20Board/Meetings/2017/021017EERSWorkshop1/Commercial%20and%20Industrial%20New%20Construction%20Non-Energy%20Impacts%20Study%20Final%20Report.pdf)
13 [1/Commercial%20and%20Industrial%20New%20Construction%20Non-](https://www.puc.nh.gov/EESE%20Board/Meetings/2017/021017EERSWorkshop1/Commercial%20and%20Industrial%20New%20Construction%20Non-Energy%20Impacts%20Study%20Final%20Report.pdf)
14 [Energy%20Impacts%20Study%20Final%20Report.pdf](https://www.puc.nh.gov/EESE%20Board/Meetings/2017/021017EERSWorkshop1/Commercial%20and%20Industrial%20New%20Construction%20Non-Energy%20Impacts%20Study%20Final%20Report.pdf)

15 4. [http://ma-eeac.org/wordpress/wp-content/uploads/Low-Income-Single-Family-](http://ma-eeac.org/wordpress/wp-content/uploads/Low-Income-Single-Family-Health-and-Safety-Related-NonEnergy-Impacts-Study.pdf)
16 [Health-and-Safety-Related-NonEnergy-Impacts-Study.pdf](http://ma-eeac.org/wordpress/wp-content/uploads/Low-Income-Single-Family-Health-and-Safety-Related-NonEnergy-Impacts-Study.pdf)

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Request IR-08:

Re page 7 of 15, Lines 19-23 state that VEIC “mapped measure and end-use values from the Massachusetts research base and TRM to the measures modelled as part of the 2016-2018 DSM Resource Plan modelling process”.

a) Please explain how VEIC did this.

b) What is the difference between “measure” and “end-use level” values?

Response IR-08:

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

a) VEIC matched comparable measures (that is, similar in design, definition, description and implementation mechanisms) between the Massachusetts 2013-2015 TRM and EfficiencyOne’s offerings. For example, the Commercial Electric Griddle measure in the Massachusetts 2013-2015 TRM was mapped directly to the Commercial Electric Griddle measure in the ENS 2016-2018 DSM Resource Plan. The Solid Door Commercial Freezer is an example of a of a measure contained in the ENS 2016-2018 DSM Resource Plan that was mapped to the Prescriptive Refrigeration end use in the Massachusetts 2013-2015 TRM, because said measure did not exist in standalone form.

b) “Measure level” refers to distinct, unique efficiency measures (e.g., Commercial Electric Griddle) and “end use level” refers to broader application categories, such as Commercial Lighting. Measure level base values (before adjustments) were adopted exactly from the Massachusetts 2013-2015 TRM, whereas end-use values would have been applied in proportion to energy savings as given by the ENS 2016-2018 DSM Resource Plan.

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Request IR-09:

Line 3 on page 13 of 15 describes the values in the VEIC report as a “living document” and Lines 5-16 on the same page discuss how the values will be updated.

- a) Line 5 notes E1’s plan to undertake a full review of the NEBs, and Line 8 recommends “that this effort be reviewed by the UARB and intervenors in the same manner as the review of the DSM Potential Study itself”. Please elaborate on the level of Board review envisaged by this statement.**
- b) Lines 13 – 16 refers to triennial or ad-hoc reviews of the NEBs using an abbreviated research review process, with changes to be discussed with the DSMAG. Please elaborate on how this process differs from the review referenced in Line 5, and why no Board review would be required.**
- c) Please discuss the process by which Massachusetts updates its NEBs, the process by which current NEBs were approved by the regulator, and the process by which modifications to the NEBs are approved.**

Response IR-09:

- a) EfficiencyOne is proposing to include updated NEB information in its filing of the DSM Potential Study. This would be subject to the regulatory process as determined by the NSUARB.**
- b) EfficiencyOne’s intention to conduct triennial or ad-hoc reviews, is to provide the opportunity to address any major changes affecting NEBs between IRP cycles. Due to the abbreviated nature of this review EfficiencyOne is proposing the DSM Advisory Group is the appropriate forum for discussion.**
- c) The following response has been provided by Vermont Energy Investment Corporation (VEIC).**

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Massachusetts efficiency programs are administered through Mass Save, a collaborative of Massachusetts' natural gas and electric utilities and energy efficiency service providers. In conjunction with the Energy Efficiency Advisory Council (EEAC), Mass Save prepares a three-year, statewide energy efficiency plan. They submit their three-year plans to the Department of Public Utilities (DPU or the regulator) on or before October 31 of the applicable planning year. The DPU must, within 90-days of the filing date, approve, modify, or reject and require the resubmission of the three-year plans. These three-year plans include the Program Administrators' use of NEBs. The process also includes approving a corresponding TRM.

Once in place, the EEAC continues to report to the DPU and evaluate and monitor the implementation of these plans. The EEAC is also charged with developing a long-term vision for Massachusetts' energy future. In recommending and overseeing specific studies and research, the EEAC works to "achieve energy efficiency savings and to maximize the economic and environmental benefits of energy efficiency", including providing recommendations on NEBs.

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Request IR-10:

The VEIC Report (Attachment 4), in the second paragraph on page 4 of 64, briefly discusses the different approaches to including NEBs. The last sentence of that paragraph notes that “Currently, broad measure-level NEBs have been approved by utility regulators and incorporated into efficiency screening in Massachusetts, Rhode Island and Maryland”.

a) Is the TRC used to screen DSM in each of the referenced states?

b) Please identify other states or provinces which use the TRC as a screening test and where such regulatory approval and incorporation of NEBs is in place.

c) Please confirm that the manner in which NEBs are included in efficiency screening in the referenced states is similar to the manner in which E1 proposes in this Application.

Response IR-10:

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

a) Massachusetts uses the TRC. Rhode Island uses the TRC, but Rhode Island is developing its own cost-effectiveness framework called the Rhode Island Test. Maryland uses the TRC as well as the UCT, PCT, RIM, and SCT.

b) Please refer to EfficiencyOne’s response to Multeese IR 03 (a).

c) Confirmed.

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Request IR-11:

Table 1 (page 5 of 64) of the VEIC Report (Attachment 4) lists NEBs “Recommended for Inclusion in the ENS Market Rate Programs”.

a) Please identify which of these E1 believes are currently accounted for by customers who consider whether to participate in DSM programs offered by E1 (either because the customers are aware of these NEBs themselves, or because they are communicated to customers by E1, as part of its DSM marketing and promotion).

b) In cases where E1 makes these benefits known to customers, are such benefits communicated in a general manner (i.e., simply make the customer aware of such benefits), or are they communicated as specific values of estimated dollar savings?

Response IR-11:

a) To varying degrees EfficiencyOne communicates all of the NEBs listed as “Recommended for Inclusion in ENS Market Rate Programs” to customers, through its DSM marketing and promotion or direct communications with EfficiencyOne staff.

b) NEBs are communicated in a general manner to make customers aware of these benefits and to encourage customers to participate in programs offered by EfficiencyOne.

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Request IR-12:

The second paragraph on page 6 of 64 of the VEIC Report (Attachment 4) discusses how NEBs were developed as a per Kwh value. Please provide an example, showing how the NEB was developed for a particular technology or end use, and how that NEB was then converted to a per Kwh value.

Response IR-12:

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

To clarify, VEIC did not develop NEBs as a per kWh value, this work was done by Massachusetts. Pages 3-30 to 3-31 of the Massachusetts C&I study provide the methodology for converting NEB values from absolute monetary values to per-kWh values.¹ Where appropriate, per kWh NEBs were referenced from the Massachusetts TRM. For example, the MA TRM establishes NEBs for C&I Large Retrofit Refrigeration end use measures as \$0.047/kWh annually. For the Solid Door Commercial Refrigerator measure, which saves 681 kWh annually (per EfficiencyOne's 2016-2018 DSM Resource Plan), VEIC established NEBs (before other adjustments) as 681 kWh x \$0.047/kWh = \$32.00.

¹ TetraTech, Massachusetts Program Administrators: Final Report – Commercial and Industrial Non-Energy Impacts Study, June 2012. http://ma-eeac.org/wordpress/wp-content/uploads/Massachusetts-Program-Administrators_Commercial-Industrial-Non-Energy-Impacts-Study.pdf

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Request IR-13:

Page 8 of 64 of the VEIC Report (Attachment 4) provides a formula for the TRC which includes “Participant Benefits” in the numerator. At the top of page 9, the report notes that “Currently, in the screening methodology for Nova Scotia’s portfolio, all the costs of the programs are included in the ratio, but some of the benefits, namely benefits to participants beyond direct energy savings, are not included in the equation”. Please clarify what participant benefits are currently included in the calculation of the TRC in NS.

Response IR-13:

EfficiencyOne’s 2016-2018 DSM Resource Plan included two participant-based resource benefits – Water Savings and Wood Savings.

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Request IR-14:

The VEIC Report (Attachment 4) states in the last sentence of the second paragraph on page 10 of 64 that “As a result of this research, the incorporation of NEBs into appropriate cost-effectiveness screening has been identified and accepted as a best practice in efficiency program administration”. Please reconcile this with Figure 1 and Figure 2, both of which appear to suggest a more restricted inclusion of NEBs in actual practice.

Response IR-14:

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

According to the National Standard Practice Manual (NSPM) for Energy Efficiency Cost-Effectiveness¹, best practice calls for screening that includes costs and benefits symmetrically. Accordingly, if a category of cost is included, the corresponding benefits should be too.

Figure 1 provides only a snapshot of the Northeast U.S. and adjacent Canadian Provinces. As of June 2017, 28 U.S. states incorporate some form of NEB adder or program screen.² Figure 2 is a reflection of the research rather than which jurisdictions include NEBs in actual practice.

¹ National Standard Practice Manual for Assessing Cost-Effectiveness of Energy Efficiency Resources. EDITION 1 Spring 2017, page 31. https://nationalefficiencyscreening.org/wp-content/uploads/2017/05/NSPM_May-2017_final.pdf

² Non-Energy Impacts Approaches and Values: an Examination of the Northeast, Mid-Atlantic, and Beyond. June 2017, page 21. <https://neep.org/sites/default/files/resources/NEI%20Final%20Report%20for%20NH%206.2.17.pdf>

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Request IR-15:

The VEIC Report (Attachment 4) states on page 6 of 64 that “After a full review of 238 measures modelled as part of the 2016-2018 DSM Resource Plan development and offered by Efficiency Nova Scotia, NEB adjustments were recommended for consideration for 156 measures”. At page 14 of 64, the report lists six categories into which the process for applying NEB values from Massachusetts to the programs in NS fell. Please identify how many of the 156 measures for which NEBs are recommended fall into each category.

Response IR-15:

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

With the removal of property values and rent revenues (refer to EfficiencyOne’s response to Multeese IR-16), 156 measures is revised to 153 measures. The breakdown is as follows:

Category 1: 115 measures

Category 2: 0 measures

Category 3: 0 measures

Category 4: 9 measures

Category 5: 25 measures

Category 6: 4 measures

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Request IR-16:

Tables 11, 12 and 13 of the VEIC Report (Attachment 4) show Total Benefits and TRC Ratios With and Without NEBs for the years 2016, 2017 and 2018, and Table 4 indicates that a high percentage (83.9%) of the NEB value is related to increased property values. Please provide Tables 11, 12 and 13 with the NEBs related to increased property values excluded.

Response IR-16:

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

Please find versions of Tables 11, 12 and 13 with the property-related NEBs (property value increases and rent revenue effects) excluded at the bottom of this response.

In light of recent developments in Massachusetts, VEIC recommends that EfficiencyOne withdraw its property value related NEBs from this application. In conjunction with the efficiency Program Administrators (PAs), the Massachusetts Energy Efficiency Advisory Council (EEAC) commissioned a report that presents a framework to guide the PAs and the EEAC in planning and conducting future NEB research. The report¹, which was issued on January 23, 2018, recommended the following:

“Due to the double counting associated with property values or rental income and the individual non-property value NEIs that are the source of changes in property value or rental income, we recommend that the PAs not count their existing property value NEIs for those measures. Rather, in the BCR calculations, the PAs should count the NEI values associated with the individual amenities such as improved comfort, health, home durability, reduced O&M costs, reduced tenant complaints, etc. For those

¹ Program Administrators of Massachusetts Non-Energy Impact Framework Study Report. January 23, 2018.
<http://ma-eeac.org/wordpress/wp-content/uploads/NEI-Framework-Study-Report.pdf>

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measures that only have property value NEIs, such as appliances and low-flow

showerheads, we recommend using in the BCR calculations the property value NEIs

as proxies for the individual NEIs that have not yet been counted.”

The PAs and the EEAC accounted for this recommendation in their 2019-2021 efficiency program filing² on October 31, 2018.

Consistent with a conservative approach, VEIC has revised Tables 10-19, Appendix B, please refer to Attachment 1 of this IR response. VEIC has revised Appendix C to reflect the removal of property value NEBs, please refer to Attachment 2 of this IR response (a Microsoft Excel file which has been included in the electronic version of this filing).

Table 11: Total Benefits and TRC Ratios with and without NEBs

Efficiency Nova Scotia Programs and Portfolio (Plan Year 2016)

Program	Plan Year 2016			
	Total Benefits w/o NEBs	Total Benefits with NEBs	TRC Ratio w/o NEBs	TRC Ratio with NEBs
BNI – Efficient Product Rebates	\$23,758,752	\$29,834,913	2.01	2.52
BNI – Direct Installation	\$7,308,883	\$14,060,922	1	1.92
Custom Incentives	\$32,039,143	\$46,063,363	2.55	3.66
Residential Efficient Product Rebates	\$6,578,241	\$6,841,730	1.63	1.69
Existing Residential	\$50,888,949	\$54,255,525	1.85	1.97
New Residential	\$6,721,775	\$7,520,399	2.49	2.79
Total Portfolio	\$127,295,743	\$159,967,753	1.928	2.423

² Massachusetts Joint Statewide Electric and Gas Three-Year Energy Efficiency Plan 2019-2021. October 31, 2018.
<http://ma-eeac.org/wordpress/wp-content/uploads/Exh.-1-Final-Plan-10-31-18-With-Appendices-no-bulk.pdf>

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Table 12: Total Benefits and TRC Ratios with and without NEBs

Efficiency Nova Scotia Programs and Portfolio (Plan Year 2017)

Program	Plan Year 2017			
	Total Benefits w/o NEBs	Total Benefits with NEBs	TRC Ratio w/o NEBs	TRC Ratio with NEBs
BNI – Efficient Product Rebates	\$25,443,534	\$31,575,993	2.2	2.73
BNI – Direct Installation	\$7,514,151	\$14,036,069	1.08	2.01
Custom Incentives	\$33,905,455	\$48,010,092	2.7	3.83
Residential Efficient Product Rebates	\$7,323,118	\$7,587,393	1.7	1.76
Existing Residential	\$58,340,624	\$62,095,797	1.93	2.06
New Residential	\$7,246,440	\$8,064,280	2.62	2.92
Total Portfolio	\$139,773,322	\$172,724,699	2.046	2.528

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Table 13: Total Benefits and TRC Ratios with and without NEBs Efficiency Nova Scotia Programs and Portfolio (Plan Year 2018)

Program	Plan Year 2018			
	Total Benefits w/o NEBs	Total Benefits with NEBs	TRC Ratio w/o NEBs	TRC Ratio with NEBs
BNI – Efficient Product Rebates	\$28,889,553	\$35,315,364	2.22	2.72
BNI – Direct Installation	\$7,682,788	\$15,556,497	1.1	2.22
Custom Incentives	\$36,399,857	\$50,646,442	2.87	3.99
Residential Efficient Product Rebates	\$7,916,033	\$8,184,551	1.8	1.86
Existing Residential	\$61,756,675	\$65,612,040	1.93	2.05
New Residential	\$7,831,324	\$8,669,775	2.76	3.06
Total Portfolio	\$150,476,230	\$184,070,665	2.091	2.558

Table 10: Recommended Nova Scotia NEBs by Measure

	VEIC Recommended NEBs			
Measure Name	VEIC Recommended One-Time NEB	VEIC Recommended Annual NEBs	Source	Treatment
BNI - Efficient Product Rebates				
Under Counter Commercial Dishwasher (Low Temp)	\$0.00	\$130.96	MA TRM p.279	Adjusted-water savings
Single-Tank Door Type Dishwasher (Low Temp)	\$0.00	\$832.93	MA TRM p.279	Adjusted-water savings
Single-Tank Conveyor Dishwasher (Low Temp)	\$0.00	\$672.55	MA TRM p.279	Adjusted-water savings
Multi-Tank Conveyor Commercial Dish Washer (Low Temp)	\$0.00	\$970.02	MA TRM p.279	Adjusted-water savings
Under Counter Dishwasher with Booster (High Temp)	\$0.00	\$55.77	MA TRM p.279	Adjusted-water savings
Single Tank Door Dishwasher with Booster (High Temp)	\$0.00	\$362.14	MA TRM p.280	Adjusted-water savings
Single Tank Conveyor Dishwasher with Booster (High Temp)	\$0.00	\$219.87	MA TRM p.280	Adjusted-water savings
Multi Tank Conveyor Dishwasher with Booster (High Temp)	\$0.00	\$834.22	MA TRM p.280	Adjusted-water savings
Standard Capacity Commercial Electric Fryers	\$0.00	\$0.00	MA TRM p.285	
Full Size Commercial Hot Food Holding Cabinet	\$0.00	\$0.00	MA TRM p.287	
Three Quarter Size Commercial Hot Food Holding Cabinet	\$0.00	\$0.00	MA TRM p.287	
Half Size Commercial Hot Food Holding Cabinet	\$0.00	\$0.00	MA TRM p.287	
Commercial Electric Griddle	\$0.00	\$0.00	MA TRM p.324	
Solid Door Commercial Refrigerator	\$0.00	\$40.32	MA TRM p.419	
Glass Door Commercial Refrigerator	\$0.00	\$41.36	MA TRM p.419	
Solid Door Commercial Freezer	\$0.00	\$57.57	MA TRM p.419	
ENERGY STAR® Ice Making Head	\$0.00	\$34.32	MA TRM p.285	Adjusted-water savings
ENERGY STAR® Remote Condensing Head/Split System Ice Maker	\$0.00	\$27.18	MA TRM p.283	Adjusted-water savings

Measure Name	VEIC Recommended NEBs		Source	Treatment
	VEIC Recommended One-Time NEB	VEIC Recommended Annual NEBs		
ENERGY STAR® Self Contained Ice Maker	\$0.00	\$36.42	MA TRM p.283	Adjusted-water savings
ENERGY STAR® Commercial Electric Convection Oven	\$0.00	\$0.00	MA TRM p.271	
Variable Speed Drive for Kitchen exhaust fans (Demand Controlled Ventilation)	\$0.00	\$0.00	MA TRM p.236	
Variable Speed Drive for Kitchen exhaust fans (Demand Controlled Ventilation)	\$0.00	\$0.00	MA TRM p.236	
ENERGY STAR®, CEE Tier 2 or CEE Tier 3 Commercial Clothes Washer	\$0.00	-\$10.70	MA TRM p.19	Adjusted-water savings
Night Covers for 3' Refrigerated Display Cases	\$0.00	\$0.00	MA TRM p.262	
Night Covers for 3' Refrigerated Display Cases	\$0.00	\$0.00	MA TRM p.262	
Night Covers for 3' Refrigerated Display Cases	\$0.00	\$0.00	MA TRM p.262	
Zero Energy Doors for Reach-In Coolers and Freezers	\$0.00	\$0.00	Not offered in MA TRM	Proxy
Zero Energy Doors for Reach-In Coolers and Freezers	\$0.00	\$0.00	Not offered in MA TRM	Proxy
Zero Energy Doors for Reach-In Coolers and Freezers	\$0.00	\$0.00	Not offered in MA TRM	Proxy
Humidity-Based Door Heater Controls for Reach-In Coolers and Freezers	\$0.00	\$0.00	MA TRM p.252	
Humidity-Based Door Heater Controls for Reach-In Coolers and Freezers	\$0.00	\$0.00	MA TRM p.252	
Humidity-Based Door Heater Controls for Reach-In Coolers and Freezers	\$0.00	\$0.00	MA TRM p.252	
Evaporator Fan Motor Controls for Walk-In Freezers and Coolers	\$0.00	\$0.00	MA TRM p.266	
Evaporator Fan Motor Controls for Walk-In Freezers and Coolers	\$0.00	\$0.00	MA TRM p.266	
Evaporator Fan Motor Controls for Walk-In Freezers and Coolers	\$0.00	\$0.00	MA TRM p.266	

	VEIC Recommended NEBs			
Measure Name	VEIC Recommended One-Time NEB	VEIC Recommended Annual NEBs	Source	Treatment
Intelligent (Electronic) Defrost Control For Freezer Display Cases	\$0.00	\$0.00	MA TRM p.264	
Intelligent (Electronic) Defrost Control For Freezer Display Cases	\$0.00	\$0.00	MA TRM p.264	
Intelligent (Electronic) Defrost Control For Freezer Display Cases	\$0.00	\$0.00	MA TRM p.264	
Intelligent (Electronic) Defrost Control For Walk-In Freezers	\$0.00	\$0.00	MA TRM p.264	
Intelligent (Electronic) Defrost Control For Walk-In Freezers	\$0.00	\$0.00	MA TRM p.264	
Intelligent (Electronic) Defrost Control For Walk-In Freezers	\$0.00	\$0.00	MA TRM p.264	
Refrigerated Vending Machine Controller	\$0.00	\$0.00	MA TRM p.269	
Refrigerated Vending Machine Controller	\$0.00	\$0.00	MA TRM p.269	
Refrigerated Vending Machine Controller	\$0.00	\$0.00	MA TRM p.269	
Strip Curtains for 3' Open Refrigerated Display Cases	\$0.00	\$0.00	Not offered in MA TRM	Proxy
Strip Curtains for 3' Open Refrigerated Display Cases	\$0.00	\$0.00	Not offered in MA TRM	Proxy
Strip Curtains for 3' Open Refrigerated Display Cases	\$0.00	\$0.00	Not offered in MA TRM	Proxy
Electronically Commutated (Brushless) DC Motors for Refrigeration Applications	\$0.00	\$0.00	MA TRM p.256	
Electronically Commutated (Brushless) DC Motors for Refrigeration Applications	\$0.00	\$0.00	MA TRM p.256	
Electronically Commutated (Brushless) DC Motors for Refrigeration Applications	\$0.00	\$0.00	MA TRM p.256	
Electronically Commutated (Brushless) DC Motors for Refrigeration Applications	\$0.00	\$0.00	MA TRM p.256	
Variable Frequency Drives	\$0.00	\$0.00	MA TRM p.299	
Variable Frequency Drives	\$0.00	\$0.00	MA TRM p.299	

	VEIC Recommended NEBs			
Measure Name	VEIC Recommended One-Time NEB	VEIC Recommended Annual NEBs	Source	Treatment
Variable Frequency Drives	\$0.00	\$0.00	MA TRM p.299	
Variable Frequency Drives	\$0.00	\$0.00	MA TRM p.299	
Fluorescent T5 and HPT8 Fixtures (4 FT) lamps-Retrofit (dual baseline)	\$0.00	\$2.19	MA TRM p.418	
Relamp/Reballast-Retrofit (dual baseline)	\$0.00	\$2.90	MA TRM p.418	
Relamp/Reballast-Retrofit (dual baseline)	\$0.00	\$2.98	MA TRM p.418	
Relamp/Reballast-Retrofit (dual baseline)	\$0.00	\$2.88	MA TRM p.418	
Relamp/Reballast-Retrofit (dual baseline)	\$0.00	\$2.90	MA TRM p.418	
Relamp/Reballast-Retrofit (dual baseline)	\$0.00	\$2.99	MA TRM p.418	
T8 Dimmable Stairwell Lighting	\$0.00	\$15.30	MA TRM p.418	
T8 Dimmable Stairwell Lighting	\$0.00	\$9.75	MA TRM p.418	
T8 Dimmable Stairwell Lighting	\$0.00	\$16.27	MA TRM p.418	
T8 Dimmable Stairwell Lighting	\$0.00	\$15.24	MA TRM p.418	
T8 Dimmable Stairwell Lighting	\$0.00	\$8.86	MA TRM p.418	
LED Lamps-Retrofit (dual baseline)	\$0.00	\$4.83	MA TRM p.418	
LED Lamps-Retrofit (dual baseline)	\$0.00	\$3.07	MA TRM p.418	
LED Lamps-Retrofit (dual baseline)	\$0.00	\$5.13	MA TRM p.418	
LED Lamps-Retrofit (dual baseline)	\$0.00	\$4.80	MA TRM p.418	
LED Lamps-Retrofit (dual baseline)	\$0.00	\$2.79	MA TRM p.418	
LED Lamps-End of Life	\$0.00	\$2.81	MA TRM p.418	
LED Lamps-End of Life	\$0.00	\$1.79	MA TRM p.418	
LED Lamps-End of Life	\$0.00	\$2.98	MA TRM p.418	

	VEIC Recommended NEBs			
Measure Name	VEIC Recommended One-Time NEB	VEIC Recommended Annual NEBs	Source	Treatment
LED Lamps-End of Life	\$0.00	\$2.80	MA TRM p.418	
LED Lamps-End of Life	\$0.00	\$1.63	MA TRM p.418	
LED Refrigeration Strip Lighting-End of Life replacement	\$0.00	\$15.12	MA TRM p.418	
LED Refrigeration Strip Lighting-End of Life replacement	\$0.00	\$15.12	MA TRM p.418	
LED Refrigeration Strip Lighting-End of Life replacement	\$0.00	\$15.12	MA TRM p.418	
LED High Bay Fixture	\$0.00	\$40.20	MA TRM p.418	
LED High Bay Fixture	\$0.00	\$40.13	MA TRM p.418	
LED High Bay Fixture	\$0.00	\$40.31	MA TRM p.418	
LED High Bay Fixture	\$0.00	\$40.39	MA TRM p.418	
LED Low Bay Fixture	\$0.00	\$5.93	MA TRM p.418	
LED Low Bay Fixture	\$0.00	\$6.32	MA TRM p.418	
LED Low Bay Fixture	\$0.00	\$5.86	MA TRM p.418	
LED Low Bay Fixture	\$0.00	\$6.04	MA TRM p.418	
LED Low Bay Fixture	\$0.00	\$6.12	MA TRM p.418	
LED Linear Replacement Lamps	\$0.00	\$4.86	MA TRM p.418	
LED Linear Replacement Lamps	\$0.00	\$5.26	MA TRM p.418	
LED Linear Replacement Lamps	\$0.00	\$4.79	MA TRM p.418	
LED Linear Replacement Lamps	\$0.00	\$4.98	MA TRM p.418	
LED Linear Replacement Lamps	\$0.00	\$5.05	MA TRM p.418	
LED Exterior Fixtures-End of Life replacement	\$0.00	\$20.69	MA TRM p.418	

Measure Name	VEIC Recommended NEBs		Source	Treatment
	VEIC Recommended One-Time NEB	VEIC Recommended Annual NEBs		
LED Exterior Fixtures-End of Life replacement	\$0.00	\$20.69	MA TRM p.418	
LED Exterior Fixtures-End of Life replacement	\$0.00	\$20.69	MA TRM p.418	
LED Exterior Fixtures-End of Life replacement	\$0.00	\$20.69	MA TRM p.418	
LED Exterior Fixtures-End of Life replacement	\$0.00	\$20.69	MA TRM p.418	
LED Exit Sign-End of Life replacement	\$0.00	\$3.00	MA TRM p.418	
LED Exit Sign-End of Life replacement	\$0.00	\$3.00	MA TRM p.418	
LED Exit Sign-End of Life replacement	\$0.00	\$3.00	MA TRM p.418	
LED Exit Sign-End of Life replacement	\$0.00	\$3.00	MA TRM p.418	
LED Exit Sign-End of Life replacement	\$0.00	\$3.00	MA TRM p.418	
Photoluminescent Exit Sign	\$0.00	\$3.67	MA TRM p.418	
Photoluminescent Exit Sign	\$0.00	\$3.67	MA TRM p.418	
Photoluminescent Exit Sign	\$0.00	\$3.67	MA TRM p.418	
Photoluminescent Exit Sign	\$0.00	\$3.67	MA TRM p.418	
Photoluminescent Exit Sign	\$0.00	\$3.67	MA TRM p.418	
Lighting Controls - Occupancy Sensors	\$0.00	\$20.48	MA TRM p.418	
Lighting Controls - Occupancy Sensors	\$0.00	\$13.05	MA TRM p.418	
Lighting Controls - Occupancy Sensors	\$0.00	\$21.78	MA TRM p.418	
Lighting Controls - Occupancy Sensors	\$0.00	\$20.40	MA TRM p.418	
Lighting Controls - Occupancy Sensors	\$0.00	\$11.86	MA TRM p.418	
Daylighting Controls	\$0.00	\$9.81	MA TRM p.418	
Daylighting Controls	\$0.00	\$9.16	MA TRM p.418	

Measure Name	VEIC Recommended NEBs		Source	Treatment
	VEIC Recommended One-Time NEB	VEIC Recommended Annual NEBs		
Daylighting Controls	\$0.00	\$9.26	MA TRM p.418	
Daylighting Controls	\$0.00	\$9.90	MA TRM p.418	
Cycling Refrigerated Air Dryers (≤ 300 CFM capacity)	\$0.00	\$0.00	MA TRM p.291	
Cycling Refrigerated Air Dryers (≤ 300 CFM capacity)	\$0.00	\$0.00	MA TRM p.291	
Cycling Refrigerated Air Dryers (≤ 300 CFM capacity)	\$0.00	\$0.00	MA TRM p.291	
Variable Speed Drive Screw Compressors (10 - 40 hp)	\$0.00	\$0.00	MA TRM p.289	
Variable Speed Drive Screw Compressors (10 - 40 hp)	\$0.00	\$0.00	MA TRM p.289	
Variable Speed Drive Screw Compressors (10 - 40 hp)	\$0.00	\$0.00	MA TRM p.289	
Air-Entraining Air Nozzles (up to 14CFM at 100 psi)	\$0.00	\$0.00	MA TRM p.289	Proxy
No-Loss Drains (Timed drains are not eligible)	\$0.00	\$0.00	MA TRM p.296	
Air Tanks for Load / No-Load Screw Compressors (10 – 40 hp)	\$0.00	\$0.00	MA TRM p.289	Proxy
Air Tanks for Load / No-Load Screw Compressors (10 – 40 hp)	\$0.00	\$0.00	MA TRM p.289	Proxy
Air Tanks for Load / No-Load Screw Compressors (10 – 40 hp)	\$0.00	\$0.00	MA TRM p.289	Proxy
Integrated Dual Enthalpy Economizer Controls	\$0.00	\$0.00	MA TRM p.238	
Integrated Dual Enthalpy Economizer Controls	\$0.00	\$0.00	MA TRM p.238	
Integrated Dual Enthalpy Economizer Controls	\$0.00	\$0.00	MA TRM p.238	
Integrated Dual Enthalpy Economizer Controls	\$0.00	\$0.00	MA TRM p.238	
HVAC Hotel Occupancy Sensor	\$0.00	\$0.00	MA TRM p.248	
Zero-Energy Livestock Waterers	\$0.00	\$0.00	Not offered in MA TRM	Flagged
Single Heat Pad	\$0.00	\$0.00	Not offered in MA TRM	Flagged

	VEIC Recommended NEBs			
Measure Name	VEIC Recommended One-Time NEB	VEIC Recommended Annual NEBs	Source	Treatment
Double Heat Pad	\$0.00	\$0.00	Not offered in MA TRM	Flagged
Dairy Scroll Compressor	\$0.00	\$0.00	Not offered in MA TRM	Flagged
Heat Reclaimer Unit	\$0.00	\$0.00	Not offered in MA TRM	Flagged
VSD for Milk Vacuum Pump	\$0.00	\$0.00	Not offered in MA TRM	Flagged
BNI- Direct Installation				
Night Covers for 3' Refrigerated Display Cases-BES	\$0.00	\$0.00	MA TRM p.262	
Night Covers for 3' Refrigerated Display Cases-BES	\$0.00	\$0.00	MA TRM p.262	
Humidity-Based Door Heater Controls for Reach-In Coolers and Freezers-BES	\$0.00	\$0.00	MA TRM p.252	
Humidity-Based Door Heater Controls for Reach-In Coolers and Freezers-BES	\$0.00	\$0.00	MA TRM p.252	
Evaporator Fan Motor Controls for Walk-In Freezers and Coolers-BES	\$0.00	\$0.00	MA TRM p.266	
Evaporator Fan Motor Controls for Walk-In Freezers and Coolers-BES	\$0.00	\$0.00	MA TRM p.266	
Electronically Commutated (Brushless) DC Motors for Refrigeration Applications-BES	\$0.00	\$0.00	MA TRM p.256	
Electronically Commutated (Brushless) DC Motors for Refrigeration Applications-BES	\$0.00	\$0.00	MA TRM p.256	
Relamp/Reballast-Retrofit (dual baseline)-BES	\$0.00	\$2.98	MA TRM p.418	
Relamp/Reballast-Retrofit (dual baseline)-BES	\$0.00	\$2.88	MA TRM p.418	
Relamp/Reballast-Retrofit (dual baseline)-BES	\$0.00	\$2.90	MA TRM p.418	
LED Lamps-Retrofit (dual baseline)-BES	\$0.00	\$3.07	MA TRM p.418	
LED Lamps-Retrofit (dual baseline)-BES	\$0.00	\$5.13	MA TRM p.418	
LED Lamps-Retrofit (dual baseline)-BES	\$0.00	\$4.80	MA TRM p.418	

Measure Name	VEIC Recommended NEBs		Source	Treatment
	VEIC Recommended One-Time NEB	VEIC Recommended Annual NEBs		
LED Lamps-End of Life-BES	\$0.00	\$1.79	MA TRM p.418	
LED Lamps-End of Life-BES	\$0.00	\$2.98	MA TRM p.418	
LED Lamps-End of Life-BES	\$0.00	\$2.80	MA TRM p.418	
High-Efficiency Air Source Heat Pumps: Air Source Heat Pumps (1-11) Tons, Baseline	\$0.00	\$587.73	MA PA 2012 Study table 1-2 HVAC	Proxy-from original research
High-Efficiency Air Source Heat Pumps: Air Source Heat Pumps (1-11) Tons, Baseline	\$0.00	\$488.45	MA PA 2012 Study table 1-2 HVAC	Proxy-from original research
High-Efficiency Air Source Heat Pumps: Air Source Heat Pumps (1-11) Tons, Baseline	\$0.00	\$572.77	MA PA 2012 Study table 1-2 HVAC	Proxy-from original research
High-Efficiency Air Source Heat Pumps: Air Source Heat Pumps (1-11) Tons, Baseline	\$0.00	\$576.26	MA PA 2012 Study table 1-2 HVAC	Proxy-from original research
High-Efficiency Air Source Heat Pumps: Electric Baseboards	\$0.00	\$609.44	MA PA 2012 Study table 1-2 HVAC	Proxy-from original research
High-Efficiency Air Source Heat Pumps: Electric Baseboards	\$0.00	\$609.44	MA PA 2012 Study table 1-2 HVAC	Proxy-from original research
High-Efficiency Air Source Heat Pumps: Electric Baseboards	\$0.00	\$609.44	MA PA 2012 Study table 1-2 HVAC	Proxy-from original research
High-Efficiency Air Source Heat Pumps: Electric Baseboards	\$0.00	\$609.44	MA PA 2012 Study table 1-2 HVAC	Proxy-from original research
Ground Source Heat Pump	\$0.00	\$1,582.87	MA PA 2012 Study table 1-2 HVAC	Proxy-from original research
Ground Source Heat Pump	\$0.00	\$1,582.87	MA PA 2012 Study table 1-2 HVAC	Proxy-from original research
Ground Source Heat Pump	\$0.00	\$1,582.87	MA PA 2012 Study table 1-2 HVAC	Proxy-from original research
Ground Source Heat Pump	\$0.00	\$1,582.87	MA PA 2012 Study table 1-2 HVAC	Proxy-from original research

	VEIC Recommended NEBs			
Measure Name	VEIC Recommended One-Time NEB	VEIC Recommended Annual NEBs	Source	Treatment
Ground/Water Source Heat Pumps	\$0.00	\$186.18	MA PA 2012 Study table 1-2 HVAC	Proxy-from original research
Ground/Water Source Heat Pumps	\$0.00	\$158.45	MA PA 2012 Study table 1-2 HVAC	Proxy-from original research
Ground/Water Source Heat Pumps	\$0.00	\$182.01	MA PA 2012 Study table 1-2 HVAC	Proxy-from original research
Ground/Water Source Heat Pumps	\$0.00	\$182.97	MA PA 2012 Study table 1-2 HVAC	Proxy-from original research
Faucet Aerator	\$0.00	\$56.40	MA TRM p.366	Adjusted-Water Savings
Faucet Aerator	\$0.00	\$56.40	MA TRM p.366	Adjusted-Water Savings
Faucet Aerator	\$0.00	\$56.40	MA TRM p.366	Adjusted-Water Savings
DHW Tank Wrap	\$0.00	\$15.00	Not offered in MA TRM	Proxy
DHW Tank Wrap	\$0.00	\$15.00	Not offered in MA TRM	Proxy
DHW Pipe Insulation	\$0.00	\$2.89	MA TRM p.420	Adjusted units of measure
DHW Pipe Insulation	\$0.00	\$2.89	MA TRM p.420	Adjusted units of measure
Low Flow Showerheads	\$0.00	\$75.41	MA TRM p.365	Adjusted-Water Savings
Custom Incentives				
Custom Efficiency		\$1,742,584.32	MA PA 2012 Study overall Custom	Flagged
Custom Efficiency		\$1,742,584.32	MA PA 2012 Study overall Custom	Flagged
Compressed Air-Custom				Flagged
HVAC-Custom				Flagged
Lighting-Custom				Flagged
Process-Custom				Flagged
Refrigeration-Custom				Flagged
Motors and Drives-Custom				Flagged

	VEIC Recommended NEBs			
Measure Name	VEIC Recommended One-Time NEB	VEIC Recommended Annual NEBs	Source	Treatment
Whole Building 20% Over Baseline		\$17.98	MA PA 2016 Study Table 2 Page 8	Flagged
Whole Building 40% Over Baseline		\$35.96	MA PA 2016 Study Table 2 Page 8	Flagged
Residential - Efficient Product Rebates				
Refrigerator Retirement		\$0.00	MA TRM p.409	Adjusted-prorated for property value
Freezer Retirement		\$0.00	MA TRM p.409	Adjusted-prorated for property value
Room A/C Retirement		\$62.37	RI TRM Appendix B	Proxy
ENERGY STAR® LED Lamps	\$3.78	\$0.00	MA TRM p.410	
Hardwired Dimmer Switch	\$4.41	\$0.00	MA TRM p.410	Proxy
Indoor Motion Sensor	\$4.41	\$0.00	MA TRM p.410	
Outdoor Motion Sensor	\$4.41	\$0.00	MA TRM p.410	
Power bar with integrated timer		\$0.00	MA TRM p.162	Proxy
Smartstrip		\$0.00	MA TRM p.162	
Heavy Duty Outdoor Timer	\$4.41	\$0.00	MA TRM p.409	Proxy
Advanced Power Strip (load sensing or remote control/wireless APS)		\$0.00	MA TRM p.164	
Dehumidifier (Retirement)		\$0.00	MA TRM p.164	
Existing Residential				
10.5 W LED	\$3.78	\$0.00	MA TRM p.412	
11 W LED	\$3.78	\$0.00	MA TRM p.412	
8 W LED	\$3.78	\$0.00	MA TRM p.412	
12 W LED: Blended 75W and 100W incandescent baseline	\$3.78	\$0.00	MA TRM p.412	

Measure Name	VEIC Recommended NEBs		Source	Treatment
	VEIC Recommended One-Time NEB	VEIC Recommended Annual NEBs		
12 W LED: 23 W CFL baseline	\$3.78	\$0.00	MA TRM p.412	
5W Chandelier LED bulb	\$3.78	\$0.00	MA TRM p.412	
1W LED Nightlight	\$3.78	\$0.00	MA TRM p.412	
1W LED Nightlight	\$3.78	\$0.00	MA TRM p.412	
Low Flow Faucet Aerator, 1.5 GPM		\$0.13	MA TRM p.176	Adjusted-Water Savings
Low Flow Faucet Aerator, 1.5 GPM		\$1.32	MA TRM p.176	Adjusted-Water Savings
Low Flow (1.25 GPM) showerhead		\$11.73	MA TRM p.176	Adjusted-Water Savings and prorated property value
Low Flow (1.25 GPM) showerhead		\$16.44	MA TRM p.176	Adjusted-Water Savings and prorated property value
DHW Pipe Insulation		\$7.01	MA TRM p.98	Adjusted-prorated for property value
DHW Pipe Insulation		\$7.01	MA TRM p.98	Adjusted-prorated for property value
DHW Tank Wrap		\$7.01	MA TRM p.98	Adjusted-prorated for property value
DHW Tank Wrap		\$7.01	MA TRM p.98	Adjusted-prorated for property value
Certified Wood Stove		\$6.38	MA TRM p.410	Proxy/ Adjusted prorated for property value
Certified Wood Boiler or Furnace		\$61.51	MA TRM p.412	Proxy/ Adjusted prorated for property value
Certified Pellet Stove		\$6.38	MA TRM p.410	Proxy/ Adjusted

Measure Name	VEIC Recommended NEBs		Source	Treatment
	VEIC Recommended One-Time NEB	VEIC Recommended Annual NEBs		
				prorated for property value
Certified Pellet Boiler or Furnace Supplemented by Baseboard Heat (Whole Home)		\$61.51	MA TRM p.412	Adjusted-prorated for property value
Advanced Automatic Pellet Combo Boiler		\$3.40	MA TRM p.411	Adjusted-prorated for property value
Ground Source Heat Pump		\$61.51	MA TRM p.412	Adjusted-prorated for property value
ENERGY STAR® Air Source Heat Pump		\$6.38	MA TRM p.410	Adjusted-prorated for property value
Solar DHW		\$1.55	MA TRM p.411	Adjusted-prorated for property value
Solar Space and Water Heat (Supplement Electricity)	\$0.00	\$0.00	Not offered in MA TRM	
Solar Space Heating (Displacing Electricity)	\$0.00	\$0.00	Not offered in MA TRM	
ENERGY STAR® Windows (Replace Single Pane)	\$0.00	\$1.54	MA PA 2011 Study table 2-6	Adjusted-prorated for property value
ENERGY STAR® Windows (300 ft2) (Replace Double Pane)	\$0.00	\$1.54	MA PA 2011 Study table 2-6	Adjusted-prorated for property value
ENERGY STAR® Door	\$0.00	\$0.00	Not offered in MA TRM	
Embertec Power Strip	\$0.00	\$0.00	MA TRM p.162	
ENERGY STAR® Refrigerator (Replacement)		\$0.00	RI TRM	Adjusted-prorated for property value
Advanced Power Strip (load sensing or remote control/wireless APS)	\$0.00	\$0.00	Not offered in MA TRM	Proxy
Building Envelope Retrofits (Insulation, Draft Proofing, EnergyStar Windows and Doors)		\$82.77	MA TRM p.410	Adjusted-prorated for property value
New Residential				

Measure Name	VEIC Recommended NEBs		Source	Treatment
	VEIC Recommended One-Time NEB	VEIC Recommended Annual NEBs		
EnerGuide 83 New Home		\$147.42	RI TRM Appendix B	Adjusted-prorated for property value
EnerGuide 85 New Home		\$147.42	RI TRM Appendix B	Adjusted-prorated for property value
EnerGuide 86 New Home		\$147.42	RI TRM Appendix B	Adjusted-prorated for property value
EnerGuide 87 New Home		\$147.42	RI TRM Appendix B	Adjusted-prorated for property value
EnerGuide 88 New Home		\$147.42	RI TRM Appendix B	Adjusted-prorated for property value
EnerGuide 88+ New Home		\$147.42	RI TRM Appendix B	Adjusted-prorated for property value
Solar DHW				Flagged
Solar Space and Water Heat (Supplement Electricity)				Flagged
Solar Space Heating (Displacing Electricity)				Flagged

Table 11: Total Benefits and TRC Ratios with and without NEBs**Efficiency Nova Scotia Programs and Portfolio (Plan Year 2016)**

Program	Plan Year 2016			
	Total Benefits w/o NEBs	Total Benefits with NEBs	TRC Ratio w/o NEBs	TRC Ratio with NEBs
BNI – Efficient Product Rebates	\$23,758,752	\$29,834,913	2.01	2.52
BNI – Direct Installation	\$7,308,883	\$14,060,922	1	1.92
Custom Incentives	\$32,039,143	\$46,063,363	2.55	3.66
Residential Efficient Product Rebates	\$6,578,241	\$6,841,730	1.63	1.69
Existing Residential	\$50,888,949	\$54,255,525	1.85	1.97
New Residential	\$6,721,775	\$7,520,399	2.49	2.79
Total Portfolio	\$127,295,743	\$159,967,753	1.928	2.423

Table 12: Total Benefits and TRC Ratios with and without NEBs
Efficiency Nova Scotia Programs and Portfolio (Plan Year 2017)

Program	Plan Year 2017			
	Total Benefits w/o NEBs	Total Benefits with NEBs	TRC Ratio w/o NEBs	TRC Ratio with NEBs
BNI – Efficient Product Rebates	\$25,443,534	\$31,575,993	2.2	2.73
BNI – Direct Installation	\$7,514,151	\$14,036,069	1.08	2.01
Custom Incentives	\$33,905,455	\$48,010,092	2.7	3.83
Residential Efficient Product Rebates	\$7,323,118	\$7,587,393	1.7	1.76
Existing Residential	\$58,340,624	\$62,095,797	1.93	2.06
New Residential	\$7,246,440	\$8,064,280	2.62	2.92
Total Portfolio	\$139,773,322	\$172,724,699	2.046	2.528

Table 13: Total Benefits and TRC Ratios with and without NEBs Efficiency Nova Scotia Programs and Portfolio (Plan Year 2018)

Program	Plan Year 2018			
	Total Benefits w/o NEBs	Total Benefits with NEBs	TRC Ratio w/o NEBs	TRC Ratio with NEBs
BNI – Efficient Product Rebates	\$28,889,553	\$35,315,364	2.22	2.72
BNI – Direct Installation	\$7,682,788	\$15,556,497	1.1	2.22
Custom Incentives	\$36,399,857	\$50,646,442	2.87	3.99
Residential Efficient Product Rebates	\$7,916,033	\$8,184,551	1.8	1.86
Existing Residential	\$61,756,675	\$65,612,040	1.93	2.05
New Residential	\$7,831,324	\$8,669,775	2.76	3.06
Total Portfolio	\$150,476,230	\$184,070,665	2.091	2.558

Table 14: 2016-2018 Aggregate TRC Impact for BNI Efficient Products Rebates Program

BNI - Efficient Product Rebates -2016-2018				
End Use	Aggregate TRC w/o NEBs	Aggregate TRC w NEBs	% Change	% of Program NEBs
COM-Lighting	1.90	2.48	31%	77%
COM-Motors	3.51	3.51	0%	0%
COM-Process	2.74	2.74	0%	0%
COM-HVAC	2.01	2.01	0%	0%
COM-Refrigeration	2.58	2.70	4%	0%
COM-Other	5.09	5.97	17%	4%
IND	2.59	3.24	25%	19%

Table 15: 2016-2018 Aggregate TRC Impact for BNI Direct Install Program

BNI - Direct Installation -2016-2018				
End Use	Aggregate TRC w/o NEBs	Aggregate TRC w NEBs	% Change	% of Program NEBs
COM-Lighting	1.68	2.19	30%	4%
COM-HVAC	0.94	1.81	94%	84%
COM-Refrigeration	2.48	2.48	0%	0%
COM-Other	3.59	12.61	252%	12%

Table 16: 2016-2018 Aggregate TRC Impact for BNI Custom Incentives

BNI - Custom Incentives -2016-2018				
End Use	Aggregate TRC w/o NEBs	Aggregate TRC w NEBs	% Change	% of Program NEBs
COM-Other	2.81	4.01	43%	61%
IND	2.72	3.92	44%	39%

Table 17: 2016-2018 Aggregate TRC Impact for Residential Efficient Product Rebates

RES - Efficient Product Rebates -2016-2018				
End Use	Aggregate TRC w/o NEBs	Aggregate TRC w NEBs	% Change	% of Program NEBs
RES-Appliance	1.41	1.41	0%	0%
RES-HVAC/Shell	0.80	2.69	237%	0%
RES-Lighting	1.74	1.88	8%	99%
RES-Plug Load	2.05	2.05	0%	1%

Table 18: 2016-2018 Aggregate TRC Impact for Existing Residential Program

RES - Existing Residential -2016-2018				
End Use	Aggregate TRC w/o NEBs	Aggregate TRC w NEBs	% Change	% of Program NEBs
RES-Lighting	5.06	5.32	5%	21%
RES-Water Heat	1.09	1.36	24%	24%
RES-HVAC/Shell	1.51	1.62	7%	55%
RES-Package	0.38	0.38	0%	0%
RES-Appliance	1.07	1.07	0%	0%
RES-Plug Load	5.10	5.10	0%	0%

Table 19: 2016-2018 Aggregate TRC Impact for Residential New Construction

RES - New Residential -2016-2018				
End Use	Aggregate TRC w/o NEBs	Aggregate TRC w NEBs	% Change	% of Program NEBs
RES-Water Heat	0.30	0.30	0%	0%
RES-HVAC/Shell	0.54	0.54	0%	0%
RES-Package	2.63	2.93	11%	100%

Appendix B: Total Resource Benefit Cost Ratio with and without NEBs

		TRC Test Analysis		
Measure Name	Target Market	TRC Calculation	TRC With NEBs	TRC % Change
BNI - Efficient Product Rebates				
Under Counter Commercial Dishwasher (Low Temp)	Retail	16.27	17.84	10%
Single-Tank Door Type Dishwasher (Low Temp)	Retail	8.56	12.79	49%
Single-Tank Conveyor Dishwasher (Low Temp)	Retail	10.54	13.63	29%
Multi-Tank Conveyor Commercial Dish Washer (Low Temp)	Retail	3.89	5.70	47%
Under Counter Dishwasher with Booster (High Temp)	Retail	7.32	7.86	7%
Single Tank Door Dishwasher with Booster (High Temp)	Retail	6.79	8.37	23%
Single Tank Conveyor Dishwasher with Booster (High Temp)	Retail	10.54	11.55	10%
Multi Tank Conveyor Dishwasher with Booster (High Temp)	Retail	6.75	8.13	20%
Standard Capacity Commercial Electric Fryers	Retail	1.79	1.79	0%
Full Size Commercial Hot Food Holding Cabinet	Retail	4.86	4.86	0%
Three Quarter Size Commercial Hot Food Holding Cabinet	Retail	1.68	1.68	0%
Half Size Commercial Hot Food Holding Cabinet	Retail	1.36	1.36	0%
Commercial Electric Griddle	Retail	3.05	3.05	0%
Solid Door Commercial Refrigerator	Retail	1.32	2.18	65%
Glass Door Commercial Refrigerator	Retail	1.07	1.77	65%
Solid Door Commercial Freezer	Retail	1.84	3.03	65%
ENERGY STAR® Ice Making Head	Retail	2.06	2.75	34%
ENERGY STAR® Remote Condensing Head/Split System Ice Maker	Retail	1.78	2.18	23%
ENERGY STAR® Self Contained Ice Maker	Retail	0.83	1.85	123%
ENERGY STAR® Commercial Electric Convection Oven	Retail	2.71	2.71	0%
Variable Speed Drive for Kitchen exhaust fans (Demand Controlled Ventilation)	Other Commercial	1.76	1.76	0%

Measure Name	Target Market	TRC Test Analysis		
		TRC Calculation	TRC With NEBs	TRC % Change
Variable Speed Drive for Kitchen exhaust fans (Demand Controlled Ventilation)	Retail	1.29	1.29	0%
ENERGY STAR®, CEE Tier 2 or CEE Tier 3 Commercial Clothes Washer	Other Commercial	1.34	1.21	-10%
Night Covers for 3' Refrigerated Display Cases	Other Commercial	1.43	1.43	0%
Night Covers for 3' Refrigerated Display Cases	Retail	1.13	1.13	0%
Night Covers for 3' Refrigerated Display Cases	School	1.53	1.53	0%
Zero Energy Doors for Reach-In Coolers and Freezers	Other Commercial	1.48	1.48	0%
Zero Energy Doors for Reach-In Coolers and Freezers	Retail	1.48	1.48	0%
Zero Energy Doors for Reach-In Coolers and Freezers	School	1.47	1.47	0%
Humidity-Based Door Heater Controls for Reach-In Coolers and Freezers	Other Commercial	5.47	5.47	0%
Humidity-Based Door Heater Controls for Reach-In Coolers and Freezers	Retail	5.52	5.52	0%
Humidity-Based Door Heater Controls for Reach-In Coolers and Freezers	School	5.36	5.36	0%
Evaporator Fan Motor Controls for Walk-In Freezers and Coolers	Other Commercial	2.08	2.08	0%
Evaporator Fan Motor Controls for Walk-In Freezers and Coolers	Retail	2.09	2.09	0%
Evaporator Fan Motor Controls for Walk-In Freezers and Coolers	School	2.04	2.04	0%
Intelligent (Electronic) Defrost Control For Freezer Display Cases	Other Commercial	3.07	3.07	0%
Intelligent (Electronic) Defrost Control For Freezer Display Cases	Retail	3.10	3.10	0%
Intelligent (Electronic) Defrost Control For Freezer Display Cases	School	3.01	3.01	0%
Intelligent (Electronic) Defrost Control For Walk-In Freezers	Other Commercial	3.26	3.26	0%
Intelligent (Electronic) Defrost Control For Walk-In Freezers	Retail	3.29	3.29	0%
Intelligent (Electronic) Defrost Control For Walk-In Freezers	School	3.20	3.20	0%
Refrigerated Vending Machine Controller	Office	3.11	3.11	0%

		TRC Test Analysis		
Measure Name	Target Market	TRC Calculation	TRC With NEBs	TRC % Change
Refrigerated Vending Machine Controller	Other Commercial	3.11	3.11	0%
Refrigerated Vending Machine Controller	Retail	3.13	3.13	0%
Strip Curtains for 3' Open Refrigerated Display Cases	Other Commercial	2.48	2.48	0%
Strip Curtains for 3' Open Refrigerated Display Cases	Retail	2.48	2.48	0%
Strip Curtains for 3' Open Refrigerated Display Cases	School	2.48	2.48	0%
Electronically Commutated (Brushless) DC Motors for Refrigeration Applications	Industrial	2.07	2.07	0%
Electronically Commutated (Brushless) DC Motors for Refrigeration Applications	Other Commercial	2.03	2.03	0%
Electronically Commutated (Brushless) DC Motors for Refrigeration Applications	Retail	2.03	2.03	0%
Electronically Commutated (Brushless) DC Motors for Refrigeration Applications	School	2.03	2.03	0%
Variable Frequency Drives	Office	4.17	4.17	0%
Variable Frequency Drives	Other Commercial	4.28	4.28	0%
Variable Frequency Drives	Retail	3.89	3.89	0%
Variable Frequency Drives	School	4.00	4.00	0%
Fluorescent T5 and HPT8 Fixtures (4 FT) lamps-Retrofit (dual baseline)	Other Commercial	0.30	0.41	37%
Relamp/Reballast-Retrofit (dual baseline)	Industrial	1.77	2.32	31%
Relamp/Reballast-Retrofit (dual baseline)	Office	1.63	2.19	34%
Relamp/Reballast-Retrofit (dual baseline)	Other Commercial	1.60	2.15	34%
Relamp/Reballast-Retrofit (dual baseline)	Retail	1.65	2.20	33%
Relamp/Reballast-Retrofit (dual baseline)	School	1.68	2.24	34%
T8 Dimmable Stairwell Lighting	Industrial	2.84	3.80	34%
T8 Dimmable Stairwell Lighting	Office	1.59	2.24	41%
T8 Dimmable Stairwell Lighting	Other Commercial	2.51	3.52	40%
T8 Dimmable Stairwell Lighting	Retail	2.41	3.37	40%
T8 Dimmable Stairwell Lighting	School	1.27	1.87	47%

Measure Name	Target Market	TRC Test Analysis		
		TRC Calculation	TRC With NEBs	TRC % Change
LED Lamps-Retrofit (dual baseline)	Industrial	8.37	11.21	34%
LED Lamps-Retrofit (dual baseline)	Office	5.82	8.03	38%
LED Lamps-Retrofit (dual baseline)	Other Commercial	7.82	10.75	37%
LED Lamps-Retrofit (dual baseline)	Retail	7.75	10.59	37%
LED Lamps-Retrofit (dual baseline)	School	5.63	7.71	37%
LED Lamps-End of Life	Industrial	2.17	2.91	34%
LED Lamps-End of Life	Office	1.30	1.79	38%
LED Lamps-End of Life	Other Commercial	2.08	2.85	37%
LED Lamps-End of Life	Retail	2.01	2.74	37%
LED Lamps-End of Life	School	1.22	1.67	37%
LED Refrigeration Strip Lighting-End of Life replacement	Other Commercial	0.99	1.42	43%
LED Refrigeration Strip Lighting-End of Life replacement	Retail	1.01	1.44	43%
LED Refrigeration Strip Lighting-End of Life replacement	School	1.00	1.43	43%
LED High Bay Fixture	Industrial	2.42	3.17	31%
LED High Bay Fixture	Other Commercial	2.19	2.94	34%
LED High Bay Fixture	Retail	2.25	3.00	33%
LED High Bay Fixture	School	2.24	2.99	34%
LED Low Bay Fixture	Industrial	1.05	1.38	31%
LED Low Bay Fixture	Office	1.01	1.35	34%
LED Low Bay Fixture	Other Commercial	0.95	1.27	34%
LED Low Bay Fixture	Retail	1.00	1.33	33%
LED Low Bay Fixture	School	1.00	1.34	34%
LED Linear Replacement Lamps	Industrial	1.13	1.51	34%
LED Linear Replacement Lamps	Office	1.09	1.50	38%
LED Linear Replacement Lamps	Other Commercial	1.01	1.39	37%
LED Linear Replacement Lamps	Retail	1.07	1.46	37%
LED Linear Replacement Lamps	School	1.07	1.47	37%
LED Exterior Fixtures-End of Life replacement	Industrial	3.09	4.06	32%
LED Exterior Fixtures-End of Life replacement	Office	3.08	4.05	32%
LED Exterior Fixtures-End of Life replacement	Other Commercial	3.08	4.05	32%
LED Exterior Fixtures-End of Life replacement	Retail	3.08	4.05	32%
LED Exterior Fixtures-End of Life replacement	School	3.08	4.05	32%

Measure Name	Target Market	TRC Test Analysis		
		TRC Calculation	TRC With NEBs	TRC % Change
LED Exit Sign-End of Life replacement	Industrial	1.95	2.69	38%
LED Exit Sign-End of Life replacement	Office	1.95	2.69	38%
LED Exit Sign-End of Life replacement	Other Commercial	1.95	2.69	38%
LED Exit Sign-End of Life replacement	Retail	1.95	2.69	38%
LED Exit Sign-End of Life replacement	School	1.95	2.69	38%
Photoluminescent Exit Sign	Industrial	1.55	2.14	38%
Photoluminescent Exit Sign	Office	1.55	2.14	38%
Photoluminescent Exit Sign	Other Commercial	1.55	2.14	38%
Photoluminescent Exit Sign	Retail	1.55	2.14	38%
Photoluminescent Exit Sign	School	1.55	2.14	38%
Lighting Controls - Occupancy Sensors	Industrial	1.81	2.67	47%
Lighting Controls - Occupancy Sensors	Office	1.41	1.99	41%
Lighting Controls - Occupancy Sensors	Other Commercial	2.24	3.14	40%
Lighting Controls - Occupancy Sensors	Retail	2.14	3.00	40%
Lighting Controls - Occupancy Sensors	School	1.13	1.65	47%
Daylighting Controls	Office	0.81	1.14	41%
Daylighting Controls	Other Commercial	0.76	1.07	40%
Daylighting Controls	Retail	0.78	1.09	40%
Daylighting Controls	School	0.71	1.04	47%
Cycling Refrigerated Air Dryers ($\leq$ 300 CFM capacity)	Industrial	4.86	4.86	0%
Cycling Refrigerated Air Dryers ($\leq$ 300 CFM capacity)	Other Commercial	6.70	6.70	0%
Cycling Refrigerated Air Dryers ($\leq$ 300 CFM capacity)	School	2.32	2.32	0%
Variable Speed Drive Screw Compressors (10 - 40 hp)	Industrial	2.60	2.60	0%
Variable Speed Drive Screw Compressors (10 - 40 hp)	Other Commercial	3.95	3.95	0%
Variable Speed Drive Screw Compressors (10 - 40 hp)	School	1.15	1.15	0%
Air-Entraining Air Nozzles (up to 14CFM at 100 psi)	School	4.19	4.19	0%
No-Loss Drains (Timed drains are not eligible)	School	4.77	4.77	0%
Air Tanks for Load / No-Load Screw Compressors (10 – 40 hp)	Industrial	2.68	2.68	0%
Air Tanks for Load / No-Load Screw Compressors (10 – 40 hp)	Other Commercial	4.09	4.09	0%
Air Tanks for Load / No-Load Screw Compressors (10 – 40 hp)	School	1.18	1.18	0%

Measure Name	Target Market	TRC Test Analysis		
		TRC Calculation	TRC With NEBs	TRC % Change
Integrated Dual Enthalpy Economizer Controls	Office	2.56	2.56	0%
Integrated Dual Enthalpy Economizer Controls	Other Commercial	2.56	2.56	0%
Integrated Dual Enthalpy Economizer Controls	Retail	1.31	1.31	0%
Integrated Dual Enthalpy Economizer Controls	School	1.25	1.25	0%
HVAC Hotel Occupancy Sensor	Other Commercial	1.83	1.83	0%
Zero-Energy Livestock Waterers	Other Commercial	4.04	4.04	0%
Single Heat Pad	Other Commercial	5.18	5.18	0%
Double Heat Pad	Other Commercial	3.86	3.86	0%
Dairy Scroll Compressor	Other Commercial	1.01	1.01	0%
Heat Reclaimer Unit	Other Commercial	3.49	3.49	0%
VSD for Milk Vacuum Pump	Other Commercial	7.24	7.24	0%
BNI- Direct Installation				
Night Covers for 3' Refrigerated Display Cases-BES	Other Commercial	1.13	1.13	0%
Night Covers for 3' Refrigerated Display Cases-BES	Retail	0.94	0.94	0%
Humidity-Based Door Heater Controls for Reach-In Coolers and Freezers-BES	Other Commercial	3.68	3.68	0%
Humidity-Based Door Heater Controls for Reach-In Coolers and Freezers-BES	Retail	3.71	3.71	0%
Evaporator Fan Motor Controls for Walk-In Freezers and Coolers-BES	Other Commercial	1.84	1.84	0%
Evaporator Fan Motor Controls for Walk-In Freezers and Coolers-BES	Retail	1.85	1.85	0%
Electronically Commutated (Brushless) DC Motors for Refrigeration Applications-BES	Other Commercial	1.61	1.61	0%
Electronically Commutated (Brushless) DC Motors for Refrigeration Applications-BES	Retail	1.61	1.61	0%
Relamp/Reballast-Retrofit (dual baseline)-BES	Office	1.38	1.85	34%
Relamp/Reballast-Retrofit (dual baseline)-BES	Other Commercial	1.36	1.82	34%
Relamp/Reballast-Retrofit (dual baseline)-BES	Retail	1.40	1.86	33%
LED Lamps-Retrofit (dual baseline)-BES	Office	2.90	3.99	38%

Measure Name	Target Market	TRC Test Analysis		
		TRC Calculation	TRC With NEBs	TRC % Change
LED Lamps-Retrofit (dual baseline)-BES	Other Commercial	3.34	4.59	37%
LED Lamps-Retrofit (dual baseline)-BES	Retail	3.37	4.61	37%
LED Lamps-End of Life-BES	Office	1.06	1.46	38%
LED Lamps-End of Life-BES	Other Commercial	1.53	2.10	37%
LED Lamps-End of Life-BES	Retail	1.50	2.05	37%
High-Efficiency Air Source Heat Pumps: Air Source Heat Pumps (1-11) Tons, Baseline	Office	4.34	8.52	96%
High-Efficiency Air Source Heat Pumps: Air Source Heat Pumps (1-11) Tons, Baseline	Other Commercial	4.06	8.00	97%
High-Efficiency Air Source Heat Pumps: Air Source Heat Pumps (1-11) Tons, Baseline	Retail	4.20	8.35	99%
High-Efficiency Air Source Heat Pumps: Air Source Heat Pumps (1-11) Tons, Baseline	School	4.19	8.34	99%
High-Efficiency Air Source Heat Pumps: Electric Baseboards	Office	1.31	2.58	96%
High-Efficiency Air Source Heat Pumps: Electric Baseboards	Other Commercial	1.30	2.57	97%
High-Efficiency Air Source Heat Pumps: Electric Baseboards	Retail	1.28	2.54	99%
High-Efficiency Air Source Heat Pumps: Electric Baseboards	School	1.27	2.54	99%
Ground Source Heat Pump	Office	0.74	1.45	96%
Ground Source Heat Pump	Other Commercial	0.73	1.45	97%
Ground Source Heat Pump	Retail	0.72	1.44	99%
Ground Source Heat Pump	School	0.72	1.43	99%
Ground/Water Source Heat Pumps	Office	2.64	5.18	96%
Ground/Water Source Heat Pumps	Other Commercial	2.38	4.69	97%
Ground/Water Source Heat Pumps	Retail	2.54	5.05	99%
Ground/Water Source Heat Pumps	School	2.53	5.05	99%
Faucet Aerator	Office	3.58	14.97	319%
Faucet Aerator	Other Commercial	3.58	14.97	319%
Faucet Aerator	Retail	3.58	14.97	319%
DHW Tank Wrap	Office	2.06	3.53	71%
DHW Tank Wrap	Retail	2.06	3.53	71%
DHW Pipe Insulation	Office	4.56	7.25	59%

		TRC Test Analysis		
Measure Name	Target Market	TRC Calculation	TRC With NEBs	TRC % Change
DHW Pipe Insulation	Retail	4.56	7.25	59%
Low Flow Showerheads	Other Commercial	3.76	11.25	199%
Custom Incentives				
Custom Efficiency	COM	2.65	3.85	45%
Custom Efficiency	Industrial	2.57	3.77	47%
Compressed Air-Custom				
HVAC-Custom				
Lighting-Custom				
Process-Custom				
Refrigeration-Custom				
Motors and Drives-Custom				
Whole Building 20% Over Baseline	New Construction - BNI	1.75	1.86	6%
Whole Building 40% Over Baseline	New Construction - BNI	1.75	1.86	6%
Residential - Efficient Product Rebates				
Refrigerator Retirement	RES-SF	1.20	1.20	0%
Freezer Retirement	RES-SF	0.86	0.86	0%
Room A/C Retirement	RES-SF	0.41	2.31	459%
ENERGY STAR® LED Lamps	RES-SF	2.09	2.23	7%
Hardwired Dimmer Switch	RES-SF	0.70	0.99	42%
Indoor Motion Sensor	RES-SF	0.72	0.83	15%
Outdoor Motion Sensor	RES-SF	1.75	1.83	5%
Power bar with integrated timer	RES-SF	1.44	1.44	0%
Smartstrip	RES-SF	0.90	0.90	0%
Heavy Duty Outdoor Timer	RES-SF	2.99	3.05	2%
Advanced Power Strip (load sensing or remote control/wireless APS)	RES-SF	2.43	2.43	0%
Dehumidifier (Retirement)	RES-SF	5.12	5.12	0%
Existing Residential				
10.5 W LED	RES-SF	4.92	5.18	5%
11 W LED	RES-SF	5.93	6.12	3%
8 W LED	MURB	4.54	4.80	6%
12 W LED: Blended 75W and 100W incandescent baseline	MURB	4.45	4.64	4%
12 W LED: 23 W CFL baseline	MURB	0.93	1.14	23%
5W Chandelier LED bulb	MURB	3.34	3.59	7%
1W LED Nightlight	RES-SF	2.39	2.84	19%
1W LED Nightlight	MURB	1.90	2.35	24%

Measure Name	Target Market	TRC Test Analysis		
		TRC Calculation	TRC With NEBs	TRC % Change
Low Flow Faucet Aerator, 1.5 GPM	RES-SF	7.98	8.03	1%
Low Flow Faucet Aerator, 1.5 GPM	MURB	5.95	6.59	11%
Low Flow (1.25 GPM) showerhead	RES-SF	6.58	8.46	29%
Low Flow (1.25 GPM) showerhead	MURB	6.35	8.89	40%
DHW Pipe Insulation	RES-SF	6.28	9.84	57%
DHW Pipe Insulation	MURB	1.93	6.32	227%
DHW Tank Wrap	RES-SF	3.08	3.99	30%
DHW Tank Wrap	MURB	2.66	3.59	35%
Certified Wood Stove	RES-SF	5.12	5.15	1%
Certified Wood Boiler or Furnace	RES-SF	1.69	1.76	4%
Certified Pellet Stove	RES-SF	3.05	3.07	1%
Certified Pellet Boiler or Furnace Supplemented by Baseboard Heat (Whole Home)	RES-SF	2.96	3.09	4%
Advanced Automatic Pellet Combo Boiler	RES-SF	4.31	4.32	0%
Ground Source Heat Pump	RES-SF	0.79	0.82	4%
ENERGY STAR® Air Source Heat Pump	RES-SF	0.81	0.82	1%
Solar DHW	RES-SF	0.28	0.29	2%
Solar Space and Water Heat (Supplement Electricity)	RES-SF	0.37	0.37	0%
Solar Space Heating (Displacing Electricity)	RES-SF	1.68	1.68	0%
ENERGY STAR® Windows (Replace Single Pane)	RES-SF	1.59	1.61	1%
ENERGY STAR® Windows (300 ft2) (Replace Double Pane)	RES-SF	0.51	0.53	4%
ENERGY STAR® Door	RES-SF	0.39	0.39	0%
Embertec Power Strip	RES-SF	4.89	4.89	0%
ENERGY STAR® Refrigerator (Replacement)	MURB	1.03	1.03	0%
Advanced Power Strip (load sensing or remote control/wireless APS)	MURB	4.81	4.81	0%
Building Envelope Retrofits (Insulation, Draft Proofing, EnergyStar Windows and Doors)	RES-SF	1.24	1.44	16%
New Residential				
EnerGuide 83 New Home	RES-NC	2.33	2.92	25%
EnerGuide 85 New Home	RES-NC	2.57	3.04	18%
EnerGuide 86 New Home	RES-NC	2.54	2.94	16%
EnerGuide 87 New Home	RES-NC	2.52	2.87	14%

		TRC Test Analysis		
Measure Name	Target Market	TRC Calculation	TRC With NEBs	TRC % Change
EnerGuide 88 New Home	RES-NC	2.50	2.81	13%
EnerGuide 88+ New Home	RES-NC	2.48	2.77	11%
Solar DHW	RES-NC	0.28	0.28	0%
Solar Space and Water Heat (Supplement Electricity)	RES-NC	0.40	0.40	0%
Solar Space Heating (Displacing Electricity)	RES-NC	0.51	0.51	0%

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Request IR-17:

Please provide the derivation of each of the following from Table 10 of the VEIC Report:

- a) The \$970.02 for Multi-Tank Conveyor Commercial Dishwasher (Low Temp) - Retail**
- b) The \$15.24 for T8 Dimmable Stairwell Lighting – Retail**
- c) The \$11.86 for Lighting Controls – Occupancy Sensors – Schools**
- d) The \$724.69 for High Efficiency Air Source Heat Pumps: Air source Heat Pumps Baseline – Office**
- e) The \$215.17 and the \$61.51 for Ground Source Heat Pump – RES SF**

Response IR-17:

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

- a) Water savings of 93,900 gallons per year were obtained from page 279 of the Massachusetts 2016-2018 TRM and converted to cubic meters (355.45 m³). This water savings value was then monetized by multiplying the water savings by the 2017 Halifax Water volumetric rate (including wastewater) of \$2.73 per cubic meter to produce annual dollar savings.
- b) An annual value of \$0.027 USD per kWh was obtained from page 418 of the 2016-2018 Massachusetts TRM (Lighting-Prescriptive value). This was converted to CAD, using an exchange rate of \$1.26 CAD per USD, to yield a value of \$0.034 per kWh. This value was then multiplied by the annual kWh savings for this measure – 448 kWh/year – to yield the value of \$15.24.
- c) An annual value of \$0.027 USD per kWh was obtained from page 418 of the 2016-2018 Massachusetts TRM (Lighting-Prescriptive value). This was converted to CAD, using an

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exchange rate of \$1.26 CAD per USD, to yield a value of \$0.034 per kWh. This value was then multiplied by the annual kWh savings for this measure – 349 kWh/year – to yield the value of \$11.86.

d) An annual value of \$0.097 USD per kWh was obtained from page 418 of the 2016-2018 Massachusetts TRM (HVAC-Prescriptive value). This was converted to CAD, using an exchange rate of \$1.26 CAD per USD, to yield a value of \$0.122 per kWh. This value was then multiplied by the annual kWh savings for this measure – 5954kWh/year – to yield the value of \$724.69. Please note that this value was further modified as part of these IR responses to remove rent revenue effects (please refer to EfficiencyOne’s response to Multeese IR-16). This was accomplished by using Table 4-7 of the Massachusetts C&I study, which specifies Rent Revenue effects are 18.90 per cent of NEBs for HVAC measures. The value of \$724.69 was multiplied by (1-0.1890) to remove these NEBs, yielding \$587.73 per year.

e) Annual values of \$27.61, \$7.33, \$13.88, and \$0.89 USD per measure for thermal comfort, home durability, equipment maintenance and health benefits, respectively, were sourced from page 412 of the 2016-2018 Massachusetts TRM (Boiler 90%). Health benefits are largely a societal NEB in Canada, so this value was discarded. The remaining annual benefits were summed to yield a value of \$48.82 USD. This was converted to CAD, using an exchange rate of \$1.26 CAD per USD, to yield a value of \$61.51 per year. The one-time value for property value-related NEBs was sourced from the same location, as \$385.23 USD. This value was then multiplied by the Canadian exchange rate (\$1.26 CAD per USD) to yield \$485.40 CAD. This value was then multiplied by the NS-Mass property value correction factor of 0.443283 to yield a one-time benefit of \$215.17. This one-time benefit has since been removed, please refer to EfficiencyOne’s response to Multeese IR-16.