



EfficiencyOne

IN THE MATTER OF The *Public Utilities Act*, RSNS 1989, c 380, as amended

- and -

IN THE MATTER OF An Application by EfficiencyOne for Approval of the 2026 DSM Extension for Demand-Side Management Activities between EfficiencyOne and Nova Scotia Power Inc., and for Approval of the Amendment to the 2023-2025 Demand-Side Management Purchase Agreement between EfficiencyOne and Nova Scotia Power Inc.

Reply Evidence of EfficiencyOne

M12249

FILED WITH THE NOVA SCOTIA ENERGY BOARD

September 4, 2025

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Appendix A: Econoler Reply Evidence

1. INTRODUCTION

EfficiencyOne's ("E1") Application for Approval of the 2026 DSM Extension for Demand-Side Management Activities ("DSM") between E1 and Nova Scotia Power Inc. ("NS Power"), and for Approval of the Amendment to the 2023-2025 DSM Purchase Agreement between E1 and NS Power (the "Application") was filed April 30, 2025. E1 seeks approval to continue its current services to the end of 2026 while it engages in an early consultation process with stakeholders on the upcoming 2027-2031 DSM Plan. This timing will also allow the 2027-2031 DSM Plan to be informed by the new Nova Scotia Energy Board ("Board" or "NSEB") mandate, as well as the outcome of the application for a new Benefit Cost Analysis ("BCA") test, which is currently under consideration by the Board under Matter M12282.

Information Requests ("IRs") on the Application were filed on June 4, 2025, to which E1 responded on June 25, 2025. Separately, the 2024 Savings Verification Review Report prepared by Gil Peach & Associates in relation to Matter M12186 ("Peach Report") was filed on June 5, 2025, and IRs on the Verification Report were filed on June 19, 2025. Responses to these IRs were filed July 3, 2025.

On July 17, 2025, the Board Counsel Consultants filed evidence prepared by Jennifer Kallay of Synapse Energy Economics Inc. ("Synapse"), and the Consumer Advocate filed evidence prepared by Mr. Theodore Love of Green Energy Economics Group Inc. ("Green Energy"). E1 did not pose any IRs with respect to the intervenor evidence submitted.

E1 appreciates the parties' participation in the process thus far, and appreciates the efforts taken to prepare the above-noted evidence. E1 has carefully considered the filed evidence and offers the limited reply evidence set out herein by way of response.

E1's reply evidence is structured to address the key themes raised by the intervenors in their evidence. E1's reply evidence will be limited, since E1 largely concurs with the findings of the Synapse and Green Energy, with only a few discrete areas of divergence that will be discussed in this reply.

With respect to the Peach Report, E1 relies on the reply evidence filed separately by Econoler, E1's independent evaluation consultant, provided as Appendix A to this reply.

2. SYNAPSE

The evidence filed by Synapse makes recommendations in relation to both the DSM Extension, as well as the upcoming 2027-2031 DSM Plan, which will be subject to its own Board process in the near future. In this section, E1 will respond to key observations and recommendations made in Synapse's evidence.

Before addressing the specific observations and recommendations in the Synapse evidence that relate to the 2027-2031 DSM Plan, E1 notes that a consultation process with stakeholders is continuing and will of course be subject to its own regulatory process once that consultation process has concluded. E1 looks forward to continuing to work with stakeholders in relation to the 2027-2031 DSM Plan. Given that the Board process with respect to the 2027-2031 DSM Plan has yet to be commenced, and given that stakeholders consultations are currently underway, E1 reserves the right to modify its position as set out in this reply evidence in light of evidence or other matters which may arise out of that ongoing process and have some bearing on the positions stated herein.

Synapse

Synapse states:

I recommend that the NSEB take the following actions:

- *Approve the energy efficiency portion of the 2026 DSM Extension as filed.*
- *Approve the demand response portion of the 2026 DSM Extension as filed, and:*
 - *Direct E1 to include a demand response offering in the 2027-2031 DSM Plan that has a [Program Administrator Cost] PAC of 1.0 or greater.*
 - *Direct E1 to conduct its own benchmarking study to develop its cost effective demand response offering for the 2027-2031 DSM Plan and to leverage Efficiency Canada's forthcoming benchmarking research for that study.¹*

¹ M12249, E1 2026 DSM Extension Application, Exhibit E-15, Synapse Evidence, July 17, 2025, page 3, lines 15-24.

E1 Response

The two points raised by Synapse with respect to the demand response program relate to the 2027-2031 DSM Plan and will be addressed below.

2.1 IMBALANCED TOTAL RESOURCE COST TEST**Synapse**

Synapse states:

The [Total Resource Cost] TRC test is imbalanced in that it includes all the costs and only a portion of the benefits. The participant benefits are missing from the TRC test. ...the TRC test is likely to be skewed and misleading...²

E1 Response

E1 acknowledges the current TRC test as described, and notes Synapse's observation. Evaluating all costs but only a subset of benefits leads to an imbalanced test that does not reflect participant benefits. E1 seeks to address this deficiency through its pending Application for approval of a new BCA test for assessing DSM Plans (M12282) by proposing an analysis that incorporates both electric utility system impacts and non-utility system impacts.

2.2 LOW-INCOME AND EQUITY PROGRAMS**Synapse**

Synapse states:

Q. Do you have any concerns that these energy efficiency program components are not cost-effective in the 2026 DSM Extension?

A. No. These two program components that are not cost-effective using the PAC serve low-income customers and programs that serve low-income customers are not typically cost-effective due to the need for higher incentives. Also, these program components had similar

² Ibid., page 5, lines 2-4, and line 8.

cost-effectiveness ratios in the 2023-2025 Plan and received approval from the NSEB. Lastly, cost effectiveness is assessed at the portfolio level.³

E1 Response

E1 asserts that program components which serve low-income and equity customers require higher incentives and can result in these program components falling below the cost-effectiveness threshold. The three low-income and equity program components (Affordable Multi-Family Housing and Non-Profit Organizations, Affordable Single-Family Homes, and the Mi'kmaw Home Energy Efficiency Project) constitute 17 percent of overall program funding. These program components are essential to E1's mandate, ensuring its services remain accessible and non-discriminatory.

2.3 OUTSTANDING AVOIDED COST INFORMATION FROM NS POWER

Synapse

Synapse states:

A. I recommend that NSPI respond to E1's questions and recommendations regarding the August 2024 avoided costs. A timely response is necessary to allow sufficient time for NSPI to develop updates to avoided costs (if needed) and for E1 to apply any updates to the 2027-2031 DSM Plan filing.

...

I recommend that the NSEB take the following actions:

...

- Direct NSPI to respond to E1's questions and recommendations on the August 2024 avoided cost updates and direct E1 to include any updates to the avoided cost values in the 2027-2031 DSM Plan.⁴*

³ Ibid., page 13, lines 9-16.

⁴ Ibid., page 5, lines 19-22 and page 23, lines 5 and lines 15-17.

E1 Response

E1 supports and accepts Synapse's recommendation that the Board direct NS Power to respond to E1's questions and recommendations on the August 2024 avoided cost updates. The avoided cost input is a significant impact stream considered in E1's cost effectiveness test used for all DSM Resources. In the event the Board elects to adopt Synapse's recommendation and issue the corresponding directive, E1 suggests that it would be beneficial for the Board to establish a specific deadline for the disclosure associated with that directive. This would allow E1 sufficient time for these avoided costs to be included in E1's proposed 'evergreen' process for the quantification of the BCA impacts which inform E1's modelling of the 2027-2031 DSM Plan.

2.4 CALCULATING ACTUAL PROGRAM ADMINISTRATOR COSTS AND TOTAL RESOURCE COSTS**Synapse**

On June 4, 2025, Synapse posed the following IR-08 to E1:⁵

Request IR-8: Please refer to Table 5: Program Savings & Investments on page 23 of the Evidence. Please provide an Excel workbook that reproduces Table 5 in five separate worksheets, with one worksheet for each of the following:

(a) 2023 Actuals

(b) 2024 Actuals

(c) 2025 Forecast

(d) 2026 Plan Extension

(e) 2023-2026 Total (sum of the previous four tables)

In each of the five worksheets, please keep all the row headings and column headings the same and in the same order as in Table 5. For example, if a program component was active in 2023 and is discontinued in 2026, please keep the row for the program component in both tables and include values of zero for the year(s) in which it is not active.

⁵ M12249, E1 2026 DSM Extension Application, Document #97916, Synapse (E1) IR 1 to 36, IR-08, June 4, 2025, page 4, lines 17-28.

E1 Response

In its response to Synapse IR-08, E1 provided excel spreadsheets showing actual lifetime benefits for energy efficiency, demand response, as well as these two components combined, for the requested years, and explained the limitations to conducting actual retroactive cost-effectiveness testing: “EfficiencyOne (E1) is unable to retroactively perform cost-effectiveness testing. E1 does not have verified customer costs or verified utility avoided costs, both of which are required to retroactively perform cost effectiveness screening with actual results.”⁶

In its evidence, Synapse cited other jurisdictions where actual benefit-cost ratios are included in annual reporting.⁷ However, Synapse noted that these calculations “...tend to hold avoided cost assumptions constant from the plans and may hold some participant cost assumptions constant as well.”⁸ Synapse recommended as follows:

*I recommend that E1 provide actual PAC and TRC results in its annual reporting, which can then be referenced in DSM Plans. E1 should document its assumptions about participant costs and avoided costs in presenting these calculations.*⁹

After reviewing Synapse’s evidence, E1 has noted a discrepancy between Synapse’s definition of actuals and E1’s own interpretation of actuals. E1 interpreted Synapse’s request under IR-08 as seeking actual retroactive figures with all variables accounted for. This gave rise to E1’s comment under Footnote (b) indicating that E1’s ability to calculate actual retroactive cost-benefit ratios was limited due to the fact that they did not have access to verified customer costs or verified utility avoided costs.

E1 understands that the purpose of the reporting Synapse is recommending is to provide insights to the Board and stakeholders on the cost effectiveness of E1’s implementation of the DSM Plan as compared to the DSM Plan as approved. E1 agrees in this case, it would be appropriate that only those inputs within E1’s control, such as E1’s actual costs and savings would change, with all other inputs remaining constant.

⁶ M12249, E1 2026 DSM Extension Application, Exhibit E-8, E1 (Synapse) Responses to Information Requests RIR 1 to 36 Redacted, June 25, 2025. E1 (Synapse) RIR-08, page 1-2 and Exhibit 8(iii) E1 (Synapse) RIR-08 Attachment 1: Excel Tabs 1 and 2 (2023 and 2024 Actuals), Footnote (b).

⁷ M12249, E1 2026 DSM Extension Application, Exhibit E-15, Synapse Evidence, July 17, 2025, page 6, lines 16-20.

⁸ Ibid., page 6, lines 20-22.

⁹ Ibid., page 7, lines 12-14.

E1 notes that TRC test results (E1 would expect in future the proposed BCA, if approved by the Board) are more complex than the PAC test results to calculate. E1 would require support from its third-party modelling consultant and evaluator to establish the methodology and approach for the calculations, including the development of guidelines and processes. This work would incur additional costs not contemplated in the 2026 DSM Extension. Due to the complexity of the work required, the earliest E1 could provide reporting would be in the 2026 Annual Progress Report for the 2026 test results, these results would not be retroactive to 2023. Alternatively, E1 proposes that limiting reporting to only the PAC test would not incur additional costs as this work would not require third party support, since this work can be completed by E1. E1 could include the PAC test results for 2023, 2024 and 2025 in the 2025 Annual Progress Report.

2.5 COST-EFFECTIVENESS OF DEMAND RESPONSE

Synapse

Synapse states:

Q: Do you have any concerns with the fact that E1's demand response offerings are not cost-effective?

A. Yes. The PAC for the proposed 2026 demand response portfolio is 0.5, which means that the utility system benefits are half of the utility system costs. Since the purpose of demand response is to provide utility system benefits, the demand response program should have a PAC that is greater than 1.0.¹⁰

...

...E1 should include a demand response offering in the 2027-2031 DSM Plan that has a PAC of 1.0 or greater.¹¹

E1 Response

E1 acknowledges the potential for further development within the demand response program. This is a key focus area in E1's discussions with stakeholders in relation to the 2027-2031 DSM Plan, and there are

¹⁰ Ibid., page 18, lines 3-8.

¹¹ Ibid., page 20, lines 10-11.

1 opportunities to explore new ways of growing demand response, such as targeting grid-constrained
2 locations (discussed further below in section 2.7).

3
4 E1 contests the use of the jurisdictions referenced in the Synapse evidence as direct comparators, given
5 that their demand response programs are more advanced than E1's. The maturity level of these programs
6 is a critical factor when assessing cost-effectiveness across different demand response initiatives. As
7 highlighted by Synapse, with increased adoption and participation, demand response programs are
8 expected to realize greater capacity and benefits relative to costs, thereby enhancing overall cost-
9 effectiveness. As such, while jurisdictional comparisons are a useful tool, the differences in program
10 variables should be taken into account when using those jurisdictions as a reference point for evaluating
11 E1's programs. The more appropriate comparison is not what these jurisdictions are currently achieving,
12 but rather what they were achieving at the time when they shared a similar maturity level to E1's program.

13
14 In the development of the 2027-2031 DSM Plan, improving the demand response programs's cost
15 effectiveness results year over year will be an important consideration. However, at this time, E1 is unable
16 to commit to its demand response program meeting a PAC of 1.0 at the end of the plan period. This
17 position is due to several considerations.

18
19 Firstly, the legislation requires that the cost-benefit analysis test be applied at the portfolio level. E1 is able
20 to report on the cost-effectiveness results for the demand response program, as it currently does in the
21 DSM Plan, ensuring continued transparency and accountability. However, Synapse's recommendation
22 extends beyond this by proposing a mandatory threshold that the demand response program must meet
23 prior to approval. Imposing an additional threshold below the portfolio level for demand response would
24 not align with existing legislation.

25
26 Secondly, the cost-benefit analysis test is presently under review by the Board. Therefore, it would be
27 premature for E1 to consent to any modifications of the current cost-benefit analysis test until this process
28 has been completed.

29
30 Thirdly, as noted by Synapse, the cost per participant for the demand response program is dropping
31 significantly, and as demand response ramps up, cost-effectiveness test results are anticipated to also

1 improve. The trajectory for demand response is positive, and even with the observed decrease in cost-
2 effectiveness of demand response, it is still in keeping with comparator jurisdictions. Despite these positive
3 characteristics, if meeting a PAC threshold of 1.0 is imposed as a requirement at the program level for
4 demand response under the 2027-2031 DSM Plan, E1 anticipates that the demand response program will
5 have to be discontinued given the threshold requirement thus limiting E1's opportunities to target grid-
6 constrained locations as part of its demand response program. It would also reverse the progress that E1
7 has achieved over the years in increasing participation in the program.

8
9 For the foregoing reasons, E1 does not agree with Synapse's recommendation. E1 is committed to ensuring
10 that the demand response program costs are reasonable and reflective of changes expected with the
11 growth of the program.

12 13 2.6 BENCHMARKING STUDY

14 Synapse

15 Synapse states:

16 *...I also recommend that NSEB direct E1 to conduct its own benchmarking study to inform*
17 *the development of its cost-effective demand response offering for its 2027-2031 DSM Plan*
18 *and to leverage Efficiency Canada's forthcoming benchmarking research for that study.*¹²

19 20 E1 Response

21 E1 acknowledges that conducting a benchmarking study could provide useful information for developing
22 its demand response offerings. Although benchmarking studies are helpful in DSM planning, E1 cautions
23 that benchmarking studies need to also consider that results do not always provide direct comparisons.
24 Since DSM variables (such as the DSM Administrator's delivery model approach or maturity levels of
25 utilities) do not always translate directly across jurisdictions, benchmarking study results need to be
26 considered carefully before drawing conclusions about how effective an approach will be in Nova Scotia,
27 even if it is successful in another jurisdiction.

¹² Ibid., page 20, lines 11-15.

1 From a process timeline perspective, there is not sufficient time to review the Efficiency Canada
2 Benchmarking Study (which has not yet been released), conduct an E1 benchmarking study aligned with
3 the Efficiency Canada study, and use those results to inform the 2027-2031 DSM Plan. Should the Efficiency
4 Canada benchmarking study be published within a suitable timeframe prior to the 2027-2031 DSM Plan,
5 E1 commits to utilizing its findings to inform the development of its DSM plan. E1 anticipates that the
6 Efficiency Canada Benchmarking Study will include Nova Scotia, thereby eliminating the need for a
7 potential redundant study to be conducted by E1.

8
9 E1 is committed to performing a jurisdictional scan and conducting literature reviews to inform the
10 development of demand response offerings for the 2027-2031 DSM Plan.

12 2.7 TARGETING GRID-CONSTRAINTS

13 Synapse

14 Synapse states:

15 *NSPI should provide E1 with sufficient detail about location of the constrained system as of*
16 *the August 2024 avoided cost update to facilitate this targeting (if NSPI has not already*
17 *provided this information). E1 should develop energy efficiency and demand response*
18 *strategies for targeting these areas and include these strategies in its 2027-2031 DSM Plan.*
19 *E1 should capture benefits associated with the constrained system as part of the benefit-*
20 *cost analysis for the 2027-2031 DSM Plan.*¹³

22 E1 Response

23 E1 accepts Synapse's observation that locational DSM can be very effective to assist with grid constrained
24 areas. E1's energy efficiency and demand response program delivery can be targeted specifically to
25 customers, however, the effectiveness of this targeting is a function of the level of information available
26 from NS Power. E1 acknowledges that NS Power did provide a list of the constrained substations as part
27 of the August 2024 Transmission and Distribution avoided cost development which is extremely helpful,
28 however, E1 would also require that NS Power provide the list of customers mapped to those substation

¹³ Ibid., page 21, lines 14-20.

locations that are the most constrained. This information is required before E1 can commit to designing locational DSM strategies.

2.8 STANDARDIZED FILING FRAMEWORK

Synapse

Synapse states:

...E1 should reconvene the DSMAG to develop updates to the Standardized Filing Framework. These updates should be included in the 2027-2031 DSM Plan.¹⁴

E1 Response

E1 shared recommended updates to the Standardized Filing Framework as part of the DSM Advisory Group (DSMAG) engagement for the 2026-2030 DSM Plan, welcoming comments from the members. E1 expects to continue this work as part of the DSMAG engagement for the 2027-2031 DSM Plan.

3. GREEN ENERGY

3.1 SIGNIFICANCE OF EVALUATION RESULTS

Green Energy

Green Energy makes several comments on the Peach Report.¹⁵

Of particular significance to this proceeding is Green Energy's determination that the savings from the Efficiency Insights Program have value at the system level. Green Energy states:

Q: Do the savings found for the Efficiency Insights Program have value at the system level?

A. Yes, and EfficiencyOne specifically calculates that value as part of its cost benefit analysis. This is done by taking the load shape for savings generated by the program

¹⁴ Ibid., page 22, lines 5-7.

¹⁵ M12249, E1 2026 DSM Extension Application, Exhibit E-16, Green Energy Economics Group Inc., Evidence, July 17, 2025, pages 9-15.

1 *and matching it to the avoided costs that have been agreed upon for the jurisdiction.*
2 *These avoided costs look not just at the benefits for avoided capacity associated with*
3 *kW savings, as Mr. Peach implies on page 53 of the 2024 Savings Verification Report,*
4 *but also at the avoided generation value as well as avoided emissions and other benefits*
5 *from lowering energy usage.*

6
7 ***Q. What Does Mr. Peach recommend regarding the continuation of the Efficiency Insights***
8 ***Program?***

9
10 A. *Recommendation SVR2024-Behaviour-5 on page 55 of the 2024 Savings Value Report*
11 *recommends that the program be continued, but that no savings should be counted for*
12 *it because “its independent contribution to energy savings at a household level is too*
13 *small to be credible as an energy saving program, and the same assertion is reasonable*
14 *at the utility system level.”*

15
16 ***Q. Do you agree with this recommendation?***

17
18 A. *No. The goal of the Efficiency Insights Program was never to achieve very significant*
19 *savings per household, but to achieve a smaller average amount of savings across a large*
20 *population. Mr. Peach’s insistence that these savings have no value is not supported by*
21 *the evidence as I have discussed previously.¹⁶*

22
23 **E1 Response**

24 E1 concurs with this conclusion and the associated recommendation that the Board should not accept the
25 proposal to exclude savings from the Efficiency Insights Program.

26
27 **3.2 REALLOCATION OF \$2.1 MILLION TO RESIDENTIAL SECTOR**

28 **Green Energy**

29 Green Energy states:

¹⁶ Ibid., page 14, lines 1-21.

I recommend that EfficiencyOne readjusts its budgets and allocates an additional \$2.1 million to the residential sector to make the residential sector budgets \$27.6 million and maintain the 55% allocation of spending from the 2025 plan year...¹⁷

E1 Response

In the development of a DSM Plan, E1 relies on several design objectives to guide the decisions that are required during the modelling phase, with one of these design objectives an investment allocation of approximately 50% for Residential programs and approximately 50% for Business Non-Profit and Institutional (BNI) programs. For the 2023-2025 DSM Plan the investment allocation to the Residential sector was 55%. E1 acknowledges that for the 2026 DSM Extension the investment allocation for the residential programs at 51% was lower than previous years, however, for the 2023-2026 period the investment allocation for residential programs at 54% has only decreased by one percentage point from the 2023-2025 DSM Plan.

E1 plans to consult on the appropriate design objectives with the Consumer Advocate, Green Energy, and other rate class representatives on the 2027-2031 DSM Plan.

3.3 LOW-INCOME AND EQUITY SAVINGS ALLOCATIONS

Green Energy

Green Energy states:

Appendix A, Attachment 2 of EfficiencyOne's 2026 Extension Application shows the allocation methods. The 2026 incidental low-income savings assumptions are based on the reported impacts from 2023 and 2024. But EfficiencyOne provides a different methodology for low-income attribution in future reported savings. The methodology in place in 2023 and 2024 was different than the methodology described for future reporting. Since the new methodology will typically result in lower allocation of savings to the low-income customers, the 2026 reported savings will likely be lower than projected.

Q. Should EfficiencyOne revise their projections for incidental low-income savings?

¹⁷Ibid., page 7, lines 19-21.

1 *Yes. EfficiencyOne should make allocation estimates based on the new methodology.*¹⁸

3 **E1 Response**

4 E1 submits that this recommendation arises from a different interpretation of E1's evidence. As E1 noted
5 in its response to CA IR-04, there are no differences in low-income and equity allocations methods,
6 assumptions, and formulas between the 2026 DSM Extension estimates and its methodology for future
7 reported savings (effective for 2025 reporting and forward).¹⁹ Further, in E1's response to Synapse IR-30,
8 E1 noted that the reported 2023 and 2024 low-income and equity actuals (used as scaling factors for 2026
9 estimations) were calculated using the same assumptions, calculations, and methodology as for the future
10 reported savings.²⁰

12 **3.3.1 SURVEYS OF LOW-INCOME PROGRAM PARTICIPANTS**

13 **Green Energy**

14 Green Energy states:

15 *...I recommend that surveys should be conducted for each of the programs to get a better*
16 *assessment of the percentage of low-income customers participating in the programs not*
17 *dedicated to low-income customers. Whereas EfficiencyOne's original allocation*
18 *methodology may have overcounted low-income savings attribution, what EfficiencyOne*
19 *has proposed for the 2026 allocation of low-income savings may now be overly*
20 *conservative.*²¹

22 **E1 Response**

23 E1 supports this recommendation, subject to the following conditions: (1) surveys will be executed
24 exclusively for programs that involve some level of low-income and equity participation; and (2) the
25 scheduling of these surveys will remain flexible to ensure alignment with each program's planned
26 evaluation timeline.

¹⁸ Ibid., page 8, lines 7-17.

¹⁹ M12249, E1 2026 DSM Extension Application, Exhibit E-3, E1 (CA) RIR 1 to 7, June 25, 2025, E1 (CA) RIR-04, page 2, lines 1-2.

²⁰ M12249, E1 2026 DSM Extension Application, Exhibit E-8, E1 (Synapse) RIR 1 to 36 Redacted, June 25, 2025, E1 (Synapse) RIR-30, page 1, line 26 to page 2, lines 1-2.

²¹ M12249, E1 2026 DSM Extension Application, Exhibit E-16, Green Energy Economics Group Inc., Evidence, July 17, 2025, page 9, lines 3-8.

3.3.2 EFFICIENT PRODUCT INSTALLATION

Green Energy

Green Energy states:

...The Efficient Product Installation program methodology has the same double counting issue that GEEG discussed with EfficiencyOne. It counts all of the known low-income customers plus applies the overall low-income prevalence to the remainder. Until a survey can be conducted, I recommend that EfficiencyOne only apply the overall low-income prevalence to all participants, unless the number of known low-income participants is greater, in which case that number should be used.²²

E1 Response

E1 submits that the reported low-income and equity impacts in Efficient Product Installation (EPI) for the undisclosed income group represents a small proportion of the overall total reported low-income and equity impacts for EPI. In 2023 and 2024, the undisclosed income group tracked low-income and equity impacts represented less than 10% of EPI's total low-income and equity impacts, with the disclosed income group comprising the majority of EPI's tracked low-income and equity impacts.

As the undisclosed income group comprises a small proportion of EPI's overall reported low-income and equity impacts, E1 proposes to continue to use its existing methodology of applying the overall low-income prevalence factor (14.9%) to the undisclosed income group until a survey of the undisclosed income group is completed. At this time, E1 does not have an alternative factor to estimate impacts for the undisclosed income group. As this program component is a free-of-charge program and has historically been targeted to lower-income geographical areas, E1 is of the view that applying the 14.9% overall low-income prevalence factor to the undisclosed income group is appropriate. E1 also notes that it remains appropriate to assume 100% low-income and equity impacts from EPI's disclosed income group, as this group is comprised of low-income participants that are tracked where income information is disclosed.

E1 does not endorse Green Energy's recommendation to apply the overall prevalence factor (14.9%) to all EPI participants, including both disclosed and undisclosed income groups, as this may result in

²² Ibid., page 9, lines 11-16.

underreporting EPI's low-income and equity impacts. In 2023 and 2024, the tracked impacts for EPI's disclosed income group exceeded the overall prevalence factor.

3.4 RISING COSTS OF RESIDENTIAL PROGRAMS

Green Energy

Green Energy states:

*Over three years, the residential sector will see unit costs for first year savings go up nearly three times higher, and lifetime savings unit costs rise over five times higher. In that same time span, low-income savings are projected to be over four times higher for both first year and lifetime savings. These are very large increases in a very short amount of time.*²³

...

Q. Are you concerned about this sharp increase in residential savings acquisition costs?

*A. Yes. The primary goal of the portfolio is to acquire energy savings, with the main constraint coming from the budget available to do so. As costs to acquire increase, and budget levels stay the same or increase slightly, the acquired savings must fall in response. Such a dramatic increase in acquisition costs has led to a sharp decline in acquired savings as discussed in Section III...*²⁴

...

*... a deep and detailed look should be taken at the residential energy efficiency program offerings for the next phase of the portfolio to ensure that the appropriate mix of programs and measures has been chosen to acquire a sufficient quantity of cost-effective savings for residential ratepayers.*²⁵

E1 Response

E1 will carry out, as part of the 2027-2031 DSM Plan development, a comprehensive review of the residential energy efficiency program offerings. E1 plans to work with the Consumer Advocate, Green Energy, and other stakeholders to develop a portfolio of residential ratepayer offerings where costs are

²³ Ibid., page 4, lines 5-9.

²⁴ Ibid., page 4, lines 10-16.

²⁵ Ibid., page 5, lines 20-23.

1 reasonable and are reflective of current and projected market conditions. E1 commits to regular and direct
2 engagement to discuss these residential programs. This approach is consistent with E1's ongoing dialogue
3 with stakeholders through the DSMAG.

4
5 E1 refers to its Quarterly and Annual Reports, which provides detailed information about the drivers of
6 unit cost escalation that it is currently facing in the residential sector.

Appendix A

Reply Evidence of Econoler

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

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September 04, 2025



Quebec, September 04, 2025

To: Nova Scotia Energy Board

From: Econoler

Subject: Reply Evidence for the Residential Behaviour Program Component, Demand Response Programs, and Compressed Air

RESIDENTIAL BEHAVIOUR PROGRAM

Introduction

Econoler was commissioned by E1 to evaluate E1's 2024 DSM program portfolio, including the Residential Behaviour program component.

E1's Residential Behaviour program component, publicly branded as Efficiency Insights, constitutes an industry standard program intended to promote behavioural change and reduce electricity consumption among residential customers. The program component provides a selected subset of customers (the treatment group) with detailed energy usage data allowing them to compare their energy use with similar homes and includes behaviour change tips and recommendations to encourage the adoption of energy-conscious habits and practices. E1, through its service provider Bidgely, uses NS Power data and proprietary algorithms to generate personalized Home Energy Reports (HERs) in both paper and digital formats which are sent to treatment group customers every two months.

Econoler's 2024 Residential Behaviour evaluation consisted of a comprehensive impact evaluation to calculate net electrical first-year energy savings. Prior to the launch of this program component, Econoler was also asked to define the study population for the program and perform the selection of the treatment and control groups. Having a third-party perform the customers assignment in a randomized controlled trial (RCT) ensures impartiality and avoids selection bias.

Reply Evidence

The Savings Verification Review of Efficiency Nova Scotia Program Year 2024 Evaluation Results (the "Peach Report") authored by H. Gil Peach & Associates ("the Verifier") for the Nova Scotia Energy Board, and filed on June 5, 2025 as Exhibit E-2 in Matter M12249 EfficiencyOne 2026 DSM Extension Application,¹ includes observations and recommendations regarding the Residential Behavioural Program evaluation. Econoler's reply evidence in response to the Peach Report is set out below.

¹ M12249, E1 2026 DSM Extension Application, Exhibit E-2, Savings Verification Review of Efficiency Nova Scotia Program Year 2024 Evaluation Results, Report for the Nova Scotia Energy Board ("Peach Report"), H. Gil Peach & Associates LLC, June 5, 2025.

1. 2024 Residential Behaviour Evaluation Approach and Results

The Peach Report states as follows in relation to Econoler's 2024 Independent Evaluation of EfficiencyOne's DSM programs:²

This evaluation is well constructed at a technical level, is well executed, and fully meets the requirements of the two most relevant evaluation protocols (Universal Methods Project and SEE Action). However, neither protocol addresses the tension evident due to the very large sample sizes and extremely small effect sizes typical of residential behaviour evaluations. Neither protocol has been updated to current, more limited, understandings of statistical significance and the process nature of randomized controlled trials. Neither has been adjusted to shift from statistical significance to consideration of practical effect size and making the business case as the primary criterion for assessing results.

At the utility system level, the effect size for the first year is 6.27 GWh. Unless NSP demonstrates otherwise, this is not a meaningful effect size at the system level. For comparison, the NSP system requirement was 11,326.3 GWh for 2024, so this is about 0.06% (six one-hundredths of one percent).

There is a problem with large sample sizes and statistical significance, so statistical significance for the 6.27 GWh should be disregarded.

Econoler Response:

Econoler does not agree with the Verifier's evidence respecting large sample sizes and statistical significance.

Econoler's approach is fully aligned with two specific industry standards for behaviour programs, both of which were developed by recognized organizations with a thorough review process:

- (1) The State & Local Energy Efficiency Action Network (SEE Action) developed the *Evaluation, Measurement, and Verification (EM&V) of Residential Behavior-Based Energy Efficiency Programs: Issues and Recommendations* in 2012.
- (2) The *Uniform Methods Project: Methods for Determining Energy Efficiency Savings for Specific Measures*, developed by the National Renewable Energy Laboratory (NREL) of the U.S. Department of Energy. The Uniform Methods Project has a chapter dedicated to residential behaviour programs; *Chapter 17: Residential Behavior Evaluation Protocol* was firstly published in 2015, then in 2017 and 2020. Twelve expert-reviewers commented on the latest version of the Uniform Methods Project in which new research regarding the calculation of statistical power and sizing of analysis samples was incorporated.

As identified in these protocols, best practice for residential behaviour programs is to use a large-scale randomized controlled trial (RCT) program design with regression analyses to calculate savings. Econoler applied this evaluation approach in the 2024 Residential Behaviour Program Evaluation.

Based on previous work in evaluating residential behaviour programs for other jurisdictions and research on methodologies used by other evaluators, Econoler can confirm that an RCT approach with regression analyses is the industry standard. Econoler can list at least fourteen energy behaviour programs implemented in North America that were designed based on a RCT approach and include savings calculations performed with a regression analysis, following the evaluation protocols recommendations.

² Ibid., pages 53-54.

The Verifier asserts that neither the Uniform Methods Project nor the SEE Action protocol specifically addresses the large sample sizes and small effect sizes characteristic of residential behaviour evaluations. However, the protocols state that, due to the small percentage savings typically seen in residential behaviour programs, large sample sizes—often numbering in the thousands—are necessary to accurately confirm these savings.³

Savings from [behavior-based] BB programs are usually a small percentage of energy use, typically less than 3%. [...] Because most BB programs result in small percentage savings, a large sample size (often in the thousands or tens of thousands of customers) is required to detect savings.

The protocols clearly address the importance of very large sample sizes in RCTs to yield robust savings estimates, even if relatively small. While the key feature of RCTs is random assignment, not sample size, large samples increase precision and chance to detect a real effect if it exists, which is often why RCTs are ideally conducted with larger samples.

Econoler does not agree that the protocols need to address the shift from statistical significance to consideration of practical effect size as this is not relevant in the case of a residential behaviour program. The reference provided by the Verifier in the discussion on statistical significance discussed the use of p-value in the context of medical education research which is a different context than energy efficiency programs and therefore does not represent a beneficial comparison.⁴ While consideration of practical effect size is important in the case of medical or pharmaceutical studies as effect must be perceived by the treatment subjects in comparison with the control group (the article refers to the common example of aspirin to treat myocardial infarction), this is not the goal in the case of programs targeting energy behaviour changes. For residential behaviour programs, the effect does not need to be perceived at the household level rather only needs to be perceived in the metering data. For these behavioural programs, it is the aggregated results that have an impact (see explanations in section 4. Causal Effects further below).

The Peach Report recommends that in addition to “practical effect size”, “making the business case” should be part of the evaluation protocols:⁵

...The evaluator should provide a business case for why the small savings per household or at the utility level justify funding the program as currently designed.

Econoler does not agree with this suggestion that an evaluator is appropriately involved with “making the business case” regarding similar type program offerings. Rather, it considers the primary role of an evaluator as providing rigorous, data-driven estimates of energy savings. These estimates serve as inputs to Program Administrators, who then assess cost-effectiveness and make appropriate business decisions. This delineation of roles ensures objectivity and clarity. The evaluation results and recommendations can inform a decision on the relevancy of a program, however justifying the business case for a program is not part of the evaluators role. Many factors, not only size of savings, are pertinent to program decisions, for example changes in the baseline for program measures, the free-ridership rate and potential for growth.

³ NREL, Chapter 17: Residential Behavior Evaluation Protocol, The Uniform Methods Project (UMP): Methods for Determining Energy Efficiency Savings for Specific Measures, September 2011 – August 2020, pages 1-3.

⁴ Reference provided on page 51 for Figure 18: Sullivan, Gail M. & Richard Fein, “Using Effect Size—or Why the P Value Is Not Enough,” Journal of Graduate Medical Education, September 2012, pages, 279-282.

⁵ M12249, Exhibit E-2, Peach Report, page 57.

2. Sample Size and Statistical Significance

The Peach Report states as follows in relation to the use of statistical significance testing for large sample sizes:⁶

Use of statistical significance testing for very large sample sizes is questionable since, historically, these tests were developed for a much smaller range of sample sizes. There exists a tension between two principles. The first principle is that in both physical and social science sampling, increasing sample sizes is generally regarded as beneficial. This is due to the fact that larger sample sizes enhance the likelihood of achieving statistically significant results.

Econoler Response:

Econoler respectfully disagrees with the assertion that the statistical tests employed in the evaluation, as well as those recommended in the evaluation protocols, lack reliability when applied to large sample sizes.

- The statistical significance tests used in the evaluation, which are based on standard errors, are recommended in the residential behaviour program evaluation protocols⁷ ⁸ which clearly state that these programs involve large sample sizes.
- Many other jurisdictions in North America (please refer to Table 1) for electric utilities with similar Residential Behaviour programs) used statistical significance to demonstrate residential behaviour program savings.
- Econoler applied a correction for sample bias of a finite population to consider the «large sample sizes» when conducting the tests.
- As noted in the Journal of Graduate Medical Education referred by the Verifier⁹, “*Effect size helps readers understand the magnitude of differences found, whereas statistical significance examines whether the findings are likely to be due to chance.*” Statistical significance should therefore be used to demonstrate if savings are real and not due to chance.
- It is also important to note that the only «samples» in E1 Residential Behaviour correspond to the treatment and control groups. Together, they include the entire study population. The consumption data of the entire study population was considered in the analysis, not only that of a sample.

The Peach Report states as follows in relation to reliability of large sample sizes:¹⁰

With a sufficiently large sample, a statistical test will almost always demonstrate a significant difference, unless there is no effect whatsoever, that is, when the effect size is exactly zero; yet very small differences, even if significant, are often meaningless.

Econoler Response:

Econoler respectfully disagrees with the statement that a statistical test will almost always demonstrate a significant difference with large sample. While it is true that a large sample size increases ability to detect

⁶ M12249, Exhibit E-2, Peach Report, page 49.

⁷ Reference on standard errors provided on pages 26-27 of the SEE Action Evaluation, Measurement, and Verification (EM&V) of Residential Behavior-Based Energy Efficiency Programs: Issues and Recommendations.

⁸ Reference on standard errors provided on page 34 of the UMP, NREL, Chapter 17: Residential Behavior Evaluation Protocol, UMP.

⁹ Reference provided on page 51 for Figure 18: Sullivan, Gail M. & Richard Fein, “Using Effect Size—or Why the P Value Is Not Enough,” Journal of Graduate Medical Education, September 2012, page 279-282.

¹⁰ M12249, Exhibit E-2, Peach Report, page 50.

real effects (savings), it does not detect effects that do not exist. If there is no meaningful difference, results will be non-significant even with thousands of observations.

Increasing sample sizes does not automatically allow to detect savings, but increases the chances to obtain statistically significant results because it decreases standard error and increases statistical power:

- The standard error, i.e., the variability in savings estimates, decreases as your sample size increases. A smaller standard error leads to narrower confidence intervals and makes it easier to detect small effects.
- Statistical power, i.e. the probability of detecting an effect if it exists, is increased with larger sample sizes.

Further evidence that large sample sizes do not automatically allow detection of savings lies in the way in which sampling is usually done for energy behaviour programs:¹¹

To determine the minimum number of subjects required and the number of subjects to be assigned to the treatment and control groups, researchers should employ a statistical power analysis. Statistical power is the likelihood of detecting a program impact of minimum size (the minimum detectable effect). Typically, researchers design studies to achieve statistical power of 80% or 90%. A study with 80% statistical power has an 80% probability of detecting the hypothesized treatment effect.

- In the case of E1 Residential Behaviour, the study population consisted of the entire residential population (residential rate codes 02B and 03B). The only «samples» that were made were to divide the population into three waves based on their energy use level (low, medium and high users) and, for each wave, assign them to the treatment or control group.
- Econoler performed statistical power tests to determine the most optimal treatment and control group split for each wave. While a 50/50 split between control and treatment group is the ideal statistical scenario to detect savings, it limits the number of treatment customers that can benefit from the program. As recommended in the UMP, most energy behaviour programs target a statistical power of 80% or 90% and end up with a proportion of treatment group customers representing around 80% of the study population. This recommendation was followed by Econoler to determine the split of treatment and control group customers in each wave of E1 Residential Behaviour.
- This means that, if Econoler had used a lower statistical power (e.g. 70%) to determine the split between the treatment and control group customers for E1 Residential Behaviour program component, the treatment group would have been larger, but no savings would have probably been detected.

The Peach Report states as follows in relation to sampling and independence of cases:¹²

[...] standard significance tests assume that the observations are completely independent of each other. If there is dependency within the data, standard statistical tests can produce misleading results. In the current study, we have energy use data from multiple measurements on households. The equivalence analysis is sufficient to show that there is no geographical pattern. However, we know that weather has not been accounted for and that within a utility data is highly influenced by days, months, and years of weather patterns and climate trends—

¹¹ NREL, Chapter 17: Residential Behavior Evaluation Protocol, UMP, September 2011 – August 2020, page 18.

¹² M12249, Exhibit E-2, Peach Report, page 52.

so the observations are not fully independent of each other but are chained and run in a pattern.

Econoler Response:

Econoler does not agree that the cases are not really independent.

- The treatment and control group customers were randomly selected with proof (the equivalency check) that the groups were homogenous before the launch of the program.
- In a regression with time period fixed effects, as was used for E1 residential behaviour savings calculation, weather data would improve the precision of the savings estimates only if there was significant variance between customers based on weather. Given the treatment and control groups were randomly assigned to ensure equivalency in terms of geographical location and household characteristics, the effect of weather on their household energy consumption is expected to be equivalent. Weather data are therefore not necessary for estimating savings.
- The vast majority of jurisdictions with residential behaviour programs do not include weather controls in their regression analysis (see table 1; 6 out of 7 electric utilities do not include weather controls).
- The calculation approach used, known as the Difference-in-Difference (DiD) method, involves comparing the difference between the measured energy usage of the treatment households relative to the energy usage of the control households before and after the program launch. The DiD approach used to measure program savings has the advantage, compared with a simple difference approach, of controlling for unobserved, time-invariant differences between groups and for external factors affecting all customers over time.

The Peach Report states as follows in relation to measuring individual household energy savings:¹³

*[...] sample size drives statistical significance, so with very large samples there will almost always be statistically significant results as an artifact of sample size and it is useful to disregard statistical significance and, instead, consider practical significance. **Practical significance** is the real-world importance or relevance of a result. Strong practical significance creates a business case for the program. If a result is large enough to be of meaningful value in a practical context, it has practical significance.*

Econoler Response:

Econoler disagrees with this evidence. In the evaluation, savings were calculated with a panel regression analysis, therefore individual household consumption values were not used in the savings calculation, but instead the average consumptions values for the group. It is the aggregated results that have an impact (see explanations in section 4. Causal Effects further below).

3. Effect Size

The Peach Report states as follows in relation to effect size at the household level:¹⁴

Due to the effect size at the household level, a savings claim for the program does not make sense. Similarly, unless NSP demonstrates otherwise, a 6.27 GWh effect at the system level means that a savings claim for the program at the system level does not make sense.

¹³ M12249, Exhibit E-2, Peach Report, page 82.

¹⁴ Ibid., page 54.

Econoler Response:

Econoler does not agree that due to the effect size at the household level, a savings claim for the program does not make sense.

- Behaviour change initiatives are designed to make small, simple changes in how individuals act. For residential behaviour programs, this means encouraging small shifts in household habits using low-cost strategies that are easy to follow and do not take much time or effort. If the program is delivering measurable energy savings, demonstrated by the impact evaluation following industry-standard evaluation protocols, savings should be claimed.
- Total net electrical energy savings of 6.270 GWh for the program represents an average savings per household ranging from 0.062 to 0.135 kWh/day, corresponding to 0.34% to 0.62% of the annual household consumption. While the program is still in its ramp-up phase after only 8 months of implementation that do not include a full heating season, these values are within the range observed in other jurisdictions, where savings vary between 0.2% and 2.3% depending on the jurisdictions and subgroups (see table 1). This indicates that E1's first program year results are already consistent with common savings levels achieved in comparable residential behaviour programs with a potential to increase in the future.
- Econoler notes that Residential Behaviour program household savings are comparable to other measures within E1's portfolio. The average savings per household for the program (0.062 kWh/day - 0.135 kWh/day) compares with the average savings calculated for LED lamps purchased as part of Instant Savings (0.113 kWh/day¹⁵).

4. Causal Effect

The Peach Report states as follows in relation to effect size at the household level:¹⁶

Currently, behavioural RCTs, of which the current program is an example, are black boxes. There is no coherent specification of the mechanism or warrant, either of specific behaviors that would save energy or of how much energy would be saved through these (unknown) behaviours. A more robust approach to RCTs has been specified by Cartwright and Hardie. This approach requires establishing warrants. Warrants are arguments for why the program should work, a set of reasons that specify both mechanism and why the mechanism will function. The involve specification of causal roles and support factors. In addition, if warrants and causal relations can be specified and specific action effects found, we will want to understand these in relation to the separate program elements (Home Energy Reports, resources on the website, usefulness and effectiveness of behavioral tips, effectiveness of recruitment to participate in other measure-based programs, and the effectiveness of interaction with energy advisors). There should be a very careful exploration and analysis of whether the energy advisors provide different levels of support to Treatment and Control households as well as careful analysis of records of interactions with each. For example, who (and what percentage) in Treatment and Control has contacted an Energy Efficiency Advisor, and when?[...] Separately, we need analysis that tracks the completion of the survey (or not) and how timing of completion of the survey affects actions and energy savings subsequent to that completion.

¹⁵ M12186, Exhibit E-2, 2024 DSM Programs Evaluation Report, 2024 Residential Efficient Product Rebates Program Evaluation Report, March 31, 2025, Instant Savings program component.

¹⁶ M12249, Exhibit E-2, Peach Report, pages 54-55.



Econoler Response:

Econoler does not agree that behavioural RCTs, and therefore energy behaviour programs, are black boxes and that additional justification is needed to claim savings for the following reasons:

- First, behavioural RCTs do not operate as black boxes. This type of approach, on which E1 Residential Behaviour program component is based, are theory-informed behavioural interventions based on well-established mechanisms such as social norms, salience, and personalized feedback, widely documented in both academic and DSM program literature. The focus is not on a single targeted action (such as turning off a light), but they address the underlying behavioural drivers. For example, the well documented conformity bias leveraged to *nudge* individuals to reduce consumption by enabling social comparison. These provide *mechanistic* accounts, undermining the black box statement, by telling us why things work, and not only what work.
- While Cartwright and Hardie's framework raises valid points about causal complexity, their approach has not been adopted in any North American jurisdiction for behaviour-based program evaluations. Current protocols, including the use of RCTs and meter-based savings estimation, provide robust causal justification and remain the accepted standard in the field.
- Randomized control trial (RCT) design and regression analyses using metering data, are transparent, replicable, and consistent with industry best practices. This approach involves fewer subjective assumptions than commonly used engineering models and simulations in measure-based programs.

Econoler does not agree with the Verifier on what warrants are arguments for why the program should work.

- In energy behaviour programs, the primary goal is to achieve energy savings at the population level, through the change of individual behaviours. Unlike behavioural interventions in health care, where the focus is often on improving individual outcomes (e.g., mental health, medication adherence), energy behaviour programs do not aim for visible changes at the individual level but for a broader impact in reducing energy consumption at the population level.
- Causal understanding of individual behaviour mechanisms (i.e., exactly how or why someone changed their behaviour) has been researched in the context of energy efficiency behaviours for close to 20 years, and such mechanisms have been implemented around the world for just as long. They represent low cost, simple, and easy ways to decrease energy consumption, by modifying the choice architectures of individuals. There is a warrant for behavioural understanding in this body of research and longstanding practice.
- In health programs, such as those mentioned by the Verifier, small changes in individual behaviour (like taking medication regularly or changing a diet) are important because they directly improve that person's well-being. But in energy behaviour programs, the goal is different. The goal is not just trying to help one person use less energy; but aiming to influence many people's habits in small ways that, together, lead to significant savings across the whole system. In energy behaviour programs, we can directly observe and measure outcomes at the meter level—whether or not the exact behavioural pathway is known. If the intervention (Home Energy Reports, resources on the website, Energy Efficiency Advisors, etc.) leads to reduced energy use across the treatment group compared to the control group, the causal effect is demonstrated through observed outcomes, even if the precise internal mechanism is not fully disentangled.

The Peach Report states as follows in relation to understanding what practices would have measurable effect:¹⁷

¹⁷ Ibid., page 73.

... There has been no attempt to check systematically yet on what practices are being adopted, and what practices would have measurable effect of a reasonable size, and what percentages of participant households vs. control households are adopting different behaviors. That information might be very helpful for optimizing program design.

Econoler Response:

In a residential behaviour program using a RCT, it is standard accepted practice to not be able to pinpoint the exact actions each household took to reduce their energy consumption. Behavioural programs aim to influence attitudes, awareness, and habits in subtle ways. These influences often lead to a range of small but wide variety of actions across households, such as turning off lights more often, adjusting thermostats slightly, or using appliances more efficiently. It is the accumulation of these actions in the treatment group that generates observable savings when compared with an equivalent group who did not receive the HERs.

5. Verifier's Recommendations

The Peach Report states the following general recommendation regarding the acceptance of 2024 evaluation results for four program components, including Residential Behaviour:¹⁸

SVR24-G-1. *The Savings Verification study recommends acceptance of the 2024 evaluation estimates for energy savings and demand reduction except for four programs. These are the Residential Behavior program (6.270 GWh; no demand reduction) [...] For the Residential Behavior Program and the two Demand Response programs, the Evaluator conducted independent evaluations and correctly followed the relevant protocols. However, for these programs the practical size of the savings and demand reduction is not large enough to be of practical value at either the household level or at the utility system level. The Evaluator correctly followed the relevant protocols, but a problem with the protocols is that they do not take into account the very large sample size problem. **For very large sample sizes statistical significance loses meaning and it is necessary to, instead, gauge performance using practical significance.** The Evaluator correctly notes that these programs look OK from the perspective of statistical significance, however, the Evaluator should have flagged these programs for not producing practical energy savings or demand reduction.*

Econoler Response:

Econoler disagrees that the 2024 evaluated energy savings for Residential Behaviour should not be accepted and that this program should have been flagged for not producing practical energy savings. As explained in detail in this reply evidence:

- Residential behaviour programs are widely implemented as DSM programs in North America with savings, representing a small percentage of the household energy consumption, claimed and accepted by utilities.
- The 2024 impact evaluation of E1 Residential Behaviour was performed following industry best practices, and evaluation results – based on metering data – demonstrate statistical significance.

The Peach Report also states three recommendations specific to Residential Behaviour: ¹⁹

¹⁸ Ibid, pages 16-17.

¹⁹ Ibid., pages 55-56.

SVR2024-Behaviour-5. *Overall, we recommend that the program be continued, but not as a direct energy savings program. Rather, it should be redesigned and evaluated as a marketing and promotional program designed to (1) support recruitment for the Administrator's measure-based programs and (2) to foster overall awareness and motivation for energy efficiency among customers. Without substantial improvement, its independent contribution to energy savings at a household level is too small to be credible as an energy saving program, and the same assertion is reasonable at the utility system level.*

Econoler Response:

Econoler disagrees with this recommendation. As previously stated in this reply evidence, E1's Residential Behaviour program should be maintained in E1's DSM program portfolio with associated savings claimed as long as statistical significance is demonstrated.

- Energy behaviour programs are widely implemented in North America and part of the program administrator's DSM portfolio, meaning that energy savings from these programs are claimed. None of the residential behaviour programs reviewed by Econoler are considered as a marketing tool.
- Across all key design and evaluation elements, E1's Residential Behaviour program aligns with the approaches used in other jurisdictions, reflecting industry standard practices are followed.
- Behavioural programs and marketing differ fundamentally in their goals, methods, and theoretical foundations. Recognizing this distinction is essential to ensure behavioural programs are properly designed, resourced, and evaluated. Unlike a marketing or promotional initiative, the purpose of a behavioural intervention is not to raise awareness or motivation (point 2 in recommendation SVR2024-Behaviour-5); it is to reshape the choice architecture by leveraging cognitive biases. These interventions aim to transform behaviour, not inform it. While hybrid approaches are possible, the core objective remains activating cognitive mechanisms to, in this context, drive measurable reductions of energy consumption. Methodologically, behavioural programs belong in the DSM portfolio because their impact is measured through observable change in energy consumption level, not through engagement or perception. The nature of the intervention is defined by how it works, not by the magnitude of its impact.

SVR2024-Behaviour-6. *...the process evaluation now planned is a good idea....In addition to attempting to cause participation in the Administrator's measure-based programs,...another goal of Efficiency Insights is to promote energy-saving habits and practices. But what behaviors will produce real energy savings at the household level? There has been no attempt to check systematically yet on what practices are being adopted, and what practices would have measurable effect of a reasonable size, and what percentages of participant households vs. control households are adopting different behaviors. That information might be very helpful for optimizing program design.*

Econoler Response:

Econoler supports the recommendation that a process evaluation may be beneficial now that the program has been running for more than a year. A process evaluation is usually aimed at achieving the following objectives:

- Assess the effectiveness of program component design and delivery.
- Determine the extent to which program implementation is proceeding as planned.
- Analyze partner and participant perspectives on program components and/or measures.
- Address other specific research questions identified in relation to the program.

However, Econoler disagrees with the part of the recommendation that suggests that the process evaluation should aim at identifying what behaviours will produce real energy savings at the household level.

- For residential behaviour programs, energy savings are assessed using metered data. These programs are not designed to collect information on the specific behaviour changes being adopted, but rather the change in energy consumption.
- Identifying behaviour changes must therefore involve a self-reported approach like a survey. Surveys used as part of process evaluation leverage smaller sample sizes. Given the smaller sample sizes and that the variety of possible actions taken, it is difficult to conclude on the actions taken by the treatment group with statistical significance.
- This inability to establish a direct link between the actions taken and the energy consumption reduction should not diminish the strength of the evaluated residential behaviour program savings.

SVR2024-Behaviour-7. *Although we know that the practical effect on energy savings so far is not meaningful either at the household level or at the system level, there could be meaningful changes in some households that get washed out in averaging. So it would be useful to partition household results by kWh savings (effect size) and focus on homes in both the treatment and control groups with relatively high energy savings (after eliminating the possibility of double counting due to program participation overlaps) to find out if there are actions that are practical and effective rather than simply signaling weak attempts to become more energy efficient.*

Econoler Response:

Econoler rejects the assertion that program savings are not meaningful. As previously detailed in this evidence, the effect of the program on energy consumption is real, was demonstrated with real metering data and should be claimed as energy savings.

- E1 Residential Behaviour program, such as the vast majority of energy behaviour programs in North America, is based on a RCT design where customers are randomly assigned to either treatment or control groups in order to calculate unbiased and robust estimates of program energy savings.
- Programs based on a RCT design uses regression analyses with meter-based customer energy consumption data to determine program savings. This approach involves fewer subjective assumptions than commonly used engineering models and simulations in measure-based programs.
- The program effect (energy savings) was directly observed and measured with the energy consumption data of the customers. All customers of the study population were included in the analysis, so it is not only the consumption data of a sample of the population that was analyzed. The statistical significance of the savings was demonstrated.

- The methodology used to calculate the energy savings follows is fully aligned with the two main protocols developed for energy behaviour programs and widely used in the industry.
- The savings percentages are expected to be small for energy behaviour programs. The savings values obtained for E1 Residential Behaviour, corresponding to 0.34% to 0.62% of the annual household consumption, are within the range observed in other jurisdictions, where savings vary between 0.2% and 2.3% depending on the jurisdictions and subgroups (see table 1). It is important to note that these results have a potential to increase in the future as the program was evaluated after only 8 months of implementation that do not include a full heating season.

Econoler also rejects the Verifier's recommendation to "*partition household results by kWh savings (effect size) and focus on homes in both the treatment and control groups with relatively high energy savings to find out if there are actions that are practical and effective rather than simply signaling weak attempts to become more energy efficient.*"

- It is impossible to select subgroups within the treatment and control groups without creating selection bias and unbalancing the groups. Partitioning households would unbalance the equivalency of the groups in terms of energy usage, location and household characteristics. If the groups are not equivalent, they cannot be compared to draw unbiased and robust conclusions or provide savings results.
- The program was designed based on a RCT approach, where all customers in the study population were randomly assigned in the treatment or control group which makes the groups equivalent in all points. In a RCT, the entire treatment group's energy consumption is compared with the entire control group's energy consumption. Even opt-out participants are kept in the analysis to avoid unbalancing the equivalency of the groups.

The following table presents the detailed results for the seven electric-only jurisdictions with publicly available impact evaluation results reviewed by Econoler.

Table 1: Jurisdictional Scan of Similar Residential Behaviour Programs

Jurisdiction - Organisation	Included in the DSM Program Portfolio?	Targeted population	Proportion of customers in the treatment and control group	Impact Evaluation Approach	Average Savings per Household (kWh/day)	Total Program Savings (GWh)	Percentage of Savings (%)
Nova Scotia – Efficiency One	Yes, with savings claimed	All residential customers Split into three groups by usage level	Varies from 70/30 to 90/10	› RCT (opt-out) › Billing analysis using the DiD method. › P-value for significance (90% confidence)	High users: 0.132 kWh/day Medium users: 0.135 kWh/day Low users: 0.062 kWh/day	High users: 3.05 GWh Medium users: 2.84 GWh Low users: 0.78 GWh	High users: 0.34% Medium users: 0.62% Low users: 0.57%
California – SDG&E ²⁰	Yes, with savings claimed	Residential customers with high energy usage and stratified by geography and income	Varies from 50/50 to 68/32	› RCT (opt-out) › DiD fixed-effects panel regression model › P-value for significance (90% confidence)	Varies between 0.112 kWh/day to 0.636 kWh/day	5.66 GWh	Varies between 0.7% to 2.2%
Minnesota – Minnesota Power ²¹	Yes, with savings claimed	Residential customers who chose to enroll in with the online portal (opt-in design)	No "pure" control group because of the opt-in nature of the program. The comparison group was past participants.	› Opt-in participants and control group of past participants › DiD regression with fixed effects and weather controls › P-value for significance (90% confidence)	0.527 kWh/day	10.75 GWh	2.0%

²⁰ DNV GL. (May 2017). *Impact Evaluation of 2015 San Diego Gas & Electric Home Energy Reports and Manage-Act-Save Programs (Final Report)*. California Public Utilities Commission.

https://www.calmac.org/publications/DNVGL_SDGE_HERs_2015_final_to_calmac.pdf

²¹ Demand Side Analytics, LLC. (March 2024). *Energy Engagement Behavioral Program Impact Evaluation Prepare for Minnesota Power*. <https://acceleratedinnovations.com/wp-content/uploads/2022/06/20224-184324-02-Minnesota-Power-2021-CIP-Status-Report-Filing.pdf>

Jurisdiction - Organisation	Included in the DSM Program Portfolio?	Targeted population	Proportion of customers in the treatment and control group	Impact Evaluation Approach	Average Savings per Household (kWh/day)	Total Program Savings (GWh)	Percentage of Savings (%)
New York – NYSEG and RG&E ²²	Yes, with savings claimed	Customers with higher-than-average consumption Split into 13 waves depending on utility, HER type and fuel (NYSEG or RG&E, digital or paper, gas or electric)	Varies from 49/51 to 94/6	› RCT (opt-out) › Billing analysis using the DiD method. › P-value for significance (95% confidence)	Varies from 0.0742 kWh/day to 0.0455 kWh/day	Varies from 0.57 GWh to 10.55 GWh per wave	Varies between 0.2%-0.3% per wave
Ohio – Duke Energy Ohio ²³	Yes, with savings claimed	Residential customers who live in single-metered, single-family homes with more than 13 months of usage history	Average of the 12 waves is 95/5	› RCT (opt-out) › DiD linear fixed-effects regression model › P-value for significance (90% confidence)	0.551 - 0.679 kWh/day	7.38 GWh	1.3%-1.7%
Oregon – Energy Trust of Oregon ²⁴	Yes, with savings claimed	Subset of residential electric customers segmented into 3 waves	Varies from 67/33 to 81/19	› RCT (opt-out) › Billing analysis using the DiD method. › P-value for significance (90% confidence)	0.145 kWh/day First-year savings: 0.099 to 0.150 kWh/day	21.8 GWh First-year savings: 36 to 55 kWh	0.3%-0.6%
Washington – Pacific Power ²⁵	Yes, with savings claimed	All residential customers segmented into 4 cohorts	Varies from 50/50 to 71/29	› RCT (opt-out) › DiD regression model. › P-value for significance (95% confidence)	0.270 kWh/day	4.52 GWh	0.4%-2.0%

²² ADM Associates, Inc. (January 2025). *Impact Evaluation for the Behavioral Program May 2023 through September 2024*. NYSEG/RG&E.

²³ Nexant. (July 2019). *My Home Energy Report Program Evaluation Submitted to Duke Energy*.

<https://dms.psc.sc.gov/Efile/042aa096-3b09-4ca8-8bb8-99d7f04f9ec9.pdf>

²⁴ DNV. (December 2024). *Home Energy Report Impact and Process Evaluation Final Report*. Energy Trust of Oregon.

<https://www.energytrust.org/documents/home-energy-report-impact-and-process-evaluation/>

²⁵ DNV. (February 2024). *Home Energy Reports 2022 Impact Evaluation and 2022-2023 Process Evaluation Report*. Puget Sound Energy.

Jurisdiction - Organisation	Included in the DSM Program Portfolio?	Targeted population	Proportion of customers in the treatment and control group	Impact Evaluation Approach	Average Savings per Household (kWh/day)	Total Program Savings (GWh)	Percentage of Savings (%)
Washington – Puget Sound Energy ²⁶	Yes, with savings claimed	All residential customers	Varies from 50/50 to 75/25	› RCT (opt-out) › DiD regression with fixed effects › P-value for significance (90% confidence)	0.315 kWh/day	42.4 GWh	0.2%-2.3%

Demand Response Programs

Introduction

Econoler was commissioned by EfficiencyOne (E1) to evaluate E1's 2024 DSM program portfolio, including the Demand Response (DR) program. The 2024 Demand Response program evaluation consisted of a comprehensive impact evaluation to calculate available DR capacity, defined as the capacity that is available to Nova Scotia Power (NS Power) to reduce the system peak demand during peak events.²⁷ In 2024, the Demand Response program was composed of two program components: Residential DR and Business, Non-profit, and Institutional (BNI) DR.

Residential Demand Response description

In 2024, Residential DR was composed only of Eco Shift – a residential “bring your own device” offering generating available DR capacity through three pathways: 1) Smart thermostats for electric space heating; 2) electric vehicles (EVs) and EV chargers; and 3) behind-the-meter batteries. In 2024, only the smart thermostat pathway was mature enough to be evaluated, as participation through the other pathways was too limited to draw conclusions. This is to be expected since the program was in its early stages. Virtual Peaker, E1's technical partner, controls participating devices via software during DR events (e.g., adjusting thermostat setpoints). Similar to residential DR programs in other jurisdictions, the goal of E1's Residential DR program component is to aggregate the impacts from many participants to generate capacity available for NS Power, which can help NS Power by 1) delaying or removing the need to build new capacity solely to meet peak period demand or 2) removing the need to buy expensive electricity from other providers during peak periods.

Econoler evaluated the Residential DR program component using an hourly regression model based on non-event day whole-home advanced metering infrastructure (AMI) data to estimate expected energy use during DR events. The model considered time of week and outdoor temperature. The available DR capacity corresponds to the difference between the expected energy use predicted by the model and the actual use during when DR events were triggered.

To establish the DR evaluation protocol for the Residential DR program component, Econoler relied on a review of the literature²⁸ to determine an appropriate approach. Econoler selected the use of regression models, which is also the most common approach identified in the literature review. Whole-house data were

²⁷ This capacity is calculated based on the first two hours of all events called between December and February, excluding weekends and holidays.

²⁸ CADMUS, prepared for CenterPoint Energy, *2023 Demand Response Impact Evaluation FINAL REPORT*, March 2024.

Retrieved from: <https://midwest.centerpointenergy.com/assets/downloads/planning/irp/IRP-vectren-demand-response-evaluation.pdf> (last accessed 04-10-2024).

Demand Side Analytics, prepared for PG&E, *2022-2023 Load Impact Evaluation of Pacific Gas and Electric's Smart Thermostat Control Pilot*, May 2024. Retrieved from: [https://www.calmac.org/publications/PY2022-2023_Smart_Thermostat_Control_Pilot_Evaluation_Report_Final_\(003\).pdf](https://www.calmac.org/publications/PY2022-2023_Smart_Thermostat_Control_Pilot_Evaluation_Report_Final_(003).pdf) (last accessed 04-10-2024).

Navigant, prepared for Eversource MA, Eversource CT, National Grid MA, and Unitil MA, *2019 Residential Wi-Fi Thermostat Direct Load Control Offering Evaluation*, April 2020. Retrieved from: <https://ma-eeac.org/wp-content/uploads/2019-Residential-Wi-Fi-Thermostat-DLC-Evaluation-Report-2020-04-01-with-Infographic.pdf> (last accessed 04-10-2024).

EPRI, prepared for Lincoln Electric, *Lincoln Electric System Demand Response Pilot Evaluation (Generic Version) - 2017 Technical Report*, May 2017. Retrieved from: <https://www.epri.com/research/products/3002011250> (last accessed 04-10-2024).

CADMUS, prepared for Portland General Electric Company, *Direct Install Smart Thermostat Pilot Evaluation Report*, September 2021. Retrieved from: <https://edocs.puc.state.or.us/efdocs/HAD/um1708had165015.pdf> (last accessed 04-10-2024).

favoured over device-level data to account for interactive effects from other uncontrolled heating systems within participating houses.

Business, Non-profit, and Institutional (BNI) Demand Response

In 2024, BNI DR was composed solely of the DR Aggregator program component. Through the DR Aggregator program component, E1 hired aggregators to enroll groups of BNI customers capable of reducing their load on request. Parsons Inc. was responsible for implementing the DR Aggregator program component during the evaluation period (December 2023-February 2024). During demand response events triggered by NS Power, aggregators either remotely control energy systems or instruct participants to implement pre-defined load reduction plans. Typical actions include turning off systems like heating or cooling (with possible pre-conditioning), ventilation, water heating, or lighting.

For the DR Aggregator program component, E1's tracked 2024 available DR capacity is calculated by comparing the actual load during events to a baseline load which is based on the average load during the same hours of the top six of the ten highest-load eligible days before the event. A same-day additive adjustment factor—based on load differences a few hours before the event—is applied to improve accuracy. E1 also reviewed projects using baseline consideration guidelines which were developed to ensure the project results obtained are the most reliable. These guidelines were developed by E1 and reviewed by Econoler. The project reviews resulted in an adjustment factor which was applied by E1 in their tracked savings. As part of the 2024 evaluation, Econoler reviewed the same projects to assess E1's application of the guidelines and to establish an evaluated adjustment ratio used to obtain the evaluated results.

Reply Evidence

The Savings Verification Review of Efficiency Nova Scotia Program Year 2024 Evaluation Results (the "Peach Report") authored by H. Gil Peach & Associates ("the Verifier") for the Nova Scotia Energy Board, and filed on June 5, 2025, as Exhibit E-2 in Matter M12249 EfficiencyOne 2026 DSM Extension Application, includes observations and recommendations regarding the DR Program evaluation. Econoler's reply evidence in response to the Peach Report is set out below.

1. Verifier's Recommendations

The Peach Report states the following general recommendation regarding the acceptance of 2024 evaluation results for four program components, including the DR program:²⁹

SVR24-G-1. *The Savings Verification study recommends acceptance of the 2024 evaluation estimates for energy savings and demand reduction except for four programs. These [four programs include][...] the Residential Demand Response program (no energy savings, 0.057 MW demand reduction), the BNI Demand Response program (no energy savings, 8.034 MW demand reduction) [...].*

*For [...] the two Demand Response programs, the Evaluator conducted independent evaluations and correctly followed the relevant protocols. However, for these programs the practical size of the savings and demand reduction is not large enough to be of practical value at either the household level or at the utility system level. The Evaluator correctly followed the relevant protocols, but a problem with the protocols is that they do not take into account the very large sample size problem. **For very large sample sizes statistical significance loses***

²⁹ M12249, Exhibit E-2, Peach Report, pages 16-17.

meaning and it is necessary to, instead, gauge performance using practical significance. The Evaluator correctly notes that these programs look OK from the perspective of statistical significance, however, the Evaluator should have flagged these programs for not producing practical energy savings or demand reduction.

Econoler Response:

Econoler disagrees that the 2024 evaluated available capacity for the Residential and BNI DR program components should not be accepted and should have been flagged for not producing practical demand reduction as discussed further below. Econoler does not agree that *“the practical size of the savings and demand reduction is not large enough to be of practical value at either the household level or at the utility system level”* is applicable to Residential and BNI DR. Econoler also does not agree with the statement that statistical significance as used for the evaluation is not reliable for DR programs.

Residential DR

- › **Practical value at the utility system level:** The Residential DR program component is not required to generate savings or demand reduction of practical value at the utility system level since it is still in the early stages. The objective of the program component, in addition to providing available DR capacity, is to test the potential for new technologies, new program deliveries or new markets. In addition, the program component is still ramping up, as observed through the increasing participation and additional measures for which demand reduction will be claimed in 2025.
- › **Practical value at the household level:** Econoler does not agree that due to the size of the demand reduction at the household level, a savings claim for the program component is not justified. The objective of the program component is to aggregate relatively small reductions at the household level to deliver available capacity. For a comparison, the average demand reduction established for thermostats (57.7 W) is higher than peak demand savings for several residential measures (e.g., 7 W for LED lamps through Instant Savings, 45 W for an efficient dehumidifier through Instant Savings).
- › **Large sample size:** The Verifier states that *“For very large sample sizes statistical significance loses meaning and it is necessary to, instead, gauge performance using practical significance”*. While there is no official definition for “very large” sample size in the industry, a sample below 1,000 observations is generally not considered very large. At this scale, standard errors remain relatively higher, and only moderate to large effects are likely to reach conventional levels of statistical significance. Considering the limited population of 272 projects for Residential DR in 2024 and that 199 projects were used in the analysis, the “very large sample size” statement is not applicable in the case of this program component.

BNI DR

- › **Practical value at the utility system level:** The BNI DR program is not required to generate savings or demand reduction of practical value at the utility system level at this stage in the program component’s development, since it is still in its early stages. The objectives of the program component, in addition to providing available DR capacity, are to test the potential for new technologies, new program deliveries or new markets. In 2024, BNI DR generated 8.034 MW of available DR capacity, which is larger than the peak demand savings generated by all program components except the Home Energy Assessment program component. While the two metrics differ (available capacity and peak demand savings), this comparison highlights that the generated demand reduction is large enough to be of practical value at the utility system level.
- › **Practical value at the household level:** Econoler does not agree that due to the size of the demand reduction at the household level, a savings claim for the program component is not justified. In the case of the BNI DR program component, the participants are BNI customers and not

households. However, similar to the residential DR program component, the focus of the BNI DR program component is at the system-level, as it aims to provide available capacity for NS Power to address grid constraints during peak periods.

- › **Large sample size:** The Verifier states that *“For very large sample sizes statistical significance loses meaning and it is necessary to, instead, gauge performance using practical significance”*. While there is no official definition for “very large” sample size in the industry, a sample below 1,000 observations is generally not considered very large. At this scale, standard errors remain relatively higher, and only moderate to large effects are likely to reach conventional levels of statistical significance. Considering the limited population of 93 projects for BNI DR in 2024, which were all included in the analysis, the “very large sample size” statement is not applicable in the case of this program component.

Conclusion

Econoler disagrees that the 2024 evaluated available DR capacity for Residential and BNI DR should not be accepted and disagrees with the recommendation that these program components should have been flagged for not producing practical energy savings or demand reduction. Consideration of practical effect size is not relevant in the case of DR programs and only statistical significance should be considered to demonstrate the validity of impact evaluation results. The 2024 impact evaluation was performed following industry best practices and evaluation results demonstrate statistical significance. In addition, the 2024 Residential and BNI DR evaluation results were obtained with a sample of 199 and 93 projects respectively, therefore the Verifier’s “very large sample size” statement is not applicable.

The Peach Report also states two recommendations specific to the DR program: ³⁰

SVR2024-Demand Response – 13. *In the next evaluation, include an analysis of the relative importance or relative lack of importance to the possible capacity shortfall problem to Nova Scotia Power, the roles of the load research shop at NSP (and other parts of NSP concerned with capacity) and Efficiency Nova Scotia. Identify the organization responsible for initiating events, explain the reasons for calling events, list the trigger reason for each event in the tables, detail the benefit received by participants (if any) and provide information on any cost to customers to participate in the program (if any). [...] Future evaluations should clarify the practical benefits of each program for households and the utility system, beyond being a learning experience. Specifically, detail how Residential DR and/or BNI DR responses impact utility operations for Nova Scotia Power. [...] If these programs are merely pilots without significant demand reduction goals, explain their purpose and value. The Evaluator should justify the business case (bottom-line value) for these programs in the evaluation since, unlike measure-based programs, the weak demand reduction effect does not highlight its value.*

Econoler Response:

While some of these activities could be supported by the Evaluator, Econoler notes that many of the aforementioned categories of information would most likely have to be provided by NS Power. Econoler also notes that its scope as an Evaluator does not involve assessing business cases for programs.

³⁰ Ibid., page 75.

SVR2024-Demand Response – 14. *Provide a discussion on the advantages/disadvantages and trade-offs in selecting either the whole-home approach or the device-level approach in the residential analysis.*

Econoler Response:

For the 2024 Residential DR evaluation, whole-house data were preferred to device-level data as they allow for the inclusion of interactive effects from equipment such as other heating systems not controlled by participating smart thermostats offsetting the reduced load associated with participating thermostats. This rationale for selecting a whole-home approach for the Residential DR evaluation was provided in Appendix II Detailed Metering Data Analysis of the 2024 Demand Response Evaluation.

Compressed Air

Introduction

Econoler was commissioned by EfficiencyOne (E1) to evaluate E1's 2024 DSM program portfolio, including the Custom Incentives program. The 2024 Custom Incentives program evaluation consisted of a comprehensive impact evaluation to calculate net electrical first-year energy savings.

In 2024, the Custom Incentives program was composed of two program components, Strategic Energy Management (SEM) and Custom. The Custom program component is comprised of four services, including the Custom Retrofit service, through which participants can receive incentives for compressed air leak audit and repair ("compressed air leak") projects. Participants who complete compressed air leak projects through Custom Retrofit, including those two specific facilities discussed herein, follow a three-step process which is as detailed below.

- 1) **Audit:** An audit of a facility's compressed air distribution network – a system of pipes and fittings designed to efficiently transport compressed air from an air compressor to various points of use within a facility (e.g. production lines, workshops, etc.) – is conducted to identify and repair air leaks. Identified leaks, along with various leak parameters (leak rate, location, energy losses) are listed by facility staff in an internal leak tracking platform.
- 2) **Repairs:** The identified leaks are repaired by facility staff, which reduces compressed air waste and lessens the load on air compressors, leading to electricity savings. Compressed air leaks are common and recurring issues in many industrial facilities, can typically not be completely eliminated, and would require on-going maintenance efforts to keep compressed air leakage to a minimum.
- 3) **Tracking:** Once repairs are completed, these are marked as such in the internal tracking platform. system.

Reply Evidence

The Savings Verification Review of Efficiency Nova Scotia Program Year 2024 Evaluation Results (the "Peach Report") authored by H. Gil Peach & Associates ("the Verifier") for the Nova Scotia Energy Board, and filed on June 5, 2025 as Exhibit E-2 in Matter M12249 EfficiencyOne 2026 DSM Extension Application, includes observations and recommendations regarding the evaluation of two specific compressed air leak projects completed under the Custom Retrofit service by the same participant at two different sites. Econoler's reply evidence in response to this section of the Peach Report is set out below.

1. Protocol Issue

The Peach Report states as follows in relation to the measurement & verification (M&V) protocol for compressed air leak projects:³¹

[...] The Uniform Methods Protocol, provided by the U.S. Department of Energy is the current standard for implementation and evaluation of compressed air leak detection and management activities for Demand Side Management evaluations. As shown in Figure [19], while ultrasonic leak detectors are recommended to detect leaks, for the separate task of determining the size of leakage rates they are "inherently inaccurate". [...] According to the Universal Methods

³¹ M12249, Exhibit E-2, Peach Report, pages 62-63.

Project (UMP) protocol, they function based on correlation with the sound produced by a leak rather than by direct measurement.

Ultrasonic leak detectors are an effective tool for identifying and locating leaks in a compressed air system but should not be relied upon for quantifying the rate of leakage. The accuracy of these devices is dependent on operator experience and proximity to source; **they are inherently inaccurate as leakage rates are not directly measured and instead are correlated based on the amount of sound produced by a given leak in decibels. The best practice for quantifying rate of leakage is to conduct leak-down tests prior to and immediately following leak repairs to determine the actual system impact.** [Emphasis added]

Figure 19: Ultrasonic Leak Detectors (emphasis added)

Instead, the protocol recommends direct measurement pre-repair, repair, then direct measurement post repair. [...]

- (1) A standardized leak-down test, pre-measurement.
- (2) Repair
- (3) A standardized leak down test, post-measurement.

Figure 20: What Should Have been Done.

Econoler Response:

Econoler recognizes that the Uniform Methods Protocol (UMP) recommends ultrasonic leak detectors for leak detection and leak-down tests for leak rate quantification. However, while ultrasonic detectors are not as accurate as leak-down tests for quantifying leaks, Econoler considers them to be sufficiently accurate for the purposes of estimating energy savings for compressed air leak projects, provided they are used by trained technicians to ensure measured leak rates are reliable. As noted below this view is widely accepted in other jurisdictions as well.

Econoler notes that E1 provided such training at both sites identified by the Verifier. Ultrasonic detectors also represent an appropriate balance between accuracy, reasonableness and cost, given that leak-down tests require interruptions to production lines, which can be highly impractical and very costly, especially for large industrial sites like the ones highlighted by the Verifier. Requiring leak-down tests for Custom Retrofit compressed air leak projects could reasonably be expected to deter industrial facilities relying on program support from completing such projects. Furthermore, use of ultrasonic devices has been accepted practice for participants completing compressed air leak projects under Custom Retrofit service for the past several years. Projects relying on this method have been reviewed by both Econoler and the Verifier as part of several impact evaluations and savings verifications of the Custom Retrofit service over those years.

Econoler examined the M&V requirements in seven jurisdictions where incentives are available for compressed air leak projects and for which M&V requirements are publicly available. Of those jurisdictions, none require that leak-down tests be performed by participants to support savings. A more detailed breakdown of M&V requirements for these jurisdictions is presented below.

- › Three jurisdictions³² accept savings estimated using ultrasonic devices.
- › Three jurisdictions³³ accept savings estimated using a table that relates approximate leak orifice diameter (e.g. 1/64 inches, 1/32 inches, 1/16 inches, etc.) to leak rate (in cubic feet per minute, or CFM) for various system pressures (in pounds per square inch gauge, or PSIG), which is considered a less stringent M&V approach than that relying on ultrasonic detectors.
- › One jurisdiction³⁴ only accepts compressed air leak projects through their Strategic Energy Management (SEM) program and requires full-facility consumption data pre- and post-retrofit (International Performance Measurement and Verification Protocol (IPMVP) Option C) for all measures implemented by each participant.

Based on Econoler's industrial field expertise, relying on ultrasonic detectors to detect compressed air leaks and estimate associated leak rates (CFM) and energy losses (kWh) is widely used as an acceptable method in industry, including for incentive program participation. Based on Econoler's industrial field experience, leak-down tests would be highly impractical and very costly for many industrial facilities, especially for large facilities like the two sites highlighted by the Verifier. Leak-down tests typically require shutting down at least portions of the facilities' production activities, which would generate considerable revenue losses. The two sites with the projects identified by the Verifier typically operate 24h/day and year-round, with production only shutting down on statutory holidays. Therefore, leak-down tests would not be feasible or aligned with the IPMVP Core Concepts (2022), which state that "the cost of the M&V effort must be aligned with the value of the project [...]"³⁵

The Verifier also notes:³⁶

Since the Evaluator did not conduct an independent evaluation of these sites using these methods and is inherently relying on inaccurate measurement, we recommend that savings from these sites not be accepted.

[...]

The evaluator needs to conduct an independent operationally definable process of measurement, which reproduces claimed savings reported by the program and is valid in the sense of producing true measurements. This is the true-up that evaluation is meant to perform, and without it there is no independent evaluation and there also can be no verification of evaluated energy savings.

Econoler disagrees that an independent evaluation of these projects was not conducted. As the Independent Evaluator, Econoler's scope of work for the evaluation of the Custom Retrofit service aims at validating whether the M&V approach, key parameters and assumptions, and energy savings claim submitted by the participant to E1 are realistic and reasonably accurate. To meet the scope of work objectives, Econoler developed an evaluation approach based on reference manuals or documents describing best practices, industry standards, as well as Econoler's professional experience and judgement. A key principle applied by Econoler in determining the evaluation approach is to apply the appropriate level of rigour; Econoler recognizes that the UMP is an excellent reference document, but notes that in the case of the recommendation for leak-down tests it is not aligned with in-field constraints and does not align with accepted industry standards. The main evaluation activities to confirm the validity of the claimed energy savings for Custom Retrofit projects include a review of project documentation (program participation agreements, M&V plan and results, calculation sheets, etc.), followed by either a site visit or a phone interview with the

³² Wisconsin, Oregon and British-Columbia (BC Hydro).

³³ Minnesota, Illinois and Connecticut.

³⁴ Ontario (IESO).

³⁵ Efficiency Valuation Organization, International Performance Measurement and Verification Protocol Core Concepts, 2022.

³⁶ M12249, Exhibit E-2, Peach Report, pages 63-64.

participant. The site visits or phone interviews serve to validate key project characteristics, including but not limited to facility operating conditions, the M&V approach, the implementation timeline, baseline assumptions, and applicability of M&V results, as well as the internal decision-making process that led to the project.

The evaluation approach used for Custom Retrofit service follows the industry standard for similar programs. In custom programs, participants are typically required to conduct M&V during the project implementation phase. As a result, the evaluation of these programs usually relies on the verification the M&V plan and results.

2. Chain of Events

The Peach Report states as follows in relation to the chain of events surrounding the two compressed air leak projects being discussed:³⁷

The result of this methodology produces estimates that are unverifiable in any way. One device is used to locate each leak, assess its size by a method not permitted by the UMP protocol, and once repaired, the leak disappears so there are no records of the leaks having existed, and no way to check how much they were leaking [...].

Econoler Response:

Econoler disagrees with this assertion, and specifically disagrees with the statement, that there are no records of the leaks having existed or no way to check how much they were leaking. The participant submitted detailed files which indicated leak locations and leak rate (CFM). The customer who completed the compressed air leak projects at the two sites in question, was supported by E1 throughout the process. An E1 on-site energy manager (OEM) provided training for the participant staff on the specific ultrasonic devices used. These staff then carry out the compressed air audit. The devices used are part of a comprehensive leak management platform which allows for detailed tracking of leak sizes and locations, of the work orders created internally for repairs to be completed by participant staff, and of repair completion.

As part of the evaluation process, Econoler reviews the documents containing details on the identified leaks such as leak location (with photo), associated machine and production unit, staff members who identified and repaired the leak, date and time of repair, as well as associated leak rates (CFM) and energy losses (kWh). This process is typical for desk reviews conducted as part of impact evaluations of compressed air leak projects.

3. Pattern of Reported Savings

The Peach Report states as follows in relation to leakage rates for the two facilities under consideration:³⁸

Observations of total claimed savings for the two locations showed that the cumulative annual claimed savings over the previous four years were a substantial portion of total energy demand for compressed air at the facility. This is contrary to observations and evaluations of other sites that often have no or little leak detection activity after many years of operation. The leakage rate appears far too high. We expect the leakage rate to decrease, and here it does not. This may be a function of special conditions at the site, since this does not occur at other sites, but it is something the Evaluator should examine and explain.

³⁷ Ibid., page 64.

³⁸ Ibid., pages 64-65.

Econoler Response:

Econoler disagrees with the statement that leakage rates appear far too high. Based on the Econoler team's in-field experience, leakage rates for compressed air systems in large industrial facilities can frequently exceed 30%, and in some cases reach 50% or higher. Since the submission of the Savings Verification Report, the Verifier has retracted their statement on leakage rates. When asked about their claim that leakage rate was too high, in E1 IR-12-c³⁹, the Verifier responded: ***"Further inspection of tracking sheet calculations for similar site operations shows that these claimed savings values fall within this boundary and so the leak rates claimed are not excessive for these sites."*** [emphasis added]

The Peach Report states as follows in relation to the pattern of savings claimed for compressed air leak projects by the two facilities:⁴⁰

Leakage rate has increased. There has been an unexplained recent surge in claimed savings at these two locations, as compared to prior years. This surge should be examined by the Evaluator and explained. Our expectation is that, over time, these site-wide observed savings should decline, precipitously, over the course of a multi-year implementation, not increase suddenly.

Econoler Response:

Econoler's review of historical savings for this participant indicates that both sites started implementing compressed air leak audit and repair efforts starting in 2022, and savings have been claimed since then. These efforts were the result of discussions between the customer and E1 in 2021. Prior to 2022, this customer had not undertaken dedicated compressed air leak audit and repair efforts at these two facilities for several years.

Each of these facilities, which are complex industrial plants, consists of several production lines and departments, of which many have their own dedicated compressed air distribution network. Given that some departments have higher leakage rates than others (well beyond 30% in some cases), and that compressed air leak audits and repairs are performed for each department or production line separately, it is not unexpected that each facility would submit several savings claims over time and that these would vary in size.

4. Maintenance Issue

The Peach Report states as follows in relation to the customer's lack of ongoing maintenance of compressed air leaks:⁴¹

It is not clear why an organization with multiple similar sites located worldwide would not have already incorporated leak detection and repair into its facility in a way that meets current standards. This is a kind of problem that occurs in other DSM programs, where utilities provide DSM funding, but individual facilities are required by their corporate management to follow intelligent corporate maintenance and replacement standards, which often incorporate energy efficiency, so that after a start, it is not necessary to continue DSM funding. In our experience in Detroit with Detroit Edison engineers in a joint compressed air project at Ford, GM, and Chrysler, everything that worked in the project was fairly quickly incorporated by client energy engineers into worldwide practice, so that continued utility funding was not required. We note similar experience in other areas with large hotel chains, and with an international religious

³⁹ M12249, E-14, Peach (E1) Responses to E1 Information Requests, July 3, 2025, Peach (E1) RIR 1 to 14, Redacted, RIR 12-c, page 24, lines 10-12.

⁴⁰ M12249, Exhibit E-2, Peach Report, page 65.

⁴¹ Ibid., page 65.

organization – corporate is quick to incorporate things that work and modify standards., so that after a start the utility can withdraw. The Evaluator should review the client's policies and manuals to see if the activities would or would not have been done in the absence of the program.

Econoler Response:

Based on Econoler's experience, in large industrial facilities similar to both sites under consideration, electricity savings generated by compressed air leak repairs may represent only a small share of facility-wide annual electricity consumption (e.g. 3-4% or less). Consequently, in such cases, assigning dedicated resources to compressed air leak management is generally not a top corporate priority without the support of a DSM program.

Additionally, as part of the impact evaluation, Econoler measures free-ridership, which estimates the probability that participants would have implemented their energy efficiency project in the absence of the program. Free-ridership is assessed using a self-report approach that involves asking participants a set of questions during phone or in-person interviews. The self-report approach is a standard practice used in many jurisdictions to measure free-ridership. Free-ridership results component are applied to gross savings to determine net savings. Therefore, only savings attributable to the program influence are claimed as net savings.

As part of the 2024 evaluation, a free-ridership interview was completed by phone for one of the two sites being discussed. Although individual free-ridership results cannot be disclosed since the Evaluator guarantees the confidentiality of participants' responses, Econoler can confirm that these two compressed air leak projects would most likely not have been carried out without the program.

5. Proprietary data issue

The Peach Report states as follows in relation to the site access and documentation provided by the customer for project reviews:⁴²

It is not unusual for some organizations to try to keep operational data proprietary and confidential, as a strategic policy. This is customary for some organizations. However, in contrast, evaluation requires both site access for direct measurement and access to usage data, and records of interventions to improve energy efficiency. If an organization will not permit the Evaluator to conduct an independent evaluation by restricting access to the site or by withholding necessary data, or by providing data but not permitting its use in public reports, the Evaluator should report this in its evaluation.

Econoler Response:

Econoler conducted a site visit for one of the two sites under consideration. These site visits are planned in collaboration with E1 and the participant with the objective of balancing the evaluation requirements and their impacts on the participant's operations. Given the strong similarities between the compressed air leak projects completed at these two sites, in terms of scope, leak audit method, leak tracking platform and repair process, Econoler only planned to visit one of the two sites and apply any findings to the second site, for which a desk review was conducted. Additionally, the participant provided the documentation required (for both sites) for the purposes of the project reviews included in the 2024 impact evaluation. The documents provided by the participant allowed Econoler to validate the savings estimation methodology (parameters,

⁴² Ibid., page 65-66.

calculations, list of repaired leaks, etc.). Econoler considers that there was no restriction or limitation on the scope of the project reviews required for impact evaluation.

It is Econoler's recommendation that E1 continue their efforts to ensure that participants are aware of evaluation requirements from the start of the participation process, and that they remain collaborative in that regard.

6. Verifier's Recommendations

The Peach Report states the following general recommendation regarding the acceptance of 2024 evaluation results for four program components, including compressed air leak projects completed at two sites:⁴³

SVR24-G-1. *The Savings Verification study recommends acceptance of the 2024 evaluation estimates for energy savings and demand reduction except for four programs. These are [...] the compressed air part of the BNI Custom Incentive Program (Custom). For the BNI Custom Incentive Program (Custom), the portion of energy savings and demand reduction attributed to the compressed air leak audit projects we recommend not accepting the value reported by the Evaluator, since there was no independent evaluation following the Universal Methods Protocol. The Evaluator made an adjustment to an older value, and reported it for 2024, but the protocol for independent assessment of compressed air was not followed.*

Econoler Response to SVR24-G-1:

Econoler disagrees that the 2024 evaluated energy savings for compressed air leak projects completed under the Custom Incentives Program (Custom) should not be accepted. Econoler considers them to have been conducted in compliance with industry norms and to be sufficiently accurate for the purposes of estimating energy savings for compressed air leak projects, provided the ultrasonic devices are used by trained technicians to ensure measured leak rates are reliable which was the case for the projects identified by the Verifier. As explained above, the use of ultrasonic leak detectors for quantifying compressed air leak rates is recognized by other leading jurisdictions and is considered a standard practice in industry.

Econoler further disagrees that the evaluation of these projects consisted of an adjustment that was made to an older value and reported for 2024. For each project, a portion of overall savings was claimed in 2022 and the remaining portion in 2023 (these are termed *partial claims*), but the participation process was not completed until early 2024. Consequently, these projects were reviewed as part of the 2024 evaluation, but no additional project savings were claimed in 2024, with the exception of true-up adjustments based on project review findings for these projects. Econoler followed the reporting approach that has been in place for several years for Custom Retrofit projects, which includes partial claims for on-going multi-year projects and true-up adjustments applied as needed when these projects complete.

The Peach Report also states three recommendations specific to compressed air leak projects:⁴⁴

SVR2024-Compressed Air – 10. *We strongly recommend that the compressed air program be redesigned to follow UMP protocol requirements.*

⁴³ Ibid., pages 16-17.

⁴⁴ Ibid., page 74-75.

**Econoler Response**

Econoler disagrees that the M&V requirements for compressed air leak projects submitted through the Custom Retrofit service be adjusted to strictly follow the leak-down method put forth by the UMP, as this method could prove prohibitively costly and not feasible for participants, thus potentially limiting those customers who may want to pursue such projects and negatively impacting participation in the Custom Retrofit service. The current M&V requirements of the Custom Retrofit service for compressed air leak projects and the evaluation approach used to review these projects align with standard industry practice.

SVR2024-Compressed Air – 11. *The Evaluator should examine and explain the unusual patterns in reported savings.*

Econoler Response:

Econoler investigated the pattern of reported savings for the two sites highlighted by the Verifier in the Savings Verification Report. As explained in detail in Item 3. above, Econoler concludes that the pattern of reported savings is logical and coherent with expected leak rates, internal leak management efforts and participation history.

SVR2024-Compressed Air-12. *Prospective clients for this program that do not permit site access to the independent Evaluator for direct on-site measurement and/or do not permit access to necessary energy usage data or the use of that data in public reports should be dropped from the program.*

Econoler Response:

As detailed in Item 5 above, Econoler considers that there was no restriction or limitation on the scope of the project reviews required for the impact evaluation of the two projects being discussed herein.