NOVA SCOTIA UTILITY AND REVIEW BOARD

IN THE MATTER OF THE PUBLIC UTILITIES ACT

- and -

IN THE MATTER OF an Application by EfficiencyOne (E1) for Approval of Supply Agreement for Electric Efficiency and Conservation Activities between E1 and Nova Scotia Power Inc. (NS Power), the establishment of a final agreement between the parties, and approval of a 2020-2022 Demand Side Management Resource Plan

M09096

Direct Testimony of

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On Behalf of

Ecology Action Centre

May 28, 2019

(I.) Introduction

Q. Please state your name and business address.

A. Philip H. Mosenthal, Optimal Energy, Inc., 10600 Route 116, Hinesburg, VT 05461.

Q. On whose behalf are you testifying?

A. I am testifying on behalf of the Ecology Action Centre (EAC). All work developing my testimony has been completed by me or under my direction.

Q. How are you employed?

A. I am the founding partner in Optimal Energy, Inc., ("Optimal Energy") a consultancy specializing in energy efficiency and utility planning. Optimal Energy advises numerous parties including utilities, non-utility program administrators, government, and environmental and other non-governmental groups.

Q. Tell me about your qualifications and experience?

A. I have 35 years of experience in all aspects of energy efficiency, including facility energy management, policy development and research, integrated resource planning, cost-benefit analysis, and efficiency and renewable program design, implementation and evaluation. I have developed numerous utility efficiency plans, and designed and evaluated utility and non-utility residential, commercial and industrial energy efficiency programs throughout North America, and in Europe and China.

I have also completed or directed numerous studies of efficiency potential and economics in many locations, including China, Kansas, Maine, Massachusetts, Michigan, Minnesota, New England, New Jersey, New York, Pennsylvania, Quebec, Texas, and Vermont. These studies ranged from high level assessments to extremely detailed, bottom-up assessments evaluating thousands of measures among numerous market segments. Recent examples of the latter are analyses of electric and natural gas efficiency and renewable potential along with the development of suggested programs for New York State, on behalf of the New York State Energy Research

and Development Authority (NYSERDA), for Minnesota on behalf of the Commerce Department, and for New Jersey on behalf of the Board of Public Utilities.

I have served as a lead advisor for business energy services in Connecticut, Massachusetts and Rhode Island on behalf of the the Energy Efficiency Advisory Council, Energy Efficiency Board, and Energy Efficiency Resource Management Council, respectively, overseeing and advising on their nation-leading utility program administrators' plans, program designs, implementation and performance. I also was the lead developer of Vermont's "efficiency utility" (Efficiency Vermont) which is the nation's first and only regulated utility dedicated solely to capturing efficiency resources, and which Efficiency One was partly modeled on.

I have been actively engaged in the Illinois Stakeholder Advisory Group (SAG) since its inception, representing the People of Illinois on behalf of the Illinois Office of the Attorney General. I have also been involved in the past few years on issues in Missouri related to KCP&L's and Ameren's IRP and MEEIA filings, as well as a witness on behalf of NRDC, the Sierra Club and Renew Missouri in various Ameren and KCPL&L dockets.

Prior to co-founding Optimal Energy in 1996, I was the Chief Consultant for the Mid-Atlantic Region for XENERGY, INC. (now DNV-GL). I have a B.A. in Architecture and an M.S. in Energy Management and Policy, both from the University of Pennsylvania.

I am including my full resume as included as Attachment -1.

Q. Have you previously testified before this Commission?

A. No, I have not.

Q. Please summarize your testimony

A. My testimony addresses Efficiency One's (E1's) 2020-2022 DSM Resource Plan Application. First I will give brief descriptions of E1's preferred plan and alternate plan. Second, I argue that the preferred plan leaves significant cost-effective energy efficiency on the table. Third, I show that a more aggressive plan

would result in higher accessibility, lower electric bills in the short term and lower bills and rates in the long term. Fourth, I show that lowering the budget from the preferred plan will result in reduced access to the benefits of efficiency – especially for low-income customers, and will risk predominantly capturing free-riders. Next, I argue that energy efficiency achieves significant benefits, even in the absence of capacity constraints, including significant economic benefits that are not quantified in IRPs or typical cost effectiveness tests. Finally, I argue that using long-term energy savings as a performance target is appropriate and beneficial.

(II.) Increasing program savings would result in increased short-term access and affordability

Q. Briefly describe E1's preferred plan.

A. Efficiency One's preferred plan calls for savings of about 141 GWh per year for three years, for an annual cost of about $43 million. This represents about 1.3% of electric load, for a cost of $0.30 per first year kWh, or $0.022 per lifetime kWh. The plan has a total Resource Cost Effectiveness Ratio (TRC) of 2.0, meaning that it will yield $2 of benefits for every $1 of costs to the Nova Scotia economy and ratepayers. The Program Administrator Cost Test (PAC) has a benefit-cost ratio of 4.8, meaning that NSP's energy related costs will be reduced by almost $5 for every $1 spent, which will ultimately flow to ratepayers as well. The application shows that these benefits are achieved at minimal rate impact – between 0.8% and 1.7%, depending on rate class.

Q. How do the efficiency levels in E1's preferred plan compare to the levels identified in the 2014 IRP?

A. They are lower. The Integrated Resource Plan examined 15 long-term resource planning scenarios in order to determine how NSP could meet its long-term resource needs in the lowest cost manner. It was identified that a "mid-level" DSM scenario would result in the lowest net present value revenue requirement for NSP and therefore the lowest electric bills for Nova Scotia ratepayers. This scenario from the IRP showed

savings of 170 GWh per year (1.5% of electric load), about 20% higher than what E1 has put forward in its preferred 2020-2022 plan. Further, E1 shows in its 2020-2022 Application (page 13), that it would have to achieve 181 GWh per year (1.6% of electric load) in order to compensate for lower levels of DSM in 2016-2018 and catch up to the levels shown to be optimal in the 2014 IRP.

Q. Describe the 2018 Generation, Utilization and Optimization Report by Synapse.

A: Similar to an IRP, the Generation, Utilization, and Optimization (GUO) Report looks at the net present value revenue requirement for various long-term resource scenarios. This report was focused on examining the possibilities of early retirement of coal plants to be replaced with a combination of energy efficiency, additional wind capacity, and new transmission lines, and whether these scenarios could result in a lower revenue requirement than a reference scenario where the coal plants are kept online through at least 2030. It finds that much more aggressive levels of DSM will result in the least cost (lowest revenue requirements), even if the cost of saved energy is twice what is currently being achieved.

Q. How does the preferred plan compare to the level of efficiency found to be optimal in the GUO?

A. It is lower. The GUO concludes that:

> "The net present value of wholesale system revenue requirements (NPVRR, 2018-2042 period) across the modeled scenarios is clearly seen to be lowest for scenarios incorporating moderate ("medium") levels of demand-side management (DSM), reflecting an increase to existing efforts up to a level eventually (within 4 years, as modeled) reaching incremental annual energy efficiency achievements equal to 2 percent of NSPI's retail sales[1]."

The GUO further concludes that this level will also forestall the need to build a new gas-fired plant, and potentially allow an early-retirement of a second coal plant. The two percent DSM level identified in the GUO report represents an approximate doubling in

[1] Synapse Energy Economics Inc. Nova Scotia Power Inc. Thermal Generation Utilization and Optimization: Economic Analysis of Retention of Fossil-Fueled Thermal Fleet to and Beyond 2030. May 1, 2018. Page 2.

efficiency savings compared to levels achieved in the 2016-2018 plan, and is still about 85% higher than the saving levels in E1's preferred plan.

Q. Are the higher savings levels identified in the Synapse GUO achievable?

A: Yes they are. Many high performing US utilities are achieving savings of at or above 2% per year, and this savings level aligns with the high savings scenario examined in the high-DSM scenario of the Navigant Potential Study done for the 2014 IRP. Further, as shown in Figure one in Glenn Reed's testimony for E1, multiple US utilities plan to achieve around 2% per year or more in the 2020-2022 time frame, including Public Service of Colorado (PSCo), Commonwealth Edison (Com Ed), Baltimore Gas and Electric (BGE), Eversource, and National Grid in both Massachusetts and Rhode Island. Further, New Jersey has signed legislation requiring that each utility achieve a minimum of 2% savings per year[2], and New York has adopted a goal of achieving 3% annual efficiency savings in the state[3]. In Canada, the Efficiency Manitoba Act calls for net efficiency savings to reach a level of at least 1.5% per year[4], and Prince Edward Island's 2016/2017 energy strategy calls for ramping up to annual electricity savings of 2% per year[5].

Q. Why does NSP take issue with E1's benchmarking analysis?

A. NSP objects that Glenn Reed's benchmarking analysis only looks at the leading US program administrators, and therefore "omits program administrators that spend lower amounts on DSM[6]." However, the purpose of the benchmarking exercise was to ensure that the high level of DSM independently identified to be cost-effective in Nova Scotia through the 2014 IRP and the more recent GUO is indeed achievable and being achieved elsewhere. The results of Mr. Reed's benchmarking analysis show that other jurisdictions are indeed achieving the level of DSM identified to be cost-effective in Nova Scotia or more – the fact that there exist other states that don't spend or save as

[2] https://www.njspotlight.com/stories/19/04/22/new-jersey-energy-efficiency-progress-and-opportunity/
[3] https://www.nyserda.ny.gov/About/Newsroom/2018-Announcements/2018-04-20-Governor-Cuomo-Announces-New-Energy-Efficiency-Target-to-Cut-Greenhouse-Gas-Emmisons
[4] https://web2.gov.mb.ca/bills/41-2/b019e.php,
[5] PEI Provincial Energy Strategy 2016/17 p. 15
[6] Evidence of Richard L. Leviathan. Page 25.

much as the leading North American jurisdictions is irrelevant to the fact that Nova Scotia could ramp up spending and savings to these levels. I am not aware of any state that has reduced its spending and savings goals because of evidence that greater levels of investment are not cost-effective and achievable. Further, NSP has provided no evidence to indicate that the percentage of achievable potential in Nova Scotia is lower than in U.S. states, nor that Navigant's potential study is flawed. In fact, I am not aware of any evidence that overall achievable potential as a percentage of load tends to be correlated with geography, or that somehow Canadian provinces are fundamentally different than U.S. States. On the contrary, ACEEE examined 55 potential studies across North America and found no correlation between the percent of electric load that is achievable and geographic location.[7]

The next section of testimony will show that increasing the spending and savings of Nova Scotia's efficiency portfolio will actually make short term electricity more affordable for Nova Scotia ratepayers.

(III.) Increasing the size of E1's efficiency programs will ensure all Nova Scotian's have access to programs, and will decrease electric bills in both the short and long term.

Q. How does NSP view E1's proposed 2020-2022 plan?

A. NSP argues that the proposed plan "does not meet the requirements of affordability and that it is possible to adopt a more affordable DSM plan than what E1 proposes in its application[8]."

Q. How does NSP define affordability in the context of energy efficiency?

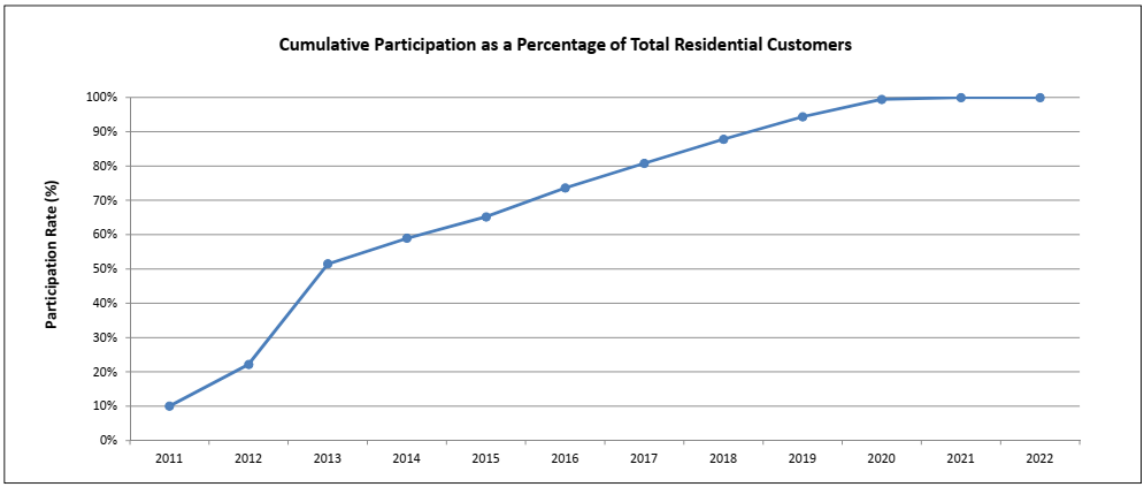
A. NSP seems to be focused on short-term rate impacts as the only or most important measure of affordability. For example, it's main argument in Section 2, "Affordability" is that a 20% increase in program budget would cause an unacceptable increase in short-term rates. NSP does not mention the corresponding decrease in energy use (and thus total bills). NSP does not mention that this 20% increase in budget only

[7] Neubauer, Max. Cracking the TEAPOT: Technical, Economic, and Achievable Potential Studies. August 14, 2014.
[8] NS Power Evidence. Page 7.

causes a rate increase of 0.8% and 1.7%, depending on the rate class, as shown in the E1 application.

Q. How would increasing the efficiency programs increase short-term electric affordability?

A. As mentioned above, E1's 2020-2022 Application shows that the preferred plan will cause NSP rates to increase between 0.8% and 1.7%, depending on the rate class. However, the programs also reduce customer's total bills, which is what customers care most about, and is also the objective of the IRP and overall electric service. The same E1 analysis shows that the preferred plan will result in a residential bill reduction of over 10% for program participants, and an average residential bill reduction of 2% for all ratepayers collectively. Further, the graph below, from E1's Application Appendix B, shows the past and projected residential sector participation in Nova Scotia Energy Efficiency programs. As seen, in 2020, participation of some form is already expected to reach 100%. This means that nearly all ratepayers are participating in the program, and thus lowering total bills, despite slightly higher rates.



Q. How might Nova Scotia Power reduce rates for its customers?

A. An effective way for Nova Scotia Power to reduce short-term rates would be to encourage its customers to waste electricity. This would allow NSP to spread its fixed costs over greater sales, thus reducing the price per kWh of electricity. This is clearly contrary to Provincial and UARB policy, and would hurt, not help affordability, but it is

the same logic that leads to the argument that increasing efficiency hurts affordability due to short-term rate impacts.

Q. Do any jurisdictions use rate impacts as a primary determinant of whether or not to plan for and implement energy efficiency?

A. No states in the U.S. do that I am aware of.

Q. How may some of the rate impacts for non-participants be mitigated?

A. The best way to reduce the impacts of efficiency for non-participants is simply to ensure that the program offerings are broad enough that everyone can easily participate. In short, the more aggressive the efficiency portfolio, the lower number of non-participants, and thus the vast majority of customers will see direct bill savings. Through things like an upstream products program, the vast majority of NSP customers will participate in some way and typically not even be aware they are participating, even if just to buy a few discounted lightbulbs, which by itself will likely offset their rate impacts and still provide them with a lower overall bill. To be specific, the E1 rate impact shows a residential rate increase of 0.8%[9]. This equates to under 70 kWh in a typical Canadian household using 700 kWh per month. A standard LED bulb saves about 35 kWh[10], meaning that the entire bill impact is offset by two LEDs. Alternatively, E1 could reinstate a Home Energy Report program, which have advanced significantly since E1 last tried them, and use custom calculations based on, at the least, home size, home type (single family, multi-family, condo, etc), and heat source (electric vs. non-electric). These programs mail out reports to residential customers comparing their electric usage with that of their neighbors, and giving tips on how to reduce consumption. These reports are widely used in the US, and are shown to save almost 2% of household energy use[11]. This alone would double the bill impact caused by E1's preferred plan, and can fairly easily be scaled to include nearly all of NSP's residential customers.

[9] E1 2020-2022 DSM Resource Acquisition Plan. Appendix B, page 26.
[10] MA TRM. Page 144.
[11] https://aceee.org/files/proceedings/2016/data/papers/2_765.pdf

Q. How might decreasing the energy efficiency programs impact electric affordability?

A. Decreasing energy efficiency programs will, by definition, decrease program activity, and thus participation rates and total savings in the programs. As the budget gets smaller, more and more Nova Scotia ratepayers will not be likely to participate, despite seeing rate impacts from the programs that other people are participating in. Decreased budgets will, in particular, hurt low-income residents, as savings in this sector tend to be the most expensive to achieve, and lower incentive amounts will have a much greater impact on low-income ratepayers than non-low-income ratepayers. In particular, the table below shows E1's estimates of the spending reduction by sector of the alternate scenario, with lower efficiency levels, and the preferred plan. As seen, low income ratepayers will see a much greater reduction in budget than standard residential and C&I ratepayers[12].

Sector	Alternate scenario budget vs. Preferred Plan
Residential	84%
Business, Non-Profit, and Industrial	88%
Low Income	73%

As NSP notes, Nova Scotia has the highest market-based poverty rate in the country, and we appreciate NSP's commitment to "assist under-served communities in Nova Scotia such as low-income and First Nations customers." However, it is clear that the more effective way to do this is to increase efficiency budgets for the sector, instead of disproportionately cutting them.

Q. What other risks are there in cutting the budget from the levels in E1's preferred plan?

A. Lowering the budget further from the levels in E1's preferred plan runs the risk of increasing the portion of savings coming from naturally occurring efficiency, or freeriders. As NSP correctly notes, there is some naturally occurring efficiency that happens regardless of whether or not energy efficiency programs exist in the jurisdictions. When programs exist, these ratepayers will typically participate and get utility incentives for the activity they were going to do anyway. For this reason, they are

[12] E1 IR-02 to EAC

often known as "freeriders." Freeriders are well-known and well-studied in the energy efficiency context, and program savings are usually adjusted downward for their presence by applying a program specific net-to-gross ratio determined by an evaluation team to estimate the true program net impacts. Depending on the type of programs, which measures are promoted, and the amount of the incentive, net-to-gross ratios often range from 0.6 – 0.9. This means that between 10% and 40% of gross savings from efficiency programs would have occurred without the program.

By reducing the efficiency budget, E1 will be forced to: 1) focus on promoting lower cost measures, and/or, 2) lower some incentive amounts as a portion of the measure incremental cost. Both of these actions will tend to increase the percentage of program budget and "savings" going towards freeriders.[13] To illustrate this, we can look at an extreme case where incentives only cover a tiny portion of the measure case. In this case, the program budget is likely going almost entirely to freeriders, as the amount of incentive is not enough to induce much, if any, additional participation. However, freeriders are still likely to participate because even a low incentive is better than none if they are already making the efficiency investment. As the incentive amount increases, the amount of freeriders will likely remain fixed, but more and more other people are induced to participate in the program. Thus, the more aggressive the program, the smaller the portion of "savings" and budget will typically go towards efficiency that would have occurred anyway. This of course results in greater net savings and higher cost-effectiveness.

Q. Why else does NSP argue that E1's preferred plan is not affordable?

A. NSP argues that the costs of energy, and especially renewable energy, have fallen enough since 2014, that efficiency levels of the preferred plan or higher are inappropriate and no longer cost effective[14].

Q. Do you agree with this assessment.

[13] Note that actual program savings will be tracked by E1 initially, but will not reflect true savings as compared to what would have happened without the programs.
[14] NS Power Evidence. Page 6.

A. No, for three reasons. First, the programs were found to be cost-effective using avoided costs that NSP confirmed to be accurate on October 16, 2018[15]. This, by definition, shows that the preferred plan is cost-effective and produces net benefits given the most recent avoided costs. Second, this is confirmed by the 2018 Synapse GUO, which finds scenarios with a ramp up to 2% annual incremental DSM savings to result in a significantly lower net present value of revenue requirement than the baseline scenarios. Finally, NSP references a cost of efficiency of $64/MWh. It is unclear exactly where this comes from, but it seems to be simply looking at the cost increment of the 2020-2022 preferred plan over the 2016-2018 programs, and dividing by the savings increment. This is inappropriate because, as explained by E1, there were many low cost lighting measures promoted in the 2016-2018 timeframe that are becoming common practice and will therefore no longer be promoted in the 2020-2022 timeframe. To make up for this, E1 will shift toward more expensive but longer-lived measures. Without a full analysis, therefore, it is inappropriate to assume that lowering the budget from the preferred plan will also lower the unit cost back to 2016-2018 measures – E1 will still be unable capture the inexpensive measure savings achieved during that time frame, and will still likely have to increase the cost of saved energy. Further, as E1 shows in its application, lifetime savings of efficiency will still only cost $0.022 per kWh, a number that compares very favorably to the $0.05 per kWh quoted by NSP as an example of how far supply-side prices have fallen.[16] Finally, NSP focuses on the cost per first year kWh savings and not lifetime, which tends to look especially high as programs become more comprehensive and promote longer-lived measures. This is a key reason whey pursuing lifetime savings targets as E1 has proposed makes good policy sense, as further discussed below. Quite simply, the 2014 IRP may be somewhat out of date as NSP asserts, but is not the real driver that should be relied on for current planning given that there are more recent and accurate analyses that fully support E1's preferred plan as a *minimum*, and suggest increasing it substantially.

[15] E1 RIR to SBA, IR-13.
[16] NS Power Evidence. Page 6 of 37

Q. Are there ways that NSP and UARB may mitigate the short-term rate impact of energy efficiency?

A. Energy efficiency can often seem expensive compared to supply side resources because its costs are all incurred in year one, while the benefits accumulate over many years. With supply side resources, by contrast, costs are typically amortized over the life of the power plant, and thus spread out over the years that the benefits are produced. Extreme rate impacts would certainly result if power plants were fully expensed in a single year. Because efficiency is typically fully funded each year, it tends to have positive short-term rate impacts, but medium and long-term impacts are much lower. In fact, as E1 shows in Appendix B, its proposed programs will indeed switch to negative rate impacts by the end of the analysis period. To combat this front loading of costs, and to ensure that demand-side resources are treated on an equal footing with supply-side resources, some jurisdictions have begun amortizing the costs of efficiency programs over the average measure life of the program. This helps better align costs and benefits, and minimizes short term rate increases from efficiency, and puts demand-side resources on the same financial footing as supply side resources. Done correctly, amortizing efficiency costs may eliminate the trade-off between short-term rate increases and long-term decreases that happens when the full program cost is recovered in year one. In fact, a move to amortization now would actual result in an initial *rate decrease* because current rates include the current levels of full funding.

The other primary driver of positive rate impacts from efficiency is that they reduce energy consumption, and therefore create some "lost revenue," which requires a redistribution of some costs. Obviously, reducing customers' bills, and by definition lowering revenue, is consistent with good practice and important Nova Scotia policy objectives, as discussed above. It is also important to note that this "lost revenue" is not a true cost of efficiency programs. It is simply a slight redistribution of a portion of NSP's fixed costs that have already been spent, and must be recovered regardless of efficiency.

(IV.) Increasing EE savings will improve long-term affordability and lower long-term rates, as well as yield significant additional economic and environmental benefits for Nova Scotia.

Q. How does cost-effective energy efficiency impact long-term electric rates?

A. Long-term rates are determined by a combination of the electric sales and the levelized costs of procuring sufficient energy to meet electric demand, regardless of whether these resource are supply-side (power plants and transmission and distribution upgrades) or demand-side (energy efficiency). Avoided energy costs used in the cost-effectiveness analysis in E1's 2020-2022 plan represent the variable cost relating to generating and deliverying additional electricity at existing facilities. Generating electricity incurs variable costs, such as fuel, operation, and maintenance. These costs would not be incurred if that unit of electricity were not produced. Some types of plants have higher marginal costs than others – for example peaker plants only run a few hours per year because the marginal costs associated with generating electricity from these plants are higher than the cost of power for all but the hours with the highest load. Efficiency, by displacing the need for the power plants with the highest marginal costs, therefore saves ratepayers significant money even when not explicitly avoiding a new power plant.

In NSP's case, however, there is evidence that achievable levels of DSM would be able to not only eliminate the need for a new gas power plant, but also allow for the early retirement of multiple existing high-cost coal plants. This can be seen in the two most recent analyses that comprehensively look at the costs associated with various resource planning scenarios. Indeed, as described earlier, both the 2014 IRP and the 2018 Synapse GUO show that high levels of efficiency result in lower revenue requirements for NSP. This also makes intuitive sense – by definition, if a unit of electricity costs less to acquire through a DSM program than through a supply-side alternative, ratepayers will pay less using the DSM program in the long run.

Q. What analysis does NSP give to support its assertion that efficiency will decrease affordability.

A. NSP does not appear to have any analysis backing this assertion, and does not appear to have a credible argument why the analyses in the 2014 IRP and 2018 GUO may be flawed[17]. Instead, NSP's focus is solely on the short-term rate impact of efficiency,

[17] NS Power IR-03 to EAC.

despite the fact that this largely comes from a beneficial improvement in customers' efficiency and a decrease in actual short-term bills, and despite both recent analyses showing that high levels of DSM will result in lower total revenue requirements for NSP.

Q. What other benefits may come from efficiency?

A. In addition to being the lowest cost resource for NSP, energy efficiency provides many other benefits to Nova Scotia ratepayers that are hard to quantify or not otherwise included in the cost-effectiveness analyses. These include:

- Job Creation and other direct and indirect economic benefits
- Reduced risk and price volatility
- Health and safety benefits
- Ancillary grid benefits
- Improved comfort and productivity
- Improved ability and speed with which electric supply can be shifted to more carbon-free sources.

Q. Please further describe the research on energy efficiency impact on jobs and economic activity.

A: There is a large and growing body of evidence that money spent on energy efficiency creates more jobs and provides a greater stimulus to local economies than equivalent money spent on supply-side resources. Efficiency investments are far more labor intensive than supply-side resources and require significant effort from contractors, design professionals, and suppliers/distributors. Further, these cannot be outsourced to other geographic areas, unlike fossil fuels which may come from far away and for which importing them can be a drain on the local economy. Academic research and interviews with business owners from process evaluations both confirm that utility-run efficiency programs can be an enormous boon for small businesses. According to 2009 study done by the University of Massachusetts, Amherst, a $1 million investment in supply-side resources will create 5.3 jobs, while an equivalent investment in efficiency can be

expected to create 16.7 jobs.[18] The table below shows estimates of the jobs effect of efficiency spending.[19] The multipliers are based on modeling by the American Council for an Energy Efficient Economy (ACEEE), with multipliers adapted from a regional economic modeling tool. Typically, studies have found that around 10-20 net jobs are created per million dollars spent on efficiency.

Table 28 | Effect of Efficiency Spending on Jobs[20]

Spending Category	Impact	Amount (Millions)	Job Multiplier	Job Impact (job-years)
Installation	Upfront payment for efficiency measures	$100	13	1,300
Consumer Spending	Because of efficiency spending, consumers spend less in the short term	-$100	12	-1,200
Consumer Savings	Because of energy savings, consumers spend more in the long term	$200	12	2,400
Lost Utility Revenues	Utility revenues decrease because of energy savings	-$200	5	-1,000
Net effect of a $100 million investment in efficiency measures				**1,500**

[18] University of Massachusetts, Amherst. The Economic Benefits of Investing in Clean Energy. June 2009. https://www.peri.umass.edu/fileadmin/pdf/other_publication_types/green_economics/economic_benefits/economic_benefits.PDF, throughout the report, one "job" represents one full time job for one year.

[19] ACEEE. *Potential for Energy Efficiency, Demand Response, And Onsite Solar Energy in Pennsylvania. April, 2009.*

[20] This study uses the same job multiplier as was found in the PA ACEEE study, or 15 jobs per million dollars spent. This number is actually on the low side of multipliers found in the economic literature. When this paper references jobs created, it is referring to a job as one full time job for one year.

For Canada specifically, a 2018 analysis done by Dunsky Consulting found that increased efficiency would cause Nova Scotia's GDP to increase by $7.7 billion dollars, and create over 58,000 job-years[21].

In addition to direct job benefits, one dollar of efficiency spending creates more than one dollar of economic activity. In economics, this is known as the multiplier effect. While every economic activity has some multiplier, the multiplier for efficiency spending is larger than that of many other activities, particularly compared with supply-side spending. The efficiency multiplier occurs as 1) people who are employed due to the efficiency program re-spend their new income into the economy; 2) increased demand for efficient products causes increased demand for upstream suppliers; and, 3) money saved by ratepayers from lower energy bills is spent on other goods and services.

These estimates have been validated by economic studies of specific investment decisions. For example, a 2009 study in East Kentucky found that efficiency investment of $634.2 million would create $1.2 billion of local economic activity and over 5,400 jobs, not including the effect of energy savings being reinvested into the local economy. A coal plant to produce the equivalent amount of energy would not only be more expensive but would create only 700 jobs during the 3-year construction phase and 60 positions once operational.[22]

(V.) Lifetime Energy Savings Targets

Q. Define Lifetime Energy Savings as it relates to E1's DSM Plan.

A. Lifetime energy savings describes the amount of energy saved over the lifetime of the measure. If two measures have the same annual savings and same initial cost, but one has a longer expected lifetime, the measure with the longer lifetime is a more valuable investment and will provide more economic and environmental benefits to society as well as the customer installing the measure. Since neither of the two current performance targets, annual energy savings and annual demand savings, capture this

[21] Dunsky Energy Consulting. The Economic Impact of Improved Energy Efficiency In Canada. http://cleanenergycanada.org/wp-content/uploads/2018/05/TechnicalReport_EnergyEfficiency_20180403_FINAL.pdf

[22] http://www.ochscenter.org/documents/EKPC_report.pdf

nuance, E1 proposes that this metric be added as a third performance metric.

Q. Does NSP support this proposal?

A. No. NSP states that "using Long-term Energy Savings (LES) as a Performance Target is premature and therefore ill-timed. EfficiencyOne has not gained enough experience with LES. EfficiencyOne should continue using LES as a Performance Indicator over the 2020-2022 time period[23]."

Q. Why does NSP say that using LES is premature and ill-timed?

A. NSP does not state any clear reasons why LES is premature, does not list any specific questions that should be studied and answered, or give any time frame of necessary experience after which they think it would be appropriate to implement LES. Lifetime savings is a common metric for energy efficiency programs, and is very well researched and well understood. Many US jurisdictions use lifetime energy savings as at least one of the targets against which efficiency programs are measured. I am not sure what possible rationale NSP has to support a claim that use of lifetime savings is premature, given that all savings estimates must already include an assumed lifetime to properly estimate cost-effectiveness and estimating lifetime savings is routine in the energy efficiency industry. Clearly, E1 has already estimated lifetimes to assess the net benefits of the program. The appropriate policy goal for Nova Scotia should focus on encouraging maximizing total net benefits.

Q. Do you support E1's proposal to use lifetime energy savings as a performance target?

A. Yes I do. Longer lived measures tend to have deeper savings and greater economic benefits, but also greater market barriers than short-lived measures, making them harder for energy efficiency programs to obtain. This also means that they are likely to have much lower freeridership rates. The LES metric provides proper incentives to the program administer to develop well-designed programs that are able to achieve significant penetration in measures with higher market barriers that will provide more

[23] NS Power Evidence. Page 27.

persistent benefits and savings to the customer and Nova Scotians overall. Further, without this metric, there is an incentive for the efficiency program to "cream-skin" and get the easiest measures to achieve while leaving significant long-term savings on the table. For example, E1 could choose to focus inordinately on home energy report programs to achieve its targets. While this program is very inexpensive per annual savings, it is actually fairly costly on a lifetime basis. The UARB should commend E1 for taking the initiative to minimize this perverse incentive and better align its incentives with what is best for all ratepayers.

(VI.) Conclusion

Q. Please summarize your testimony.

A. I urge the UARB to mandate increased levels of efficiency above and beyond what is currently described in E1's preferred plan. I recommend it directs E1 to ramp up over a few years to 2% per year electric load savings, as shown by the GUO report to be cost-effective. Doing this will:

- Align actual efficiency programs in Nova Scotia with levels found by the two most recent comprehensive analyses to result in the lowest costs for ratepayers
- Reduce electric bills in the short-term
- Reduce electric bills and rates in the long-term
- Ensure that all Nova-Scotians, and in particular low-income Nova Scotians, have ready access to efficiency opportunities
- Ensure that E1's programs are capturing significant energy efficiency above and beyond naturally occurring efficiency
- Mitigate inherent uncertainty in the electric forecast, and reduce reliance on commodity market pricing
- Enable a more rapid and reliable shift to renewable energy
- Benefit the environment
- Produce significant additional unquantified economic, job creation, and health and comfort benefits.

I further recommend that the UARB make clear that rate impacts should not be the primary decision criteria for efficiency efforts, but rather whether efficiency provides overall greater benefits and a lower present value cost resource than other supply-side alternatives for all Nova Scotians.

Q. Does this conclude your testimony?

A. Yes it does.