NOVA SCOTIA UTILITY AND REVIEW BOARD

In the Matter of Energy Efficiency Nova Scotia Corporation -
Application for Approval of its Electricity Demand Side Management Plan for 2013-2015
E-ENSC-R-12 / Matter No. M04819

# Direct Testimony of
# Tim Woolf

## On Behalf of
## Counsel to Nova Scotia Utility and Review Board

## On the Topics of
## Rate Impacts, Bill Impacts, Participation Rates
## and Multi-Year Planning Cycles

**May 22, 2012**

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## 1. INTRODUCTION AND QUALIFICATIONS

**Q. Please state your name, title and employer.**

A. My name is Tim Woolf. I am a Vice-President at Synapse Energy Economics, located at 485 Massachusetts Avenue, Cambridge, MA 02139.

**Q. Please describe Synapse Energy Economics.**

A. Synapse Energy Economics is a research and consulting firm specializing in electricity and gas industry regulation, planning and analysis. Our work covers a range of issues including integrated resource planning; economic and technical assessments of energy resources; electricity market modeling and assessment; energy efficiency policies and programs; renewable resource technologies and policies; and climate change strategies. Synapse works for a variety of clients, with an emphasis on consumer advocates, regulatory commissions, and environmental advocates.

**Q. Please summarize your professional and educational experience.**

A. Before joining Synapse Energy Economics, I was a commissioner at the Massachusetts Department of Public Utilities (DPU). In that capacity I was responsible for overseeing a significant expansion of clean energy policies, including an aggressive increase in ratepayer-funded energy efficiency programs; the implementation of decoupled rates for electric and gas companies; an update of the DPU energy efficiency guidelines; the promulgation of net metering regulations; review of smart grid pilot programs; and review of long-term contracts for renewable power.

Prior to being a commissioner at the Massachusetts DPU, I was employed as the Vice President at Synapse Energy Economics; a Manager at Tellus Institute; the Research Director of the Association for the Conservation of Energy; a Staff Economist at the Massachusetts Department of Public Utilities; and a Policy Analyst at the Massachusetts Executive Office of Energy Resources.

I hold a Masters in Business Administration from Boston University, a Diploma in Economics from the London School of Economics, a BS in Mechanical Engineering and a BA in English from Tufts University.

**Q. Please describe your professional experience as it relates to energy efficiency policies and programs.**

A. Energy efficiency policies and programs have been at the core of my professional career. While at the Massachusetts DPU I played a leading role in updating the Department's energy efficiency guidelines, in reviewing and approving the recent three-year energy efficiency plans, in reviewing and approving energy efficiency annual reports, in leading a working group on rate and bill impacts, and advocating for allowing energy efficiency to participate in the New England wholesale electricity market. I served as a co-chair of the Working Group on Utility Motivation as part of the State Energy Efficiency Action Network sponsored by the US Department of Energy and the US Environmental Protection Agency.

As a consultant I have reviewed and critiqued utility energy efficiency policies and programs throughout the US, and I have testified on these issues in British Columbia, Colorado, Delaware, Massachusetts, Minnesota, Nevada, Nova Scotia, Québec, and Rhode Island. My work has encompassed all aspects of energy efficiency program design and implementation, including efficiency measure assessment, program delivery options, program budgeting, cost-benefit analyses, avoided costs, utility performance incentives and other relevant regulatory policies. I have represented clients on several energy efficiency collaboratives, where policies and programs were discussed among a variety of stakeholders. In 2006 and 2007 I worked for the Nova Scotia Utility and Review Board (the Board), along with other Synapse staff, assisting with the review of the 2007 Integrated Resource Plan (IRP).

**Q. On whose behalf are you testifying in this case?**

A. I am testifying on behalf of counsel to the Nova Scotia Utility and Review Board.

**Q. Have you testified previously before the Nova Scotia Utility and Review Board (Board)?**

A. Yes. I presented testimony to the Board regarding the Energy Efficiency Nova Scotia Corporation's (ENSC) Electricity Demand Side Management Plan for 2012, in Docket E-ENSC-R-10, Matter No. MO3669. My testimony in that docket was also on behalf of counsel to the Board.

**Q. What is the purpose of your testimony?**

A. The purpose of my testimony is two-fold. First, I provide an overview of how ENSC should be considering the rate impacts, bill impacts and participation rates associated with its DSM Plans. Assessing these impacts is a critical aspect of understanding the full implications of the proposed DSM programs, and should become a routine component of every DSM plan filed with the Board. My testimony on this subject is a follow-up to my testimony presented to the Board regarding the ENSC Electricity Demand Side Management Plan for 2012, in Docket E-ENSC-R-10, Matter No. MO3669. Second, I provide some comments on the ENSC proposal to move to a multi-year planning cycle.

**Q. How is your testimony organized?**

A. My testimony is organized as follows:

1. Introduction and Qualifications.
2. Summary of Conclusions and Recommendations.
3. Rate Impacts, Bill Impacts and Participation Rates.
4. Multi-Year Planning Cycle

## 2. SUMMARY OF RECOMMENDATIONS

**Q. Please summarize your primary recommendations regarding rate impacts, bill impacts and participation rates.**

A. I offer the following recommendations with regard rate impacts, bill impacts and participation rates:

- ENSC should fully comply with the Board's order in last year's 2012 DSM Plan docket to develop better information on rate and bill impacts for future DSM proceedings.

- ENSC should develop a methodology for analyzing rate and bill impacts with input from the DSM Advisory Group. The DSM Advisory Group offers a great opportunity for providing directional advice and stakeholder perspectives on this important emerging issue.

- ENSC should complete its methodology, and develop rate and bill impact estimates for its DSM Plan in time to be included in the first DSM Annual Progress Report filing, expected in the first quarter of 2013.

- ENSC's methodology for analyzing rate and bill impacts should build upon the methodology illustrated below in my testimony. In particular,

  - Rate and bill impact analyses should account for impacts over the long-term in order to capture the full effect of energy efficiency savings.

  - Rate and bill impacts should separately identify the impacts on (a) program participants, (b) program non-participants, and (c) all customers on average.

  - Rate and bill impact analyses should estimate the number of program participants, in order to provide an indication of the portion of customers that experience bill reductions.

- ENSC should take steps to improve its methods for tracking customer participation, including tracking by customer for each program and in each year, in order to keep track of customers that may be double-counted.

**Q. Please summarize your primary recommendations regarding a multi-year planning cycle for energy efficiency programs.**

A. I fully support the proposal to move to a multi-year planning cycle for energy efficiency programs. However, I recommend that if ENSC proposes to make any significant changes to the three-year plans then it should notify the Board of its proposal in the relevant Annual Progress Report.

ENSC would only be required to notify the Board of significant proposed changes, where significant changes would be defined as any of the following:

- adding a new program that is not in the three-year plan;
- terminating an existing program that is in the three-year plan;
- increasing or decreasing three-year plan budgets for the total residential sector programs or the total business, non-profit and institutional (BNI) sector programs by more than 25 percent;
- increasing or decreasing the three-year plan savings estimates of the total residential sector programs or the total BNI sector programs by more than 25 percent.

If ENSC proposes to make any such significant change to its three-year plan, then the Board will decide at that time whether to investigate the proposal in a formal docket. In the meantime, ENSC would be able to continue to operate under the presumption that it has on-going approval from the Board to continue to implement its three-year plan as modified.

## 3. RATE IMPACTS, BILL IMPACTS AND PARTICIPATION RATES

**Q. Please summarize the recommendations you made to the Board regarding rate impacts, bill impacts and participation rates in your testimony regarding the 2012 DSM Plan.**

A. During the Board's review of the 2012 DSM plan, I testified on the importance of properly accounting for rate and bill impacts associated with energy efficiency programs. In my testimony, I recommended that the Board establish several key principles regarding how to quantify and assess rate impacts. The specific principles that I recommended be applied when quantifying rate impacts of energy efficiency programs are as follows:

- Rate impact analyses should estimate the impacts of energy efficiency on customer bills, as well as customer rates, because the primary direct benefits of efficiency measures are reflected in the customer bills.
- Rate and bill impacts should separately identify the impacts on (a) program participants, (b) program non-participants, and (c) all customers on average.

- Rate and bill impact analyses should estimate the number of program participants, in order to provide an indication of the portion of customers that experience bill reductions.

- Rate and bill impact analyses should account for impacts over the long-term (e.g., using a study period that includes at least the average life of energy efficiency measures), in order to capture the full effect of energy efficiency savings.

- Rate and bill impact analyses should compare (a) the estimated rates and bills resulting from the energy efficiency programs associated with IRP targets to (b) the estimated rates and bills resulting from different levels of efficiency programs.

- Rate and bill impact analyses should account for all the costs of energy efficiency that are expected to affect rates.

- Rate and bill impact analyses should account for all the benefits of energy efficiency that are expected to affect rates, including avoided generation costs, avoided transmission costs, and avoided distribution costs.

I also recommended that the level of program participation, program design issues, and overall benefits of the efficiency programs be considered in deciding whether specific rate impacts are acceptable.

**Q. What did the Board find with regard to your recommendation?**

In its Order on ENSC's 2012 DSM Plan, the Board accepted my recommendation, stating that there is a need to have better information on rate and bill impacts in future proceedings, and directing ENSC to undertake the necessary consultation with a view to providing enhanced information as suggested by me in connection with the 2013 DSM Plan. (NSUARB-E-ENSC-R-10, 2011 NSUARB 99, page 29.)

**Q. How has ENSC complied with the Board's order regarding the 2012 DSM Plan?**

A. In response to the Board's Order, ENSC retained Elenchus Research Associates (Elenchus) to conduct an analysis of the projected rate and bill impacts of ENSC's DSM programs for NSPI's ratepayers based on the cost projections contained in the 2013-2015 DSM Plan. Elenchus was also charged with developing and reviewing a cost allocation model to fully allocate costs to taxpayer-funded programs and ratepayer-funded programs.

**Q. Please describe ENSC's proposed rate and bill impact analysis.**

A. The rate and bill impacts provided by Elenchus highlight the year-to-year change in rates and bills resulting from the proposed DSM programs. Elenchus also provided the total change in rates and bills by the end of 2015, as compared to the rates and bills from 2012. Table 1, below, summarizes the rate and bill impacts for each customer class, as presented in the Elenchus report.

Elenchus states that the bill and rate impacts provided in its report should be viewed as indicative only. Actual impacts will vary for a number of reasons, including when the cost allocation model is used to allocate ENSC's actual costs, variations in actual program costs from preliminary budgets, as well as variations in rates and load forecasts in future years (Appendix C, 13).

**Table 1: Summary of ENSC's Proposed Rate and Bill Impacts**

| Rate Class | Bill Impacts | | | |
|---|---|---|---|---|
| | 2013 | 2014 | 2015 | Total |
| Residential | (0.5%) | 0.3% | 0.4% | 0.2% |
| Small General | (1.7%) | (0.3%) | (0.0%) | (2.0%) |
| General Demand | 1.0% | (0.2%) | (0.0%) | 0.8% |
| Large General | 4.4% | (0.0%) | 0.1% | 4.5% |
| Small Industrial | (1.3%) | (0.2%) | (0.1%) | (1.7%) |
| Medium Industrial | (2.2%) | (0.0%) | 0.1% | (2.1%) |
| Large Industrial | (0.4%) | 0.0% | 0.1% | (0.3%) |
| ELI 2P-RTP | (0.8%) | 0.0% | 0.0% | (0.8%) |
| Municipal | 0.3% | 0.1% | 0.3% | 0.6% |
| Unmetered | 12.1% | (0.1%) | (0.2%) | 11.8% |
| Bowater Mersey (AE only) | 0.3% | 0.0% | 0.1% | 0.4% |
| Gen. Repl. / Load Foll. | 1.3% | 0.1% | 0.1% | 1.4% |

**Q. In your opinion, has ENSC adequately complied with the Board's order and your principles regarding the proper assessment of rate and bill impacts resulting from energy efficiency programs?**

A. No, not entirely. While ENSC has considered the impact on rates and bills from its DSM programs, it has done so in only a limited fashion.

**Q. Please explain how ENSC has not fully addressed your recommendations.**

A. ENSC's rate and bill impact analysis ignores three of the principles that I presented in my previous testimony, and that the Board supported in its order. First, ENSC has not provided rate and bill impact analyses that account for impacts over the long-term (e.g., using a study period that includes at least the average life of energy efficiency measures). The ENSC analysis therefore does not account for the full effect of energy efficiency savings on rates and bills. Second, ENSC has failed to present rate and bill impact analyses that account for all the benefits of energy efficiency that are expected to affect rates (i.e., including avoided generation costs, avoided transmission costs, avoided distribution costs, and avoided environmental compliance costs.) Finally, ENSC has not presented rate and bill impacts that separately identify the impacts on program participants, program non-participants, and all customers on average. Without these important aspects of the rate and bill impact analysis, it is not possible for ENSC, the Board, or other stakeholders to obtain a complete picture of the impact of the energy efficiency programs on customers' rates and bills.

**Q. Please provide an example of how ENSC should more fully address your recommendations.**

A. To illustrate how my recommended principles should be applied, I will use the Residential rate class and the Existing Residential DSM program as an example of the type of analysis that could be conducted. The Residential rate class accounts for approximately 58 percent of the energy requirements and 45 percent of the demand requirements over the three years of the DSM plan, and approximately 51 percent of DSM costs are allocated to this rate class.

The Existing Residential program makes for a good program illustration as it is designed to promote cost-effective energy efficiency improvements to Nova

Scotia's housing stock of single detached houses, duplexes, rental housing, mobile/mini homes and multi-family buildings, and includes small community buildings such as fire halls and churches. Incentives are available for lighting upgrades, measures to reduce electric water heating energy use, appliance upgrades and other items. Incentives for homes with electric space heating may include a full range of envelope measures, such as air-sealing and insulation, and green heating system measures.

**Q. What is ENSC proposing for the Residential rate class and the Existing Residential program?**

A. ENSC proposes to recover through the Residential rate class an average of $24 million each year of its three year plan (Appendix C). This rate class uses approximately 750 kWh a month on average (Appendix C).

Over the three year period, the Existing Residential program is expected to achieve approximately 50 GWh in annual energy savings, 766.5 GWh in lifetime energy savings with a measure life of about 15 years, save 12.5 MW on-peak, enroll approximately 33,000 participants out of 415,000 eligible participants at a cost of approximately $30.6 million (Appendix C; Evidence, 19-21; Avon IR-3).

**Q. How would you apply your rate and bill impact principles to the Residential rate class and Existing Residential program?**

A. I would start by analyzing the residential rate and bill impacts from the DSM Plan, as compared to rates and bills that would occur in a scenario where no DSM programs were implemented. Such an approach isolates the impact of efficiency on customers' rates and bills.

When conducting such an analysis, it is important to take a "snapshot" of the program planning assumptions that are under review by the Board. In this case, ENSC is proposing efficiency investments for 2013 through 2015, and expects savings over the average life of the measures installed, which is through 2029 (15 years). The analysis I present below considers only the costs in the three years of the plan, and the benefits over the life of the measures installed.

While ENSC will certainly file a new plan for the Board's review at the conclusion of the currently proposed three-year plan with budgets and rate adjustments beginning in 2016, I choose not to include the impacts of those programs in the rate and bill impact analysis for the 2013 through 2015 programs. This approach is a useful way of isolating the rate and bill impacts of just the three years of programs in question. If I were to include the rate and bill impacts of energy efficiency programs beyond 2015, then in order to be internally consistent it would be necessary to expand the study period to include the full life of the energy efficiency measures installed in those years.

I recognize that the analysis presented below appears to be truncated or incomplete, because there is no analysis of the rate and bill impacts of the energy efficiency programs implemented after 2015. Nonetheless, I believe that the snapshot approach is very useful for the purpose of both isolating and fully capturing the rate and bill impacts of the three-years of efficiency program currently at issue before the Board.

**Q. Please provide a summary of your residential rate impact analysis.**

A. Figures 1 and 2 below present a summary of my rate and bill impacts analysis for residential customers. These analyses were conducted using the information provided by ENSC in its Evidence and in response to information requests. Exhibit TW-2 includes the input assumptions that I used for this analysis, and Exhibit TW-3 includes the results of this analysis in tabular form.

This analysis compares two scenarios: one with the DSM programs at the levels proposed by ENSC in this docket, and one with no DSM programs at all. The scenario with no DSM programs at all is purely a hypothetical case in order to put the DSM rate and bill impacts into context. As I discuss below, a better approach would be to compare two scenarios with two different levels of DSM investment.

The DSM costs include all of the costs that will be passed on to residential customers. For the program savings and participation information below, I assume a typical residential customer who uses 750 MWh per month, participates

in the Existing Residential program and reduces electricity consumption by roughly 16 percent through that program.

Figure 1 indicates the changes in a typical customer's rates (in ¢/kWh), and Figure 2 presents the percent change in a typical customer's rates. Note that in the first three years rates are expected to increase in order to collect sufficient funds to pay for the DSM programs, while there will be energy and capacity savings over the life of the efficiency measures that will lead to reductions in rates. Also note that I have calculated an average rate impact across the entire study period to indicate how the customers will be affected on average over all the relevant years.

As shown in Figure 1, the rate impact to the Residential customer class from the DSM programs is likely to be on the order of 0.5 to 0.6 ¢/kWh in the first three years, and then there is likely to be rate reductions of less than 0.1 ¢/kWh as a result of the efficiency savings over time. The average rate impact across the entire study period is likely to be just under 0.05 ¢/kWh.

As shown in Figure 2, the rate impact to the Residential customer class from the DSM programs is likely to be on the order of four percent of rates in the first three years, and then there is likely to be rate reductions of roughly 0.5 percent as a result of the efficiency savings over time. The average rate impacts across the entire study period is likely to be under 0.5 percent.

**Figure 1: Rate Impacts on Residential Customers – in Dollars (¢/kWh)**

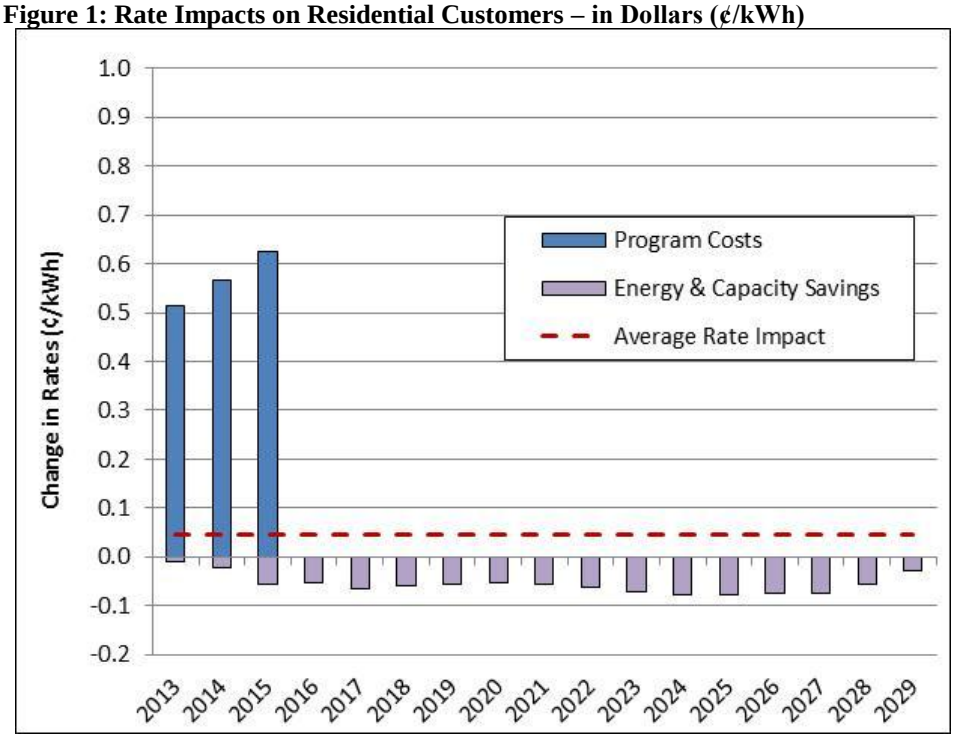
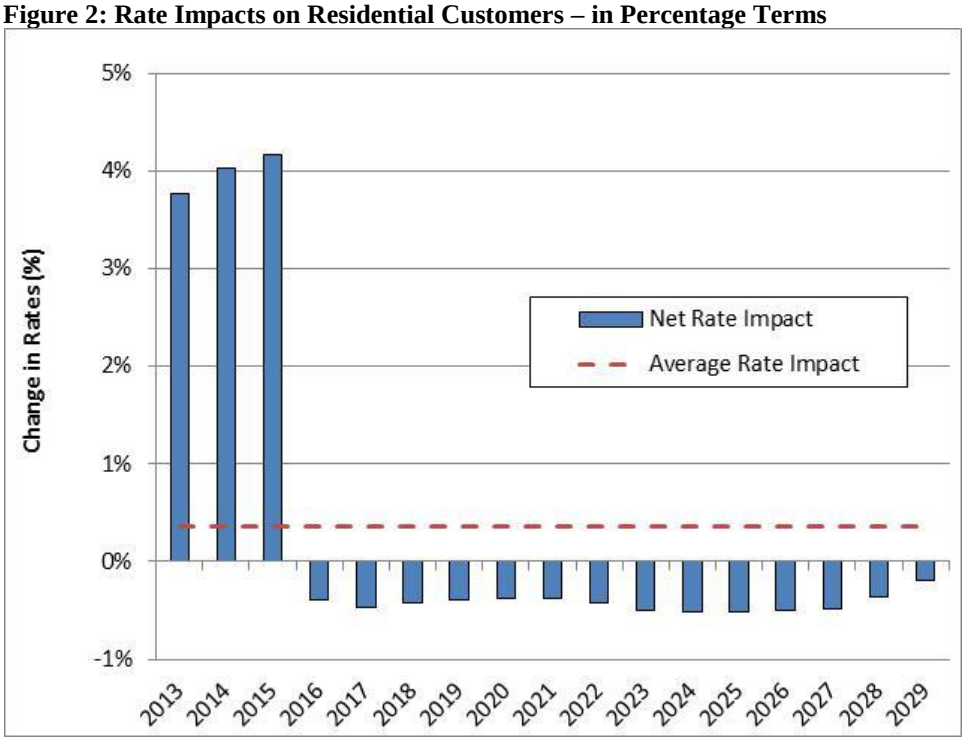



**Figure 2: Rate Impacts on Residential Customers – in Percentage Terms**



**Q. Please provide a summary of your residential bill impact analysis.**

A. The effect on a customers' bill depends on whether or not a customer participates in the DSM programs. Through participation in efficiency programs, a customer will decrease its monthly consumption, which mitigates the rate increase from the DSM charge.

Figure 3 summarizes the bill impacts on three types of customers in the Residential rate class. First, non-participants do not reduce their consumption from the installation of efficiency measures, and, therefore, their bill impact represents only the change in rates from the DSM charge and energy and capacity savings.

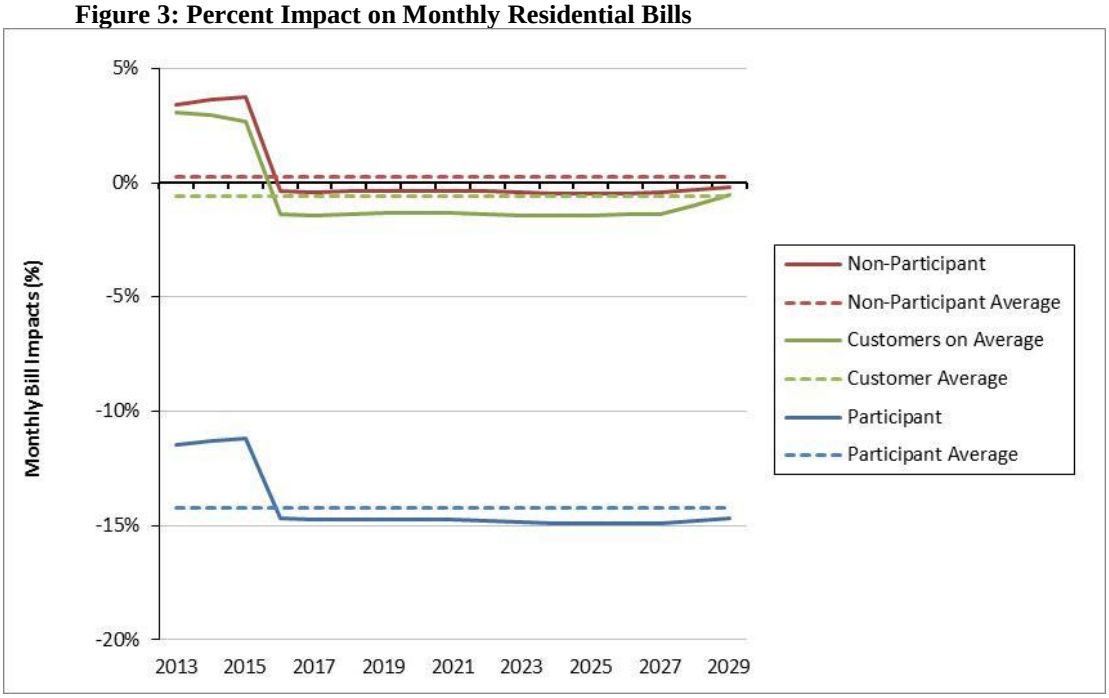
Second, participants in the Existing Residential program experience the same rate impacts as the non-participant, yet their monthly consumption is reduced through their participation in the efficiency program. For the Existing Residential program in 2013, ENSC expects 14.3 GWh annual energy savings from 10,000 participants. Therefore, savings per participant are likely to be approximately 1,430 kWh a year, or 119 kWh a month.

Finally, I present the bill impacts for residential customers on average. This information represents the average effect on customers' bills across both program participants and non-participants. It is a hypothetical construct meant to indicate how customers across the entire residential sector are affected by the efficiency programs.

Figure 3 summarizes the bill impacts for each of the three customer types, expressed as the percent change on monthly bills over the average life of measures adopted through the Existing Residential program. For non-participants and customers on average the bills are expected to be higher by three to four percent in the first three years, and then lower by roughly one percent or less after that. On average across the study period non-participants are expected to see a roughly 0.3 percent increase in bills, while customers on average are expected to see a 0.6 percent decrease in bills. Program participants fare the best, with bill

reductions of more than 10 percent in the first few years, nearly 15 percent in the later years, and roughly 14 percent on average across the study period.

**Figure 3: Percent Impact on Monthly Residential Bills**




**Q. What conclusions do you draw with regard to the magnitude of these rate and bill impacts?**

A. I do not intend to draw any conclusions about the magnitude of these rate and bill impacts at this point in time. Instead, I present the results here to illustrate how the rate and bill impact analysis should be conducted, and the type of information that it can provide. I recommend that ENSC provide this type of rate and bill impact information in future DSM Plans, so that the Board and other stakeholders can get a sense of the magnitude of rate and bill impacts associated with the ENSC energy efficiency activities.

**Q. You mentioned that ENSC should look at program participation levels. Why?**

A. After reviewing the rate and bill impact analysis, it is important to analyze program participation to discern the extent of customers experiencing bill increases or decreases. As observed in the above analysis, the electricity bills for program participants and customers on average are reduced over the long-run,

despite the rate increase from DSM. As previously stated in my 2012 DSM Plan testimony, the extent of customer participation in energy efficiency programs should be a critical factor considered in assessing whether particular rate and bill impacts are acceptable. Once energy efficiency programs reach a point where a large portion of customers participate in the programs, then concerns about rate impacts should be significantly mitigated.

**Q. Please summarize your analysis of program participation levels.**

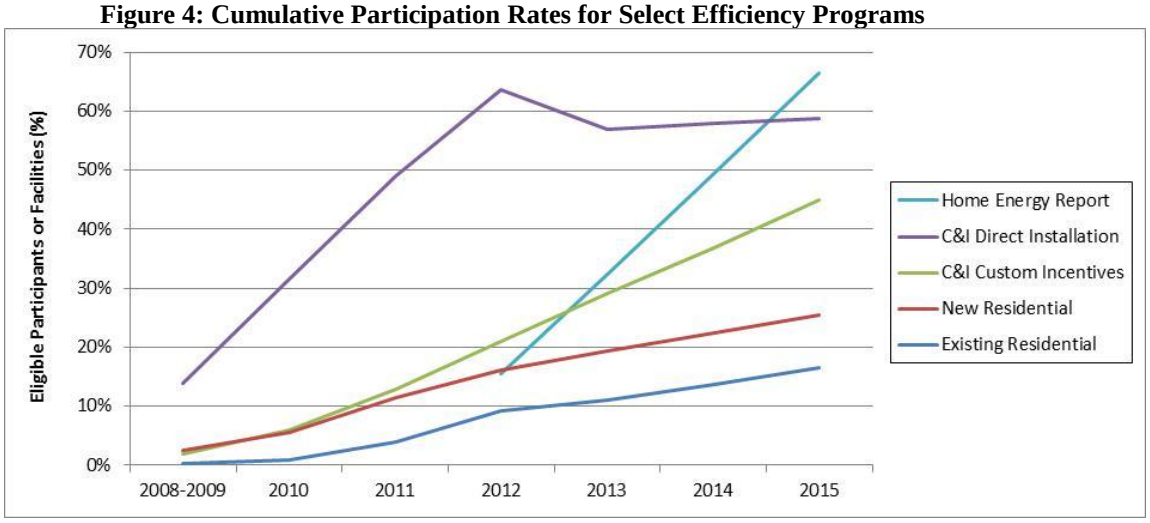
A. Figure 4 presents a summary of program participation rates for some of ENSC's key DSM programs, based on information provided by ENSC in response to information requests. For each of these programs I have taken the ratio of the number of participants in each year to eligible customers in each year, to estimate a participation rate. I then calculate a cumulative participation rate for each of these programs, including the historic years of 2008 through 2011, as well as the current and future years of 2012 through 2015. Exhibit TW-4 presents the numbers behind my analysis of participation rates.

It is very important to note that there are several challenges to estimating participation and participation rates in energy efficiency programs. One of the most significant challenges is to properly identify a participant. For the programs presented in Figure 4, ENSC identifies a participant as either a housing unit (for residential customers) or a facility (for business customers). For other programs (e.g. the Efficient Products Rebate program) participants are sometimes defined as an efficiency measure. Another significant challenge is to avoid double-counting of participants. For example, some residential customers may participate in both the Existing Residential program and in the Efficient Products Rebate program in any one year. Similarly, a business customer may participate in the BNI Custom Incentives program in more than one year during the timeline presented below.

I have not attempted to address all these issues in the participation rates presented below. Instead, I have taken the simplest approach of taking the ratio of eligible customers to participants. Therefore, the participation rates presented below should be seen as an illustrative example of how participation rates should be

analyzed and presented. Over time, ENSC should collect sufficient data to be able to sort out some of the challenges about defining participants and avoiding double-counting.

**Figure 4: Cumulative Participation Rates for Select Efficiency Programs**




**Q. Why have you not included all of ENSC's DSM programs in Figure 4?**

A. I did not include the Efficient Product Rebate programs for Residential and BNI customers in Figure 4 because participation for these programs is measured in units, or the number of financial incentives (rebates or financing) offered to customers (2013-2015 DSM Filing, App. A, 16). When reviewing program participation for these programs, cumulative participation rates quickly exceed 100 percent of eligible participants. This indicates that participants receive more than one financial incentive or participate multiple times. I have not included these two programs in my analysis because to do so would not provide a meaningful indication of the number of customers that have participated in efficiency programs. However, I recommend that ENSC should track the number of rebates or units provided to each participant or facility, so that program participation from these two programs could be better analyzed, and the impact on customer's rates and bills from these programs would be better understood.

**Q. What is the value of investigating the participation rates?**

A. Any analysis of rate and bill impacts should include some investigation of participation rates, in order to indicate the extent of customers that are likely to see lower bills as a result of the programs. The information presented above illustrates the type of participation rate analysis that ENSC should conduct in future DSM filings, in order to provide the Board and other stakeholders with information that will be useful in evaluating future rate and bill impacts. If, in future DSM proceedings, ENSC or the Board are in the position of balancing higher rates and lower bills, it will be useful to consider participation rates in achieving the proper balance.

Furthermore, this type of participation information can be very important in reviewing and assessing ENSC's DSM programs in general. It provides an indication of how successfully each program is pursuing customers, as well as an indication of how many more customers could benefit from future efficiency programs.

**Q. What conclusions do you draw from the information presented in Figure 4?**

A. I do not intend to draw specific conclusions from the participation rates in Figure 4 as part of my testimony, because I see these participation rates as preliminary estimates and I expect they include some double-counting of customers.

Nonetheless, we can draw some general conclusions from this information. It is clear that by the end of the three-year plan a large portion of Nova Scotia electricity customers will have been served by the DSM programs in one way or another, and will thereby experience lower bills. The Existing Residential Program is likely to reach over 15 percent of residential customers, and the Home Energy Report Program is expected to reach well over 50 percent of residential customers. When we add to this the many customers that purchase efficient equipment through the Efficient Product Rebate Program it is clear that many residential customers will participate in the efficiency programs and will thereby experience lower bills. The same conclusion can be drawn about the BNI sector.

Between the Custom Program, the Direct Install Program and the Efficient Product Rebate Program, many BNI customers will participate in the efficiency programs and thereby experience lower bills.

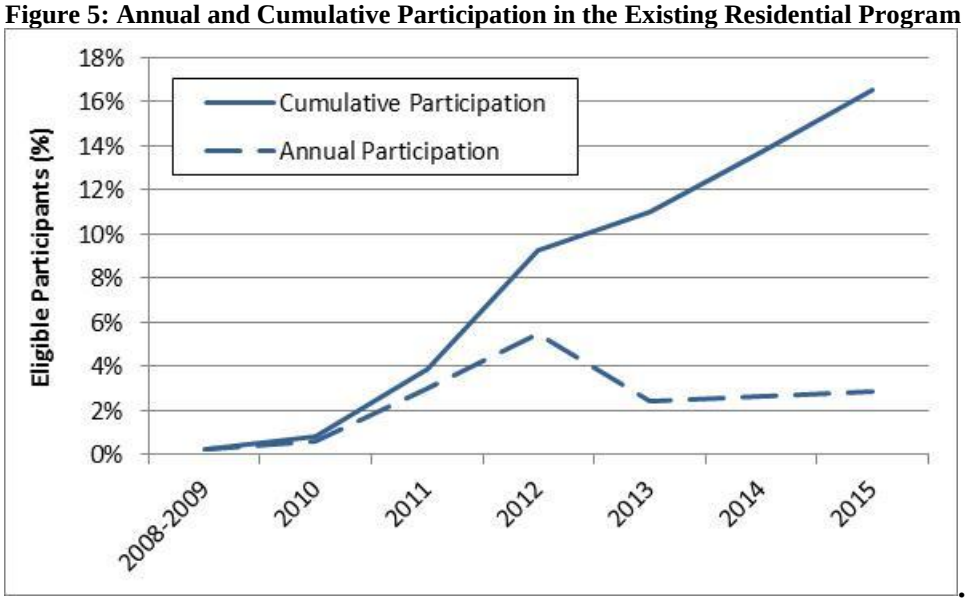
These are very important conclusions in the context of the rate and bill impact analysis. They indicate that the majority of customers are likely to see lower bills as a result of the energy efficiency programs, because the bill savings from the efficiency measures outweigh rate impact of the DSM rider. I recommend that ENSC be encouraged to maximize customer participation rates over time, so as to ensure the greatest amount equity among customers and to mitigate concerns about rate impacts.[1] Indeed, ENSC should pursue the ultimate goal of reaching all electricity customers in one way or another over time.

**Q. Please summarize your analysis of the participation rates for the Existing Residential Program.**

A. Figure 5, below, presents the annual and cumulative participation rates of customers in the Existing Residential program since 2008 (Avon IR-3). As the figure demonstrates, ENSC proposes to engage over 16 percent of eligible participants by the end of 2015. The figure also indicates that ENSC has proposed a significant reduction in annual participation rates in this program after 2012. ENSC explains that this is because the 2012 program includes a direct install pilot component that is not factored into the 2013 DSM Plan (Synapse IR-16).

[1] It is important to note that this goal must be balanced with other important goals, such as avoiding cream-skimming and lost opportunities.

**Figure 5: Annual and Cumulative Participation in the Existing Residential Program**

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**Q. You have analyzed rate and bill impacts by comparing the proposed 2013-2015 DSM initiatives to a scenario where no DSM occurs. Is this the most appropriate use of rate and bill impact analyses?**

A. No, it is not. The hypothetical scenario where no DSM occurs is not meaningful because it is very unlikely to happen. I present that analysis above to demonstrate conceptually how rate and bill impacts can be analyzed from this most simple comparison.

**Q. Is there a better way to apply the rate and bill impact analyses?**

A. Yes. Energy efficiency program administrators and regulators frequently wrestle with the question of how much ratepayer money should be invested in energy efficiency programs. One of the key concerns is that too much funding of energy efficiency programs will lead to unacceptable rate impacts. In these decisions, there are often two or more scenarios for how much to invest in energy efficiency programs. For example, regulators may be faced with one proposal to maintain constant efficiency budgets from one year to the next and a second proposal to increase efficiency budgets by a certain amount in order to obtain additional efficiency savings. In this context, the rate and bill impact analysis should consider the same two scenarios: constant efficiency budgets compared to increased efficiency budgets. In this way, the program administrators, the

regulators and other stakeholders will be able to assess the likely rate and bill impacts associated with the decision that is at issue. I refer to this approach as an "incremental" rate and bill impact analysis, because it captures the effects of incremental changes to energy efficiency budgets.

**Q. Please provide an example of what you mean by an incremental rate and bill analysis.**

A. Using the same information discussed in my analysis above, I have conducted a second analysis that considers the impacts on residential rates and bills assuming that ENSC increased its proposed 2013 through 2015 residential DSM budgets by 20 percent.

**Q. Why did you choose to increase ENSC's 2013 through 2015 residential budgets by 20 percent?**

A. I chose this budget increase merely to provide an illustration of an incremental rates and bill analysis. An increase of 20 percent in program budgets would bring ENSC's three-year cumulative residential program budget from $74 million to $89 million. I assume for simplicity that this increased budget would be used to provide the same type of energy efficiency services to additional program participants, i.e., the increased budget would lead to a 20 percent increase in program participants.

**Q. What is the impact on Residential rates from the proposed 20 percent increase in the residential program budget?**

A. The impact on residential rates from this incremental increase in program budgets are presented in Figures 6 and 7 below. These figures mirror the information presented in Figures 1 and 2 above. Exhibit TW-5 presents the results of my analysis in tabular form.

As shown in Figure 6, the rate impact to the Residential customer class from the DSM programs is likely to be on the order of 0.1 ¢/kWh in the first three years, and then there is likely to be small rate reductions as a result of the efficiency savings over time. The average rate impact across the entire study period is likely to be less than 0.01 ¢/kWh.

As shown in Figure 7, the rate impact to the Residential customer class from the DSM programs is likely to be between 0.5 and 1.0 percent in the first three years, and then there will be small rate reductions as a result of the efficiency savings over time. The average rate impact across the entire study period is likely to be less than 0.1 percent.

**Figure 6: Rate Impacts on Residential Customers (¢/kWh) – Incremental Analysis**

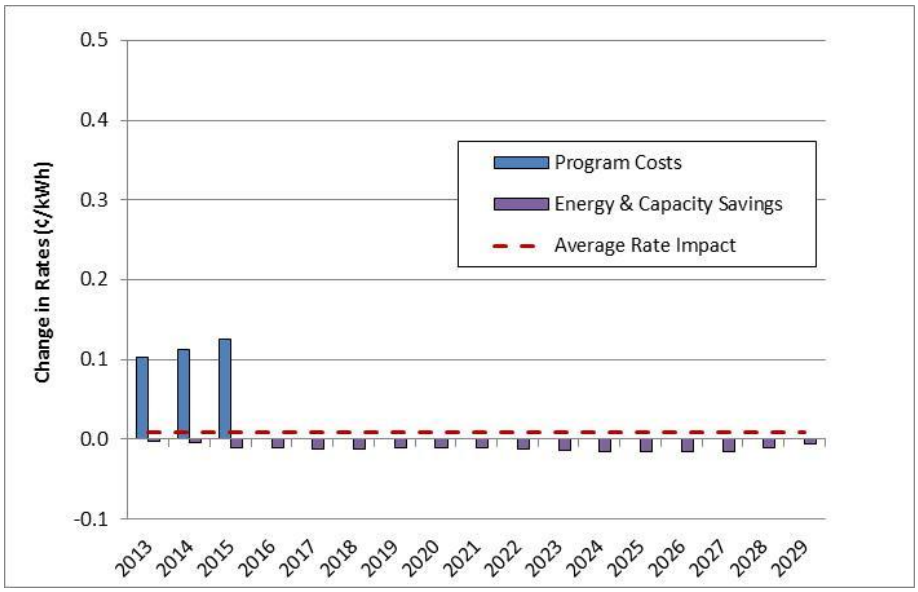
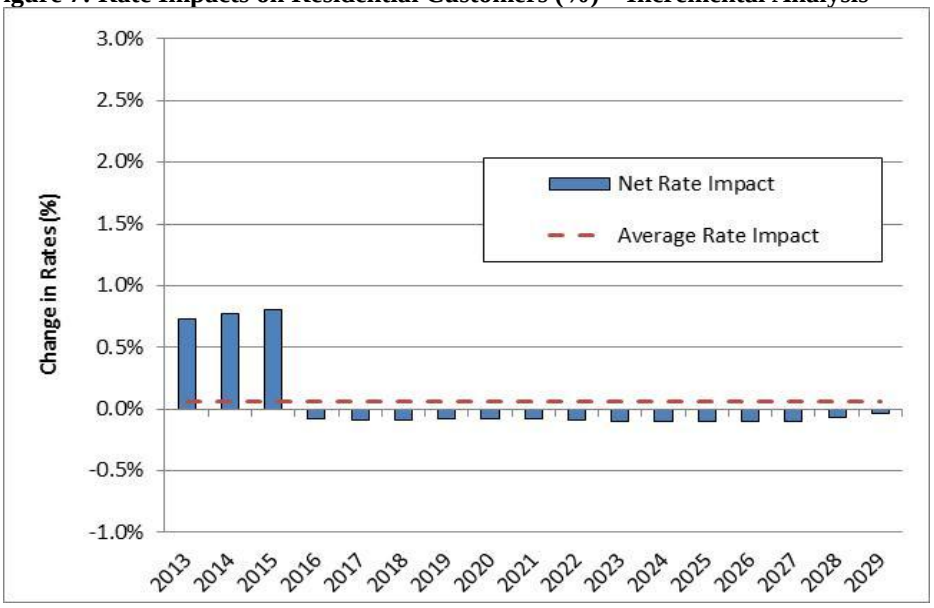



**Figure 7: Rate Impacts on Residential Customers (%) – Incremental Analysis**

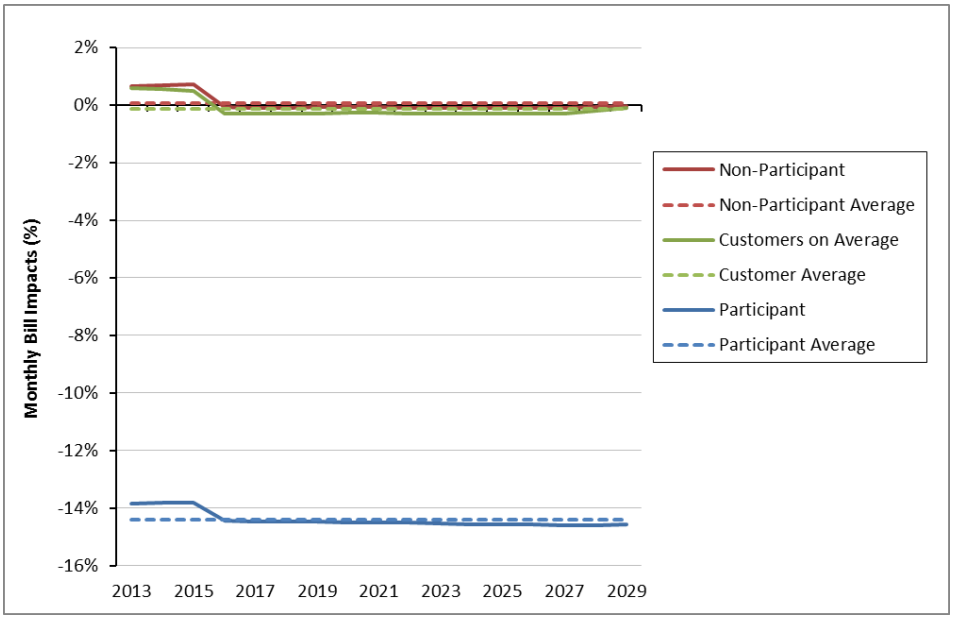


**Q. What is the impact on Residential bills from the 20 percent increase in program budgets?**

A. The impact on bills from this incremental increase in program budgets are presented in Figure 8. This figure mirrors the information presented in Figure 3 above. Exhibit TW-5 presents my estimates

For non-participants and customers on average the bills are expected to be higher by 0.5 to 1.0 percent in the first three years, and then lower by roughly 0.1 to 0.3 percent after that. On average across the study period non-participants are expected to see a roughly 0.06 percent increase in bills, while customers on average are expected to see a 0.12 percent decrease in bills. Program participants are expected to see bill reductions comparable to those in the previous case, on the order of 14 percent on average. (Again, for this analysis we have defined program participants as those that would not have participated under the current budget proposal but would participate as a result of the increased funding.)

**Figure 8: Percent Impact on Residential Monthly Bills – Incremental Analysis**

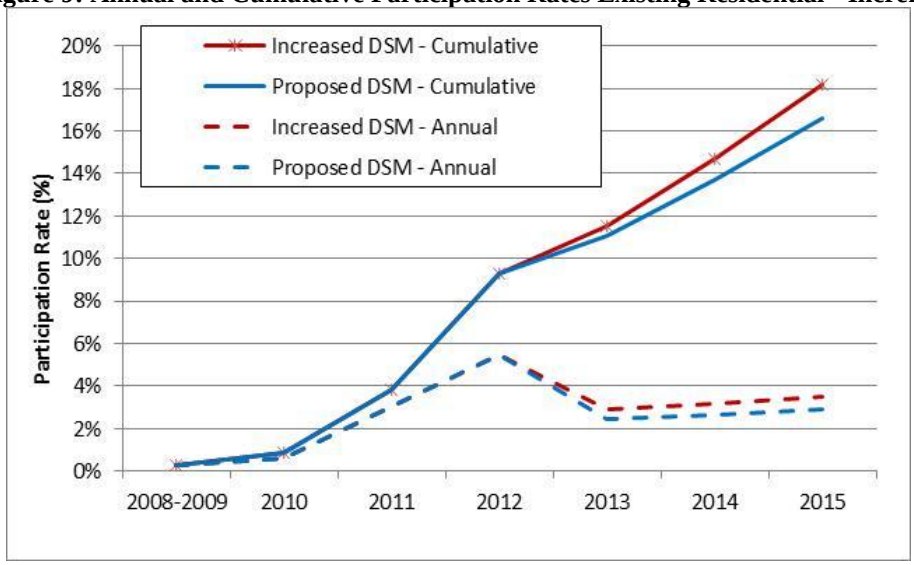



**Q. What is the impact on the participation levels of the Existing Residential program from the 20 percent increase in program budgets?**

A. With a larger budget available for efficiency programs, ENSC could enroll more participants than currently proposed. Under the Existing Residential program for

2013, ENSC expects 10,000 participants resulting in annual savings of 14.3 GWh for the year (Evidence, 19; Avon IR-3). Assuming that the savings-per-participant remains constant at 1,430 kWh, a 20 percent increase in budget would allow ENSC to reach a corresponding 20 percent increase in participants, for a total of 12,000 participants. This would result in annual savings of 17.2 GWh in 2013 for the program. Figure 9, below, provides the annual and cumulative participation levels for both budget scenarios, presented as a percent of total eligible participants.

**Figure 9: Annual and Cumulative Participation Rates Existing Residential - Incremental**




**Q. Please summarize the results of your incremental analysis.**

A. The incremental analysis can be summarized as follows:

- Increased budget: $15 million, over three years.
- Increased savings: 2.9 to 3.8 GWh per year.
- Increased participants: 6,600 households, over three years.
- Average rate impact over study period: less than 0.1 percent.
- Average bill impact over study period (dollars):
  - non-participants: $0.07 per month (0.06 percent).

- customers on average: -$0.12 per month (-0.12 percent).
- participants: -$17.20 per month (-14.4 percent).

**Q. How do you recommend the results of your incremental analysis be used?**

A. Again, I present the incremental rate and bill impact analysis to illustrate how such an analysis could be used in the future to assist with a decision about DSM program funding. I recommend that ENSC develop rate and bill impact analyses along the lines of what I have outlined above. This sort of information should be provided with each proposal for a new DSM Plan. If in the future ENSC and the Board are faced with a decision as to whether to increase or decrease DSM program budgets relative to current levels, this information will be useful in drawing the appropriate balance between reducing average costs to all customers and increasing electricity rates.

**Q. What else do you recommend about ENSC's program participation going forward?**

A. I recommend that ENSC take steps to improve its methods for tracking customer participation. This includes defining participation better, including participation in the Efficient Products Rebate programs. It also includes tracking customers by account number for each program that they participate in each year, in order to keep track of customers that may be double-counted. Better participation information will be useful over time in order to provide meaningful information regarding the magnitude of customers that experience bill savings from the DSM programs. It will also be useful in assessing program performance as the ENSC programs gain more experience and reach a greater level of maturity. Furthermore, more detailed information on participation rates will help ENSC identify those customers that may not have participated yet in the efficiency programs, so that it can target the efficiency programs to those customers in order to maximize customer participation rates.

**Q. You have provided an illustration of the rate impacts and bill impacts of the residential DSM programs, with a focus on the participants in the Existing Residential program. What do you recommend with regard to the business, non-profit and institutional sector?**

A. I recommend that ENSC conduct parallel analyses of the rate and bill impacts of the BNI sector energy efficiency programs. In this case, it may be appropriate to investigate the impacts on participants in the Custom Incentives Program separately from the impacts on participants in the Direct Installation program, given that the amount of savings per participant and the number of participants are likely to be considerably different across the programs.

## 4. MULTI-YEAR PLANNING CYCLE

**Q. Please describe ENSC's proposed multi-year planning cycle.**

A. In its 2012 DSM Plan filing, ENSC indicated its intent to engage stakeholders in consultation and dialogue to further assess the available options for the implementation of a future multi-year regulatory model. Such a model would allow greater flexibility and capacity in the delivery of DSM programming.

ENSC engaged Dunsky Energy Consulting (Dunsky) to review the current regulatory oversight model and propose changes to improve ENSC's ability to assist Nova Scotians in saving energy as efficiently and effectively as possible. Dunsky's review noted that the limited (twelve month) approval period of ENSC's plans creates uncertainty in the market. ENSC is unable to make a commitment longer than one year to its contractors (who must decide whether, and to what extent, to invest in building capacity in Nova Scotia), to critical market players (including those who are being asked to provide new products and services to Nova Scotians), to its current and prospective staff, and to its larger customers (who often plan important investments in equipment and buildings over several years). The one-year approval period can further lead to missed savings, as well as diverted organizational time and focus.

Consistent with Dunsky's report, ENSC has prepared a three-year DSM plan that includes the following:

- the approach it intends to take to achieve savings within its target markets
- a forecast of annual costs (budgets) and energy savings for each of the three years
- a high-level evaluation plan indicating when and how evaluation activities would be conducted, and a timetable for reporting the results.

In addition, the multi-year filing includes two additional years of DSM outlook, intended for directional information purposes, not for Board approval. This rolling approach is designed to keep the period between formal plan approvals relatively short for the Board and stakeholders, while allowing ENSC, its delivery agents, and trade allies to operate with a multi-year view that enables capacity building for continued future success.

Beginning in 2013, and in each intervening year between multi-year filings, ENSC will file an annual progress report in the first quarter of the calendar year, intended to be a paper filing and consisting of:

- a summary of the context, activities and milestones achieved in the prior year
- a management discussion and analysis of any major discrepancies relative to the original plan's intent and forecasts
- a summary of costs and savings for each program or target market area

Dunsky recommends, and ENSC concurs, that the Board consider adopting a trigger mechanism whereby, if reported results fall below 75 percent of the original plan's forecast savings up to that point, ENSC would be required to file a corrective action plan designed to achieve the total approved energy savings target, within the approved multi-year budget.

Revisions to the schedule and approach for evaluating DSM program savings are also proposed, changing from an all-in-one annual process to an ongoing multi-year process.

ENSC recommends that it continue to meet quarterly with the Board. Regular meetings with the DSM Advisory Group will provide ongoing opportunities to update stakeholders and discuss issues and concerns. The meetings and reports will provide quarterly status updates and highlights, as well as communicate course changes within the approved DSM Plan.

**Q. Is ENSC's proposal to move from an annual planning cycle to a multi-year planning cycle appropriate?**

A. Yes. For all the reasons discussed in Dunsky's report, as briefly summarized above, a multi-year planning cycle can be beneficial to program planning. Moving from annual to multi-year planning cycles is becoming a trend in several jurisdictions that I am aware of.

**Q. Do you have any recommendations regarding ENSC's multi-year planning proposal?**

A. Yes. While I fully support ENSC's proposal to move to a multi-year planning cycle, I have some recommendations about the trigger mechanism that requires ENSC to file a Corrective Action Plan to adjust its original plan. This trigger is of utmost importance as it serves to weigh the balance between ENSC's flexibility to implement effective programs (indeed, the benefits of moving to multi-year planning cycle), with the need for adequate oversight by the Board and stakeholders. Such a balance can be challenging to achieve, and needs to be clearly identified prior to the plan's implementation. As such, a trigger mechanism must be carefully crafted and clearly understood by all parties involved.

**Q. Why do you state that a balance between flexibility and oversight can be difficult to achieve, and needs to be identified prior to the plan's implementation?**

A. My recent experience in Massachusetts leads me to be circumspect about establishing an appropriate trigger mechanism. After the three-year planning cycle was adopted in Massachusetts, some efficiency program administrators submitted to the Department of Public Utilities (DPU) the equivalent of corrective action plans within six months of the three-year plans being approved. Additionally, annual plan modifications became a customary filing in Massachusetts, essentially

maintaining the annual planning process that was expected to be overhauled by a three-year planning cycle.

**Q. Why do you think these energy efficiency filings were submitted to the Massachusetts DPU so shortly after the three-year plans were approved in Massachusetts?**

A. The primary reason is that the conditions established requiring DPU review of changes to the three-year plan were more detailed than what is proposed here, and were much more stringent. In addition, there was some uncertainty among the program administrators as to how the conditions should be applied.

**Q. Please explain how the conditions triggering a regulatory review in Massachusetts were different from those that are proposed here.**

A. First, I note that the DPU required energy efficiency program administrators to file a request for mid-term modifications – i.e., modifications to the three-year efficiency plans during the course of the three years – if the program administrators anticipated significant changes to program designs. In this way, the DPU would be able to review and decide upon anticipated changes to the energy efficiency programs before they were implemented. This is different from Nova Scotia, where corrective action plans are only required if reported results fall below a trigger. In other words, the approach in Massachusetts is to anticipate future changes in the plans, whereas the approach proposed in Nova Scotia is to respond to historic experience relative to the efficiency plans.

Second, the conditions established in Massachusetts were more detailed and more stringent than what is proposed in Nova Scotia. The Massachusetts DPU established guidelines requiring that program administrators submit mid-term modifications to their three-year plans if any of the following changes occurred:

- a new program is added to the portfolio of programs;
- an existing program is terminated;
- the budget for an energy efficiency program is changed by 20 percent;
- the savings of an efficiency program are changed by 20 percent; or

- the performance incentives resulting from an energy efficiency program are changed by 20 percent.[2]

**Q. Why did these conditions lead to program administrators filings so shortly after the commencement of the three-year plans.**

A. First, there was some uncertainty about how these conditions should be applied. The program administrators assumed that they should be applied on an annual basis, i.e., if an annual budget was expected to deviate by more that 20 percent of an annual budget in the three-year plan, then it should be reviewed by the DPU. The DPU has since clarified that these triggers should instead be applied over the entire three-year plan, i.e., a 20 percent budget under-run in one year is acceptable if the difference is made up in the following year.[3]

Second, the triggers are fairly broad and stringent, especially relative to the conditions proposed in Nova Scotia. The Massachusetts triggers apply on a program level, as opposed to the portfolio level. The Massachusetts triggers go beyond energy savings to include budgets and program administrator performance incentives. The Massachusetts triggers apply to savings results above and below those of the three-year plan, as opposed to just savings results that are below the plan. The Massachusetts triggers of 20 percent are slightly more stringent than the 25 percent proposed in Nova Scotia. Finally, the Massachusetts triggers include additions of programs and terminations of programs, while the Nova Scotia proposal does not.

**Q. What is the current status of these guidelines?**

A. The DPU has opened an investigation to determine whether its mid-term modification guidelines should be modified to strike a better balance between

[2] Massachusetts Department of Public Utilities, *Investigation by the Department of Public Utilities on its Own Motion into Updating its Energy Efficiency Guidelines*, DPU 08-50-B, October 26, 2009.

[3] Massachusetts Department of Public Utilities, *Petition of the Cape Light Compact for Approval of a Modification to its Three-Year Energy Efficiency Plan Budget for Program Year 2020*, DPU 10-106, January 10, 2011.

program administrator flexibility and regulatory review.[4] That investigation has not yet been completed.

**Q. What is your recommendation regarding ENSC's proposed trigger mechanism for the three-year plan?**

A. I believe that there is value in providing the Board with proposals to make significant changes to the energy efficiency programs *before* the changes are implemented. In this way, the Board will be able to review any significant changes prior to their implementation, as opposed to many months afterwards.

It is important to note that the electricity industry and the energy efficiency market are constantly in flux, and there may be many good reasons for ENSC to make significant modifications to its efficiency programs during the course of its three-year plans. For example, once NSPI completes its forthcoming integrated resource plan it may provide compelling evidence to make significant changes to the current three-year DSM plan.

Nonetheless, in order to avoid the problems encountered in Massachusetts, these prospective triggers should be clearly defined and should be relatively broad.

**Q. What do you recommend with regard to prospective triggers?**

A. I recommend that ENSC be required to notify the Board in its Annual Progress Report if it plans to make any of the following changes to its three-year plan:

- add a new program;
- terminate an existing program;
- increase or decrease three-year budgets for the total residential sector programs or the total BNI sector programs by more than 25 percent;
- increase or decrease the three-year savings estimates of the total residential sector programs or the total BNI sector programs by more than 25 percent.

[4] Massachusetts Department of Public Utilities, *Investigation by the Department of Public Utilities on its Own Motion into Updating its Energy Efficiency Guidelines*, DPU 11-120, November 29, 2011.

**Q. Please explain why you believe these prospective triggers are important.**

A. ENSC may want to add a new program or terminate an existing program during the course of the three-year plan, and this is clearly a significant change that the Board should be made aware of prior to it being implemented.

I recommend that there be a trigger for efficiency budgets, as well as efficiency savings, because the budgets are an important indicator of the program priorities and an important driver of the program impacts.

I recommend that the budget and savings triggers be applied at the sector level, because there are important policy and equity considerations with regard to providing energy efficiency opportunities to both sectors. If the trigger is for all sectors combined, then ENSC could shift budgets, and therefore savings, from one sector to another, which might lead to inequities that would be of concern to the Board.

I recommend that the budget and savings triggers be applied both for increases and decreases, as the Board may be interested in significant changes in either direction.

I recommend the 25 percent level for the trigger, because this is consistent with the current proposal and it strikes an appropriate balance between flexibility for ENSC and regulatory oversight.

**Q. If one of these triggers is met, and ENSC were to notify the Board in an Annual Progress Report, then how do you recommend the Board should respond to this additional information.**

A. The Board should make it clear in approving these triggers that ENSC has on-going approval from the Board to continue to implement its three-year plan as modified, unless the Board makes a finding otherwise within a given timeframe. If a trigger is met in any one of the Annual Progress Reports, then the Board could decide how to address it on a case-by-case basis. For example, if ENSC were to propose increasing savings to the residential sector by 30 percent due to increased adoption of highly cost-effective residential efficiency measures, then the Board may see no need for any formal review of such a proposal. If on the

other hand, ENSC were to propose terminating a cost-effective program that was serving hard-to-reach small business customers, then the Board may want to investigate that proposal. At that time, the Board would establish a streamlined process for conducting its review and making its findings on the ENSC proposal.

**Q. Does this conclude your pre-filed testimony?**

A. Yes, it does.

# Tim Woolf

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## PROFESSIONAL EXPERIENCE

**Synapse Energy Economics Inc**., Cambridge, MA. Vice President, 2011 to present. Provides expert consulting on the economic, regulatory, consumer, environmental, and public policy implications of the electricity and gas industries. The primary focus of work includes technical and economic analyses, electric power system planning, climate change strategies, energy efficiency programs and policies, renewable resources and related policies, power plant performance and economics, air quality, and many related aspects of consumer and environmental protection.

**Massachusetts Department of Public Utilities,** Boston, MA. Commissioner, 2007- 2011. Oversaw a significant expansion of clean energy policies as a consequence of the Massachusetts Green Communities Act, including an aggressive expansion of ratepayer-funded energy efficiency programs; the implementation of decoupled rates for electric and gas companies; an update of the DPU energy efficiency guidelines; the promulgation of net metering regulations; review of smart grid pilot programs; and review of long-term contracts for renewable power. Oversaw six rate case proceedings for Massachusetts electric and gas companies. Played an influential role in the development of price responsive demand proposals for the New England wholesale energy market. Served as President of the New England Conference of Public Utility Commissioners from 2009-2010. Served as board member on the Energy Facilities Siting Board from 2007-2010. Served as co-chair of the State Energy Efficiency Action Working Group on Utility Motivation. Served as co-chair of the Steering Committee for the Northeast Energy Efficiency Partnership's Regional Evaluation, Measurement and Verification Forum.

**Synapse Energy Economics Inc**., Cambridge, MA. Vice President, 1997-2007.

**Tellus Institute**, Boston, MA. Senior Scientist, Manager of Electricity Program, 1992-1997.

**Association for the Conservation of Energy**, London, England. Research Director, 1991-1992.

**Massachusetts Department of Public Utilities**, Boston, MA. Staff Economist, 1989-1990.

**Massachusetts Office of Energy Resources**, Boston, MA. Policy Analyst, 1987-1989.

**Energy Systems Research Group**, Boston, MA. Research Associate, 1983-1987.

**Union of Concerned Scientists,** Cambridge, MA. Energy Analyst, 1982-1983.

## EDUCATION

Masters, Business Administration. Boston University, Boston, MA, 1993.
Diploma, Economics. London School of Economics, London, England, 1991.
B.S., Mechanical Engineering. Tufts University, Medford, MA, 1982.
B.A., English. Tufts University, Medford, MA, 1982.

## TESTIMONY

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**Nevada Public Utilities Commission (Docket Nos. 06-04002 & 06-04005)**. Direct testimony regarding Nevada Power Company's and Sierra Pacific Power Company's Renewable Portfolio Standard Annual Report. On behalf of the Nevada Bureau of Consumer Protection. October 26, 2006

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**Nevada Public Utilities Commission (Docket No. 05-10021)**. Direct testimony regarding the Sierra Pacific Power Company's Gas Demand-Side Management Plan. On behalf of the Nevada Bureau of Consumer Protection. February 22, 2006.

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**Maryland Public Utilities Commission (Case No. 8973).** Oral testimony regarding proposals for the PJM Generation Attributes Tracking System. On behalf of the Maryland Office of People's Counsel. December 3, 2003.

**Rhode Island Public Utilities Commission (Docket No. 3463).** Oral testimony regarding the settlement of Narragansett Electric Company's 2004 Demand-Side Management Programs. On behalf of the Division of Public Utilities and Carriers. November 21, 2003.

**California Public Utilities Commission (Rulemaking 01-10-024).** Direct testimony regarding the market price benchmark for the California renewable portfolio standard. On behalf of the Union of Concerned Scientists. April 1, 2003.

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**Connecticut Department of Public Utility Control (Docket No. 99-09-03 Phase II).** Direct testimony on Connecticut Natural Gas Company's proposed performance-based ratemaking mechanism. On behalf of the Connecticut Office of Consumer Counsel. September 25, 2000.

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**Delaware Public Service Commission (Docket No. 99-328).** Direct testimony on maintaining electric system reliability. On behalf of the Public Service Commission Staff. February 2, 2000.

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| | Information | 2013 | 2014 | 2015 | Units | Source |
|---|---|---|---|---|---|---|
| **Customer Class Information** | | | | | | |
| | Utility | ENSC / NPSI | | | | |
| | Sector | Residential | | | | |
| | Base Year | 2013 | | | year | |
| | Customers | 452,558 | 456,991 | 461,716 | people | Synapse IR-3 |
| | Annual Sales | 4,373 | 4,373 | 4,373 | GWh | App. C, Att. 2-1 (Revised April 18, 2012) |
| | Average Monthly Consumption | 750 | 750 | 750 | kWh/Mo/Cust | App. C, Att. 3-5 (Revised April 18, 2012) |
| | Customer Growth Rate | -0.3% | | | % | Synapse IR-3 |
| | Sales Growth Rate | 1.00% | | | % | Synapse IR-4 |
| | All Customer Classes Annual Sales | 9,829 | 9,829 | 9,829 | GWh | App. C, Att. 2-1 (Revised April 18, 2012) |
| | | | | | | |
| **Rate Class Information** | | | | | | |
| | Rate Class | Residential (Domestic) | | | | |
| | Customer Charge | 10.83 | | | $/month | App. C, Att. 3-1 (Revised April 18, 2012) |
| | Energy Charge | | | | | |
| | Block 1 Volume | 750 | | | kWh | App. C, Att. 3-1 (Revised April 18, 2012) |
| | Block 1 Rate | 0.12638 | | | $/kWh | App. C, Att. 3-1 (Revised April 18, 2012) |
| | FAM Volume | 750 | | | kWh | App. C, Att. 3-1 (Revised April 18, 2012) |
| | FAM Rate | 0.00698 | | | $/kWh | App. C, Att. 3-1 (Revised April 18, 2012) |
| | DSM Cost Recovery | 0.00513 | 0.00565 | 0.00624 | $/kWh | App. C, Att. 3-1 (Revised April 18, 2012) |
| | Energy Inflation | 1.0% | | | % | General inflation |
| | | | | | | |
| **EE Program Costs and Impacts** | | | | | | |
| | Cost in Rates | 22,436,308 | 24,713,537 | 27,282,418 | $ | App. C, Att. 1-5, Table 3; Att. 1-11, Table 3; Att. 1-15, Table 3 (Revised April 18, 2012) |
| | Percent Increase in Budget | 20% | 20% | 20% | % | analysis input |
| | New Cost in Rates | 26,923,570 | 29,656,244 | 32,738,902 | $ | calculation: Cost in Rates * Percent Increase in Budget |
| | Program | Existing Residential | | | | |
| | Annual Energy Savings | 14.3 | 16.9 | 18.9 | GWh | Evidence, 19-21 (Revised April 18, 2012) |
| | Lifetime Energy Savings | 219 | 259 | 289 | GWh | calculation: Annual savings * Measure life |
| | Demand Savings | 3.5 | 4.2 | 4.8 | MW Peak | Evidence, 19-21 (Revised April 18, 2012) |
| | Measure Life | 15.3 | 15.3 | 15.3 | years | Synapse IR-5 |
| | Eligible Customers | 415,000 | 415,000 | 415,000 | Participants | Avon IR-3(b) (Revised April 18, 2012) |
| | Participants | 10,000 | 11,000 | 12,000 | Participants | Avon IR-3(b) (Revised April 18, 2012) |
| | Participant Monthly Savings | 119 | 128 | 131 | kWh | calculation: annual savings / participant / 12 |
| | Inflation Rate | 2.00% | | | % | General inflation; Synapse IR-8 |
| | Real Discount Rate | 6.81% | | | % | Synapse IR-8 |
| | Nominal Discount Rate | 8.95% | | | % | calculation: (1 + Real Discount Rate) * (1 + Inflation Rate) - 1 |
| | Annual Cost of Saved Energy | 1,568,973 | | | $/MWh | calculation: Cost in Rates / Annual Energy Savings |
| | Lifetime Cost of Saved Energy | 102,547 | | | $/MWh | calculation: Cost in Rates / Lifetime Energy Savings |
| | Levelized Cost of Saved Energy | 168,251 | | | $/MWh | calculation: Cost in Rates * Capital Recovery Factor / Annual Energy Savings |
| | Capital Recovery Factor | 11% | | | % | calculation: [ discount rate * (1 + discount rate) ^ measure life ] / [ (1+ discount rate) ^ measure life -1 ] |
| | $ spent = # Lifetime kWh Savings | 102.5 | 95.6 | 94.3 | kWh | calculation: Cost in Rates / Lifetime Energy Savings |
| | | | | | | |
| **Notes** | | | | | | |
| | Red text = input | | | | | |
| | Black text = calculation | | | | | |

**Rate Impacts of Energy Efficiency: Base DSM Rates**

| Year | Base Case (Without Efficiency) | | | Efficiency Case (Currently Proposed) | | | Difference Between Cases | | | | Efficiency Rate Impacts | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | Supply Rate | Demand Rate | Total | Supply Rate | Demand Rate | Total | Supply Rate | Demand Rate | Total | | Program Costs | T&D Savings | Energy & Capacity Savings |
| | (¢/kWh) | (¢/kW/Mo) | (¢/kWh) | (¢/kWh) | (¢/kW/Mo) | (¢/kWh) | (¢/kWh) | (¢/kW/Mo) | (¢/kWh) | % | (¢/kWh) | (¢/kWh) | (¢/kWh) |
| 2013 | 13.336 | 0.0 | 13.34 | 13.839 | 0.0 | 13.84 | 0.503 | 0.0 | 0.503 | 3.77% | 0.513 | 0.000 | -0.010 |
| 2014 | 13.469 | 0.0 | 13.47 | 14.012 | 0.0 | 14.01 | 0.543 | 0.0 | 0.543 | 4.03% | 0.565 | 0.000 | -0.022 |
| 2015 | 13.604 | 0.0 | 13.60 | 14.171 | 0.0 | 14.17 | 0.567 | 0.0 | 0.567 | 4.17% | 0.624 | 0.000 | -0.057 |
| 2016 | 13.740 | 0.0 | 13.74 | 13.686 | 0.0 | 13.69 | -0.054 | 0.0 | -0.054 | -0.39% | 0.000 | 0.000 | -0.054 |
| 2017 | 13.877 | 0.0 | 13.88 | 13.812 | 0.0 | 13.81 | -0.065 | 0.0 | -0.065 | -0.47% | 0.000 | 0.000 | -0.065 |
| 2018 | 14.016 | 0.0 | 14.02 | 13.957 | 0.0 | 13.96 | -0.059 | 0.0 | -0.059 | -0.42% | 0.000 | 0.000 | -0.059 |
| 2019 | 14.156 | 0.0 | 14.16 | 14.101 | 0.0 | 14.10 | -0.056 | 0.0 | -0.056 | -0.39% | 0.000 | 0.000 | -0.056 |
| 2020 | 14.298 | 0.0 | 14.30 | 14.243 | 0.0 | 14.24 | -0.055 | 0.0 | -0.055 | -0.38% | 0.000 | 0.000 | -0.055 |
| 2021 | 14.441 | 0.0 | 14.44 | 14.386 | 0.0 | 14.39 | -0.055 | 0.0 | -0.055 | -0.38% | 0.000 | 0.000 | -0.055 |
| 2022 | 14.585 | 0.0 | 14.59 | 14.523 | 0.0 | 14.52 | -0.062 | 0.0 | -0.062 | -0.42% | 0.000 | 0.000 | -0.062 |
| 2023 | 14.731 | 0.0 | 14.73 | 14.659 | 0.0 | 14.66 | -0.073 | 0.0 | -0.073 | -0.49% | 0.000 | 0.000 | -0.073 |
| 2024 | 14.879 | 0.0 | 14.88 | 14.801 | 0.0 | 14.80 | -0.077 | 0.0 | -0.077 | -0.52% | 0.000 | 0.000 | -0.077 |
| 2025 | 15.027 | 0.0 | 15.03 | 14.950 | 0.0 | 14.95 | -0.077 | 0.0 | -0.077 | -0.51% | 0.000 | 0.000 | -0.077 |
| 2026 | 15.178 | 0.0 | 15.18 | 15.103 | 0.0 | 15.10 | -0.075 | 0.0 | -0.075 | -0.49% | 0.000 | 0.000 | -0.075 |
| 2027 | 15.329 | 0.0 | 15.33 | 15.255 | 0.0 | 15.26 | -0.074 | 0.0 | -0.074 | -0.48% | 0.000 | 0.000 | -0.074 |
| 2028 | 15.483 | 0.0 | 15.48 | 15.428 | 0.0 | 15.43 | -0.055 | 0.0 | -0.055 | -0.35% | 0.000 | 0.000 | -0.055 |
| 2029 | 15.638 | 0.0 | 15.64 | 15.609 | 0.0 | 15.61 | -0.029 | 0.0 | -0.029 | -0.19% | 0.000 | 0.000 | -0.029 |
| **Average** | | | 14.46 | | | 14.50 | | | 0.044 | 0.36% | 0.100 | 0.000 | 0.000 |

Source: See Exhibit TW-2 for inputs.
Note: Demand rates do not apply to residential customers.

**Bill Impacts of Energy Efficiency: Base DSM Bills**

| Year | Rates - All Customers | | No DSM Case | | Participant | | | | Non-Participant | | | | Customers on Average | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | No DSM | With DSM | | | DSM Case | | Bill Impact | | DSM Case | | Bill Impact | | DSM Case | | Bill Impact | |
| | Average Rate | Average Rate | Usage | Average Monthly Bill | Usage | Average Monthly Bill | Dollars | Percent | Usage | Average Monthly Bill | Dollars | Percent | Usage | Average Monthly Bill | Dollars | Percent |
| Units -> | (¢/kWh) | (¢/kWh) | (kWh) | ($) | (kWh) | ($) | ($) | (%) | (kWh) | ($) | ($) | (%) | (kWh) | ($) | ($) | (%) |
| 2013 | 13.3 | 13.8 | 750 | 110.9 | 631 | 98.1 | -12.72 | -11.5% | 750 | 114.6 | 3.77 | 3.4% | 748 | 114.3 | 3.43 | 3.1% |
| 2014 | 13.5 | 14.0 | 750 | 111.9 | 631 | 99.2 | -12.62 | -11.3% | 750 | 115.9 | 4.07 | 3.6% | 745 | 115.2 | 3.32 | 3.0% |
| 2015 | 13.6 | 14.2 | 750 | 112.9 | 631 | 100.2 | -12.63 | -11.2% | 750 | 117.1 | 4.25 | 3.8% | 741 | 115.9 | 3.04 | 2.7% |
| 2016 | 13.7 | 13.7 | 750 | 113.9 | 631 | 97.2 | -16.71 | -14.7% | 750 | 113.5 | -0.40 | -0.4% | 741 | 112.3 | -1.57 | -1.4% |
| 2017 | 13.9 | 13.8 | 750 | 114.9 | 631 | 98.0 | -16.95 | -14.7% | 750 | 114.4 | -0.49 | -0.4% | 742 | 113.3 | -1.65 | -1.4% |
| 2018 | 14.0 | 14.0 | 750 | 116.0 | 631 | 98.9 | -17.08 | -14.7% | 750 | 115.5 | -0.44 | -0.4% | 742 | 114.3 | -1.61 | -1.4% |
| 2019 | 14.2 | 14.1 | 750 | 117.0 | 631 | 99.8 | -17.22 | -14.7% | 750 | 116.6 | -0.42 | -0.4% | 742 | 115.4 | -1.58 | -1.4% |
| 2020 | 14.3 | 14.2 | 750 | 118.1 | 631 | 100.7 | -17.38 | -14.7% | 750 | 117.7 | -0.41 | -0.3% | 742 | 116.5 | -1.57 | -1.3% |
| 2021 | 14.4 | 14.4 | 750 | 119.1 | 631 | 101.6 | -17.56 | -14.7% | 750 | 118.7 | -0.41 | -0.3% | 742 | 117.6 | -1.58 | -1.3% |
| 2022 | 14.6 | 14.5 | 750 | 120.2 | 631 | 102.4 | -17.77 | -14.8% | 750 | 119.8 | -0.46 | -0.4% | 742 | 118.6 | -1.63 | -1.4% |
| 2023 | 14.7 | 14.7 | 750 | 121.3 | 631 | 103.3 | -18.01 | -14.8% | 750 | 120.8 | -0.55 | -0.4% | 742 | 119.6 | -1.71 | -1.4% |
| 2024 | 14.9 | 14.8 | 750 | 122.4 | 631 | 104.2 | -18.22 | -14.9% | 750 | 121.8 | -0.58 | -0.5% | 742 | 120.7 | -1.74 | -1.4% |
| 2025 | 15.0 | 15.0 | 750 | 123.5 | 631 | 105.1 | -18.39 | -14.9% | 750 | 123.0 | -0.58 | -0.5% | 742 | 121.8 | -1.74 | -1.4% |
| 2026 | 15.2 | 15.1 | 750 | 124.7 | 631 | 106.1 | -18.56 | -14.9% | 750 | 124.1 | -0.56 | -0.4% | 742 | 122.9 | -1.72 | -1.4% |
| 2027 | 15.3 | 15.3 | 750 | 125.8 | 631 | 107.1 | -18.74 | -14.9% | 750 | 125.2 | -0.56 | -0.4% | 742 | 124.1 | -1.72 | -1.4% |
| 2028 | 15.5 | 15.4 | 750 | 127.0 | 631 | 108.2 | -18.80 | -14.8% | 750 | 126.5 | -0.41 | -0.3% | 745 | 125.7 | -1.24 | -1.0% |
| 2029 | 15.6 | 15.6 | 750 | 128.1 | 631 | 109.3 | -18.82 | -14.7% | 750 | 127.9 | -0.22 | -0.2% | 747 | 127.5 | -0.66 | -0.5% |
| **Average:** | | | | 119.3 | | 102.3 | -17.0 | -14.2% | | 119.6 | 0.3 | 0.3% | | 118.6 | -0.7 | -0.6% |
| **Cumulative Present Value:** | | | | 1,163.4 | | 1,001.7 | -161.7 | -13.9% | | 1,170.7 | 7.2 | 0.6% | | 1,160.6 | -2.8 | -0.2% |
| **Levelized:** | | | | 124.8 | | 107.4 | -17.3 | -13.9% | | 125.5 | 0.8 | 0.6% | | 124.5 | -0.3 | -0.2% |

Source: See Exhibit TW-2 for inputs.

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**Historical Program Participation - All Programs**

**Annual Participation (Units/ Participants/ Facilities)**

| Program | Historical | | | | Base Efficiency Case (Currently Proposed) | | |
|---|---|---|---|---|---|---|---|
| | 2008-2009 | 2010 | 2011 | 2012 | 2013 | 2014 | 2015 |
| Existing Residential (P) | 1,041 | 2,196 | 11,563 | 21,000 | 10,000 | 11,000 | 12,000 |
| New Houses (P) | 77 | 260 | 701 | 900 | 1,150 | 1,375 | 1,625 |
| Custom Incentives (F) | 49 | 102 | 172 | 200 | 205 | 195 | 200 |
| Direct Installation (F) | 4,830 | 6,248 | 6,063 | 5,144 | 500 | 375 | 325 |
| Home Energy Report (P) | | | | 60,000 | 66,492 | 66,492 | 66,492 |
| Efficient Products Rebate (Residential) (U) | 93,324 | 205,916 | 341,237 | 300,000 | 100,070 | 161,514 | 198,864 |
| Efficient Product Rebates (BNI) (U) | 1,400 | 494,636 | 575,778 | 550,000 | 242,682 | 223,911 | 210,491 |

**Cumulative Participation (Units/ Participants/ Facilities)**

| Program | Historical | | | | Base Efficiency Case (Currently Proposed) | | |
|---|---|---|---|---|---|---|---|
| | 2008-2009 | 2010 | 2011 | 2012 | 2013 | 2014 | 2015 |
| Existing Residential (P) | 1,041 | 3,237 | 14,800 | 35,800 | 45,800 | 56,800 | 68,800 |
| New Houses (P) | 77 | 337 | 1,038 | 1,938 | 3,088 | 4,463 | 6,088 |
| Custom Incentives (F) | 49 | 151 | 323 | 523 | 728 | 923 | 1,123 |
| Direct Installation (F) | 4,830 | 11,078 | 17,141 | 22,285 | 22,785 | 23,160 | 23,485 |
| Home Energy Report (P) | - | - | - | 60,000 | 126,492 | 192,984 | 259,476 |
| Efficient Products Rebate (Residential) (U) | 93,324 | 299,240 | 640,477 | 940,477 | 1,040,547 | 1,202,061 | 1,400,925 |
| Efficient Product Rebates (BNI) (U) | 1,400 | 496,036 | 1,071,814 | 1,621,814 | 1,864,496 | 2,088,407 | 2,298,898 |

**Eligible Units/ Participants/ Facilities**

| Program | Historical | | | | Base Efficiency Case (Currently Proposed) | | |
|---|---|---|---|---|---|---|---|
| | 2008-2009 | 2010 | 2011 | 2012 | 2013 | 2014 | 2015 |
| Existing Residential (P) | 385,000 | 385,000 | 385,000 | 385,000 | 415,000 | 415,000 | 415,000 |
| New Houses (P) | 3,000 | 3,000 | 3,000 | 3,000 | 4,000 | 4,000 | 4,000 |
| Cumulative New Houses (P) | 3,000 | 6,000 | 9,000 | 12,000 | 16,000 | 20,000 | 24,000 |
| Custom Incentives (F) | 2,500 | 2,500 | 2,500 | 2,500 | 2,500 | 2,500 | 2,500 |
| Direct Installation (F) | 35,000 | 35,000 | 35,000 | 35,000 | 40,000 | 40,000 | 40,000 |
| Home Energy Report (P) | | | | 385,000 | 390,000 | 390,000 | 390,000 |
| Efficient Products Rebate (Residential) (U) | 440,000 | 440,000 | 440,000 | 440,000 | 450,000 | 455,000 | 460,000 |
| Efficient Product Rebates (BNI) (U) | 40,000 | 40,000 | 40,000 | 40,000 | 40,000 | 40,000 | 40,000 |

**Percent of Eligible U/P/F Participating Cumulatively**

| Program | Historical | | | | Base Efficiency Case (Currently Proposed) | | |
|---|---|---|---|---|---|---|---|
| | 2008-2009 | 2010 | 2011 | 2012 | 2013 | 2014 | 2015 |
| Existing Residential (P) | 0% | 1% | 4% | 9% | 11% | 14% | 17% |
| New Residential (P) - Cumulative Eligible | 3% | 6% | 12% | 16% | 19% | 22% | 25% |
| Custom Incentives (F) | 2% | 6% | 13% | 21% | 29% | 37% | 45% |
| Direct Installation (F) | 14% | 32% | 49% | 64% | 57% | 58% | 59% |
| Home Energy Report (P) | | | | 16% | 32% | 49% | 67% |

Source: Avon IR-3 (Revised April 18, 2012)

**Program Participation - Existing Residential**

| Base DSM Case (Currently Proposed Budget) | Units | Historical | | | | Base Efficiency Case (Currently Proposed) | | |
|---|---|---|---|---|---|---|---|---|
| | | 2008-2009 | 2010 | 2011 | 2012 | 2013 | 2014 | 2015 |
| Eligible Participants | (participants) | 385,000 | 385,000 | 385,000 | 385,000 | 415,000 | 415,000 | 415,000 |
| Annual Participants | (participants) | 1,041 | 2,196 | 11,563 | 21,000 | 10,000 | 11,000 | 12,000 |
| Participation Rate | (%) | 0% | 1% | 3% | 5% | 2% | 3% | 3% |
| Cumulative Participation | (participants) | 1,041 | 3,237 | 14,800 | 35,800 | 45,800 | 56,800 | 68,800 |
| Percent Eligible Participating (Annual) | (%) | 0% | 1% | 3% | 5% | 2% | 3% | 3% |
| Percent Eligible Participating (Cumulative) | (%) | 0% | 1% | 4% | 9% | 11% | 14% | 17% |

| Increased DSM Case | Units | Historical | | | | Increased DSM Case (20% Increase) | | |
|---|---|---|---|---|---|---|---|---|
| | | 2008-2009 | 2010 | 2011 | 2012 | 2013 | 2014 | 2015 |
| Proposed Budget | ($) | | | | | 22,436,308 | 24,713,537 | 27,282,418 |
| Proposed Annual Savings | (kWh) | | | | | 14,300,000 | 14,300,000 | 14,300,000 |
| Savings per Participant | (kWh) | | | | | 1,430 | 1,300 | 1,192 |
| Participants per Dollar Spent | (participants) | | | | | 0.00045 | 0.00045 | 0.00044 |
| Increased Budget (20%) | ($) | | | | | 26,923,570 | 29,656,244 | 32,738,902 |
| Increased Annual Participants | (participants) | 1,041 | 2,196 | 11,563 | 21,000 | 12,000 | 13,200 | 14,400 |
| Increased Cumulative Participants | (participants) | 1,041 | 3,237 | 14,800 | 35,800 | 47,800 | 61,000 | 75,400 |
| Percent Eligible Increased Participating (Annual) | (%) | 0% | 1% | 3% | 5% | 3% | 3% | 3% |
| Percent Eligible Increased Participating (Cumulative) | (%) | 0% | 1% | 4% | 9% | 12% | 15% | 18% |

Source: Avon IR-3 (Revised April 18, 2012)
Also see Exhibit TW-2.

Testimony of Tim Woolf
Exhibit TW-5


**Rate Impacts of Energy Efficiency: Increased DSM**

| Year | Base DSM (Currently Proposed) | | | Increased DSM (20% Increase) | | | Difference Between Cases | | | | Increased Efficiency Rate Impacts | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | | | | | | | Efficiency Impacts | | | Incrmntl Impact |
| | Supply Rate | Demand Rate | Total | Supply Rate | Demand Rate | Total | Supply Rate | Demand Rate | Total | | Program Costs | T&D Savings | Energy & Capacity Savings | Energy & Capacity Savings |
| | (¢/kWh) | (¢/kWh) | (¢/kWh) | (¢/kWh) | (¢/kWh) | | (¢/kWh) | (¢/kWh) | (¢/kWh) | % | (¢/kWh) | (¢/kWh) | (¢/kWh) | (¢/kWh) |
| 2013 | 13.839 | 0.000 | 13.84 | 13.940 | 0.000 | 13.94 | 0.101 | 0.000 | 0.101 | 0.73% | 0.616 | 0.000 | -0.012 | -0.002 |
| 2014 | 14.012 | 0.000 | 14.01 | 14.121 | 0.000 | 14.12 | 0.109 | 0.000 | 0.109 | 0.78% | 0.678 | 0.000 | -0.026 | -0.004 |
| 2015 | 14.171 | 0.000 | 14.17 | 14.285 | 0.000 | 14.28 | 0.113 | 0.000 | 0.113 | 0.80% | 0.749 | 0.000 | -0.068 | -0.011 |
| 2016 | 13.686 | 0.000 | 13.69 | 13.675 | 0.000 | 13.68 | -0.011 | 0.000 | -0.011 | -0.08% | 0.000 | 0.000 | -0.065 | -0.011 |
| 2017 | 13.812 | 0.000 | 13.81 | 13.799 | 0.000 | 13.80 | -0.013 | 0.000 | -0.013 | -0.09% | 0.000 | 0.000 | -0.078 | -0.013 |
| 2018 | 13.957 | 0.000 | 13.96 | 13.945 | 0.000 | 13.95 | -0.012 | 0.000 | -0.012 | -0.08% | 0.000 | 0.000 | -0.071 | -0.012 |
| 2019 | 14.101 | 0.000 | 14.10 | 14.090 | 0.000 | 14.09 | -0.011 | 0.000 | -0.011 | -0.08% | 0.000 | 0.000 | -0.067 | -0.011 |
| 2020 | 14.243 | 0.000 | 14.24 | 14.233 | 0.000 | 14.23 | -0.011 | 0.000 | -0.011 | -0.08% | 0.000 | 0.000 | -0.065 | -0.011 |
| 2021 | 14.386 | 0.000 | 14.39 | 14.375 | 0.000 | 14.38 | -0.011 | 0.000 | -0.011 | -0.08% | 0.000 | 0.000 | -0.066 | -0.011 |
| 2022 | 14.523 | 0.000 | 14.52 | 14.511 | 0.000 | 14.51 | -0.012 | 0.000 | -0.012 | -0.09% | 0.000 | 0.000 | -0.074 | -0.012 |
| 2023 | 14.659 | 0.000 | 14.66 | 14.644 | 0.000 | 14.64 | -0.015 | 0.000 | -0.015 | -0.10% | 0.000 | 0.000 | -0.087 | -0.015 |
| 2024 | 14.801 | 0.000 | 14.80 | 14.786 | 0.000 | 14.79 | -0.015 | 0.000 | -0.015 | -0.10% | 0.000 | 0.000 | -0.093 | -0.015 |
| 2025 | 14.950 | 0.000 | 14.95 | 14.935 | 0.000 | 14.93 | -0.015 | 0.000 | -0.015 | -0.10% | 0.000 | 0.000 | -0.093 | -0.015 |
| 2026 | 15.103 | 0.000 | 15.10 | 15.088 | 0.000 | 15.09 | -0.015 | 0.000 | -0.015 | -0.10% | 0.000 | 0.000 | -0.090 | -0.015 |
| 2027 | 15.255 | 0.000 | 15.26 | 15.240 | 0.000 | 15.24 | -0.015 | 0.000 | -0.015 | -0.10% | 0.000 | 0.000 | -0.089 | -0.015 |
| 2028 | 15.428 | 0.000 | 15.43 | 15.417 | 0.000 | 15.42 | -0.011 | 0.000 | -0.011 | -0.07% | 0.000 | 0.000 | -0.066 | -0.011 |
| 2029 | 15.609 | 0.000 | 15.61 | 15.603 | 0.000 | 15.60 | -0.006 | 0.000 | -0.006 | -0.04% | 0.000 | 0.000 | -0.035 | -0.006 |
| **Average** | | | 14.50 | | | 14.51 | | | 0.009 | 0.07% | 0.120 | 0.000 | -0.067 | -0.011 |

Source: See Exhibit TW-2 for inputs.
Note: Demand rates do not apply to residential customers.

Testimony of Tim Woolf
Exhibit TW-5
Page 2 of 2

**Bill Impacts of Energy Efficiency: Increased DSM Bills**

| Year | Rates - All Customers | | Base DSM Case | | Participant | | | | Non-Participant | | | | Customers on Average | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | Base DSM | Increased DSM | | | Increased DSM | | Incrmntl Bill Impact | | Increased DSM | | Incrmntl Bill Impact | | Increased DSM | | Incrmntl Bill Impact | |
| | Average Rate | Average Rate | Usage | Average Monthly Bill | Usage | Average Monthly Bill | Dollars | Percent | Usage | Average Monthly Bill | Dollars | Percent | Usage | Average Monthly Bill | Dollars | Percent |
| Units -> | (¢/kWh) | (¢/kWh) | (kWh) | ($) | (kWh) | ($) | ($) | (%) | (kWh) | ($) | ($) | (%) | (kWh) | ($) | ($) | (%) |
| 2013 | 13.8 | 13.9 | 750 | 114.6 | 631 | 98.8 | -15.86 | -13.8% | 750 | 115.4 | 0.75 | 0.7% | 747 | 115.0 | 0.68 | 0.6% |
| 2014 | 14.0 | 14.1 | 750 | 115.9 | 631 | 99.9 | -16.01 | -13.8% | 750 | 116.7 | 0.81 | 0.7% | 744 | 115.8 | 0.66 | 0.6% |
| 2015 | 14.2 | 14.3 | 750 | 117.1 | 631 | 100.9 | -16.17 | -13.8% | 750 | 118.0 | 0.85 | 0.7% | 740 | 116.5 | 0.60 | 0.5% |
| 2016 | 13.7 | 13.7 | 750 | 113.5 | 631 | 97.1 | -16.38 | -14.4% | 750 | 113.4 | -0.08 | -0.1% | 740 | 112.0 | -0.31 | -0.3% |
| 2017 | 13.8 | 13.8 | 750 | 114.4 | 631 | 97.9 | -16.54 | -14.5% | 750 | 114.3 | -0.10 | -0.1% | 740 | 112.9 | -0.33 | -0.3% |
| 2018 | 14.0 | 13.9 | 750 | 115.5 | 631 | 98.8 | -16.71 | -14.5% | 750 | 115.4 | -0.09 | -0.1% | 740 | 114.0 | -0.32 | -0.3% |
| 2019 | 14.1 | 14.1 | 750 | 116.6 | 631 | 99.7 | -16.87 | -14.5% | 750 | 116.5 | -0.08 | -0.1% | 740 | 115.1 | -0.32 | -0.3% |
| 2020 | 14.2 | 14.2 | 750 | 117.7 | 631 | 100.6 | -17.04 | -14.5% | 750 | 117.6 | -0.08 | -0.1% | 740 | 116.2 | -0.31 | -0.3% |
| 2021 | 14.4 | 14.4 | 750 | 118.7 | 631 | 101.5 | -17.21 | -14.5% | 750 | 118.6 | -0.08 | -0.1% | 740 | 117.2 | -0.31 | -0.3% |
| 2022 | 14.5 | 14.5 | 750 | 119.8 | 631 | 102.4 | -17.39 | -14.5% | 750 | 119.7 | -0.09 | -0.1% | 740 | 118.3 | -0.32 | -0.3% |
| 2023 | 14.7 | 14.6 | 750 | 120.8 | 631 | 103.2 | -17.56 | -14.5% | 750 | 120.7 | -0.11 | -0.1% | 740 | 119.3 | -0.34 | -0.3% |
| 2024 | 14.8 | 14.8 | 750 | 121.8 | 631 | 104.1 | -17.74 | -14.6% | 750 | 121.7 | -0.12 | -0.1% | 741 | 120.3 | -0.35 | -0.3% |
| 2025 | 15.0 | 14.9 | 750 | 123.0 | 631 | 105.0 | -17.91 | -14.6% | 750 | 122.8 | -0.12 | -0.1% | 741 | 121.4 | -0.35 | -0.3% |
| 2026 | 15.1 | 15.1 | 750 | 124.1 | 631 | 106.0 | -18.09 | -14.6% | 750 | 124.0 | -0.11 | -0.1% | 741 | 122.6 | -0.34 | -0.3% |
| 2027 | 15.3 | 15.2 | 750 | 125.2 | 631 | 107.0 | -18.27 | -14.6% | 750 | 125.1 | -0.11 | -0.1% | 741 | 123.7 | -0.34 | -0.3% |
| 2028 | 15.4 | 15.4 | 750 | 126.5 | 631 | 108.1 | -18.45 | -14.6% | 750 | 126.5 | -0.08 | -0.1% | 744 | 125.5 | -0.25 | -0.2% |
| 2029 | 15.6 | 15.6 | 750 | 127.9 | 631 | 109.3 | -18.64 | -14.6% | 750 | 127.9 | -0.04 | 0.0% | 747 | 127.3 | -0.13 | -0.1% |
| **Average:** | | | | 119.6 | | 102.4 | -17.2 | -14.4% | | 119.7 | 0.07 | 0.06% | | 118.4 | -0.14 | -0.12% |
| **Cumulative Present Value:** | | | | 1171 | | 1,002.9 | -167.8 | -14.3% | | 1,172.1 | | | | 1,160.0 | | |
| **Levelized:** | | | | 125.5 | | 107.5 | -18.0 | -14.3% | | 125.7 | | | | 124.4 | | |

Source: See Exhibit TW-2 for inputs.