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 2012
E-ENSC-R-10 / Matter No. MO3669

Direct Testimony of
Tim Woolf

On Behalf of
Nova Scotia Utility and Review Board Counsel

On the Topic of
Efficiency Nova Scotia Corporation's
Electricity Demand Side Management Plan for 2012

April 8, 2011

Table of Contents

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 programs 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. What is the purpose of your testimony?

A. The purpose of my testimony is to provide a general assessment of the pace at which Efficiency Nova Scotia Corporation (ENSC) is ramping up its efficiency programs over time. The efficiency program budgets levels in the 2012 Demand Side Management (DSM) Plan deviate from the budget levels in the most recent IRP. Board counsel has asked me to assess and comment on whether the deviations are appropriate, from a long-term perspective. In addition, Board counsel has asked me to comment on how to consider rate impacts of efficiency programs, as this issue can sometimes affect the pace at which efficiency programs are ramped up over time.

Q. How is your testimony organized?

A. My testimony is organized as follows:

1. Introduction and Qualifications.
2. Summary of Conclusions and Recommendations.
3. Pace of Implementation of Efficiency Programs.
4. Rate and Bill Impacts of Efficiency Programs.

2. SUMMARY OF CONCLUSIONS AND RECOMMENDATIONS

Q. Please summarize your primary recommendations regarding the pace at which efficiency programs are ramped up over time.

A. I offer the following recommendations with regard to program ramp-up:

- ENSC should have an obligation to implement all cost-effective energy efficiency resources. This should be the fundamental principle underlying the energy efficiency savings in future DSM Plans.
- I recommend that ENSC conduct a thorough assessment of the potential for all cost-effective energy efficiency opportunities, for the next DSM Plan.
- I recommend ENSC include in all future DSM Plans at least a three-year projection of energy efficiency savings, from both customer funded efficiency programs and outside sources of efficiency savings. Such a projection should provide the Board and other stakeholders with a more

clarity of how ENSC will meet the future energy savings goals. These projections could also be used to inform future IRPs.

- I also recommend that if ENSC intends to deviate from the energy savings targets in the most recent IRP or DSM Plan, then it must first demonstrate why it is appropriate to do so, including a complete description of the reasons why the savings targets are unobtainable.

Q. Please summarize you primary recommendations regarding rate impacts of energy efficiency programs.

A. I offer the following recommendations with regard to rate impacts of energy efficiency programs:

- ENSC should not be allowed to limit DSM budgets for the purpose of mitigating rate impacts, unless there is sufficient analysis and clear evidence that the expected rate impacts are unacceptable relative to the benefits offered by the efficiency programs.

- Several key principles should be applied in quantifying rate impacts. At a minimum, rate impact estimates should account for all costs and benefits that affect rates, should estimate impacts on bills as well as rates, should account for long-term impacts, and should quantify the number and type of program participants.

- When assessing rate impacts, the extent of program participation should be an important factor, and ENSC should design energy efficiency programs to achieve high levels of participation.

- When considering options to mitigate rate impacts, ENSC and other stakeholders should consider the option of increasing program budgets in order to increase program participation.

- When assessing whether certain rate and bill impacts are acceptable, ENSC should compare them with the overall benefits of the efficiency programs, including benefits that accrue to all customers.

3. RAMP UP SCHEDULE OF EFFICIENCY PROGRAMS

Q. Please summarize the general conclusions from the 2007 IRP and the 2009 IRP with regard to the implementation of energy efficiency programs.

A. The 2007 IRP identified a large potential for cost-effective energy efficiency resources in Nova Scotia, and set a course for the province to undertake a major initiative to develop those resources at a relatively rapid pace. The 2007 IRP concluded that the long-term resource plan containing the high level of DSM resources – based on spending five percent of NSPI revenues on energy efficiency programs – resulted in the lowest costs to NSPI ratepayers by a significant margin.[1]

The 2009 IRP maintained the same high level of DSM resources as the 2007 IRP. The 2009 IRP included cost-effective DSM resources that were sufficient to reduce electricity use by roughly two percent per year.[2]

The energy efficiency budgets and savings targets from the 2009 IRP are presented in Figure 4.1 in the ENSC Evidence, page 11. For the year 2012, the incremental energy savings target from energy efficiency activities was 205 GWh per year.

Q. Have NPSI been successful in achieving the 2009 IRP targets to date?

A. Yes. For 2008 and 2009 NSPI was able to exceed the IRP savings targets, by a significant margin.[3] For 2010 NSPI was able to approximately meet the energy and capacity savings targets of the 2009 IRP.[4] In my view, NSPI should be lauded for achieving these relatively aggressive energy efficiency targets in the first three years of this new DSM initiative.

---

1 Nova Scotia Power Incorporated, *Integrated Resource Plan Report*, July 2007, (2007 IRP), pages 18-20.

2 Nova Scotia Power Incorporated, *Integrated Resource Plan Update Report*, November 2009, (2009 IRP), page 47.

3 Efficiency Nova Scotia Corporation, *Evidence of ENSC as DSM Administrator*, February 28, 2010 (ENSC Evidence), page 12, Figure 4.3.

4 ENSC Evidence, pages 11-12, Figures 4.1 and 4.2. H. Gil Peach & Associates, *Savings Verification Study of the DSM Administrator's 2010 Demand Side Management Programs*, March 2011, page 6, Table 2.

Q. Does the 2012 DSM Plan budget deviate from the program cost that was proposed in the 2009 IRP?

A. Yes. The 2009 IRP included a program cost of $61 million for 2012, but the 2012 DSM Plan includes a budget of $43.7 million. ENSC explains that it will be able to achieve the energy savings targets from the 2009 IRP with this lower budget level by including energy savings from other sources.[5]

Q. Please explain how ENSC expects to get energy savings from other sources.

A. The sources of the energy savings for the 2012 DSM Plan are presented in the Table 1 below.[6] The savings from the energy efficiency programs implemented by ENSC are expected to save roughly 124 GWh of energy in 2012.

Table 1. Energy Savings from the 2012 DSM Plan and Other Sources

Source of Efficiency Savings	Incremental Annual Energy Savings (GWh)
ENSC 2012 Residential DSM Programs	50.1
ENSC 2012 Commercial/Industrial DSM Programs	74.1
ENSC 2012 Programs Total	124.2
Overachievements from 2008 – 2009 DSM	19.5
Extra-Large Industrial Projects	80.0
Adoption of Codes and Standards	10.0
Total from ENSC and Other Sources	233.6
2009 IRP Savings Target	205

In addition, there are three other sources of energy savings that ENSC is including as part of the 2012 DSM Plan Savings. First, it includes "overachievements from 2008-2009 DSM," which represents 19.5 GWh of energy savings that will persist through 2012. Second, it includes energy savings from extra-large industrial (ELI) customers who implement their own energy efficiency measures without assistance from ENSC, which represents 80 GWh of savings in 2012. Third, it includes energy savings from the adoption of codes and standards, which represents 10 GWh of energy savings in 2012.

[5] All the savings estimates presented here are from ENSC Evidence, Figure 4.1, page 13; and Figure 5.1, page 14.

[6] Figure 5.1 of ENSC Evidence, page 14.

The energy savings from the ENSC energy efficiency programs combined with these three additional sources of efficiency savings results in a total of roughly 234 GWh of energy savings in 2012. This total amount is higher than the 2009 IRP energy savings target for 2012 of 205 GWh.

Q. Why does ENSC include the energy savings from these other sources as part of its 2012 DSM Plan?

A. ENSC includes these other sources in order present total energy savings that are consistent with the savings targets of the 2009 IRP. ENSC explains that the 2009 IRP explicitly included energy savings from sources both inside and outside of customer-funded DSM programs.[7] ENSC claims that these other sources of energy savings – particularly the outside sources of savings from ELI and codes and standards – should be presented in the 2012 DSM Plan in order to allow for a proper comparison between 2012 DSM Plan savings and 2009 IRP targets. ENSC claims that, from this perspective, it is able to achieve the 2012 energy savings goals of the 2009 IRP with a budget that is significantly lower than the one anticipated at that time.[8]

Q. Do you agree with the way that ENSC has included the savings from other sources as part of its 2012 DSM Plan?

A. Yes. First, the 2009 IRP savings targets explicitly include potential savings from sources outside of customer funded DSM programs, as well as savings from those programs.[9] Therefore, in order to make a meaningful comparison between the 2009 IRP savings and the 2012 DSM Plan savings it is necessary to present these additional sources of savings. One of the key guiding principles of the 2012 DSM Plan is to meet the IRP targets. Therefore, it is important to put the ENSC DSM programs in the full context of those targets.

Second, it is important that the savings and budget information for DSM Plans in general be presented in a way that is as comprehensive and transparent as possible. Providing estimates of energy savings from outside sources of

[7] ENSC Evidence, pages 13-15.
[8] ENSC Evidence, page 13.
[9] 2009 IRP Report, Appendix D, Attachment 1, page 50.

efficiency savings – explicitly identified and broken out from the savings from the ENSC initiatives – provides the Board and other stakeholders a more complete picture of the ENSC initiatives as they relate to other opportunities for savings in Nova Scotia.

Q. Do you agree with the ENSC proposal to use a lower budget amount for the 2012 DSM Plan than the amount contained in the 2009 IRP?

A. As noted above, an assessment of the 2012 DSM budget is outside the scope of my testimony. Mel Whalen will address budget issues in his testimony on behalf of the Board. The focus of my testimony is on the long-term ramp-up schedule of the ENSC programs.

On that issue, I recommend that the Board require ENSC to ensure that future year DSM plans continue to meet the savings targets of the 2009 IRP (as well as targets from future IRPs). In future years it will be more challenging to achieve the IRP savings targets, even after including the savings from other sources. The IRP savings targets are considerably higher in 2013 than in 2012, and most of the additional savings may need to come from the ENSC DSM programs.

ENSC notes that its estimate of savings from ELI efficiency projects will undergo evaluation in 2011.[10] ENSC also notes that it will work on its approach to assessing the savings from codes and standards in 2011 and 2012, in consultation with stakeholders.[11] These activities will be important in order to allow for a better understanding of the role that these outside sources will play in meeting future IRP savings targets.

I recommend that the Board require ENSC in future DSM Plans to explicitly identify and document the expected savings associated with outside sources of efficiency savings, as well as the expected costs and savings associated with the customer funded DSM programs. The distinction between the types of efficiency activities may become increasingly important as future energy efficiency goals become more difficult to attain.

[10] ENSC Evidence, page 15.
[11] ENSC Evidence, page 17.

Q. How do the 2012 DSM Plan energy savings goals fit in a long-term plan for ramping up energy efficiency programs in Nova Scotia?

A. This issue was addressed in some detail in a report prepared for ENSC by Dunsky Energy Consulting.[12] The Dunsky report notes that the interim energy savings targets for the 2011-2013 timeframe may be overly ambitious. The report notes that the energy savings targets in the 2009 IRP are ambitious relative to other program administrators, and that the pace at which these savings are to be achieved is especially ambitious. The Dunsky report suggests that it may be appropriate to consider an alternative ramp-up schedule where lower energy savings are achieved in early years and higher energy savings are achieved in later years.[13] The report does not present a specific set of energy saving goals for future years; instead it presents alternative schedules for illustrative purposes only.

Q. What are your views on the concept of an alternative ramp-up schedule as proposed in the Dunsky report?

A. There is no question that the energy savings goals for 2013 are ambitious. There is also no question that the pace at which Nova Scotia is ramping up to these goals is ambitious.

On the other hand, NSPI has to date been very successful in achieving the ambitious energy savings goals for 2008, 2009 and 2010. In addition, the efficiency programs currently being offered by ENSC are very cost-effective and offer significant benefits to electricity customers and society in general. From a Total Resource Cost perspective the 2012 programs have a benefit-cost ratio of 1.9. From a Program Administrator Cost Perspective the 2012 programs have a benefit-cost ratio of 3.1. This means that every dollar spent on efficiency by ENSC results in three dollars of reduced electricity costs in Nova Scotia. Furthermore, ENSC has not claimed that it will be unable to meet the IRP goals

[12] ENSC Evidence, Appendix C, Dunsky Energy Consulting, *Electricity Demand Side Management Review*, November 25, 2010, (Dunsky report) pages 21-23.

[13] See the Dunsky report, page 22, Figure 4.

for 2013, nor has it presented any evidence as to why it might not be able to meet those goals.[14]

In my view it is premature to draw any firm conclusions about an alternative ramp-up schedule at this time. It may turn out that an alternative ramp-up schedule – with lower savings in early years and greater saving in later years – is appropriate. However, before adopting an alternative ramp-up schedule, ENSC must make a clear case to the Board and other stakeholders as to why an alternative schedule is necessary.

Q. What do you recommend with regard to the rate at which ENSC ramps up the energy efficiency programs?

A. I recommend that the Board confirm that ENSC has an obligation to implement all cost-effective energy efficiency resources. This should be the fundamental principle underlying each year's DSM Plan, as well as the long-term rate at which energy efficiency programs are ramped up. Of course, there are limits to the amount of cost-effective efficiency resources that can be achieved in any one year. ENSC should attempt to implement all the cost-effective efficiency resources that can reasonably be achieved in each year.

The 2009 IRP includes a set of energy efficiency targets that – while aggressive – were expected to be achievable. Unless and until the Board is presented with evidence to indicate that these targets are not achievable they should remain the targets that are used for the annual DSM Plans.

With regard to the 2012 DSM Plan savings, I concur with my colleague Mel Whalen that ENSC should at least maintain, if not exceed, the savings goals from the 2011 DSM Plan.

Q. Do you have any additional recommendations for how the Board should consider the rate at which ENSC ramps up the energy efficiency programs?

A. Yes. I have several additional recommendations.

[14] See, ENSC Response to Synapse Information Requests IR-8 and IR-11.

I recommend that ENSC conduct a thorough assessment of the potential for all cost-effective energy efficiency opportunities, for the next DSM Plan. The 2009 IRP included energy efficiency assumptions that were taken almost entirely from the 2007 IRP. Many factors affecting energy efficiency potential, cost-effectiveness and achievability may have changed since 2007. In particular, there will have been several years of experience in delivering efficiency programs at a relatively aggressive rate, and there will certainly be more detailed and updated information relative to the 2007 IRP assumptions.

I recommend ENSC include in all future DSM Plans at least a three-year projection of energy efficiency savings, from both customer funded efficiency programs and outside sources of efficiency savings. Such a projection should provide the Board and other stakeholders with a more clarity of how ENSC will meet the future energy savings goals. These projections could also be used to inform future IRPs.

I also recommend that if ENSC intends to deviate from the energy savings targets in the most recent IRP or DSM Plan, then it must first demonstrate why it is appropriate to do so, including a complete description of the reasons why the savings targets are unobtainable.

Finally, I recommend that if ENSC or other stakeholders propose that IRP or DSM Plan targets cannot be met in the future as a result of concerns about customer rate impacts, that this issue be investigated thoroughly before any decision is reached to depart from IRP or DSM Plan targets. I address this issue in more detail in the next section of my testimony.

4. RATE IMPACTS OF ENERGY EFFICIENCY PROGRAMS

Q. Why is it important for the Board to be thinking at this time about the rate impacts associated with energy efficiency programs?

A. The energy efficiency programs implemented by ENSC are funded by a set of charges to NSPI customers. In many jurisdictions it is common for stakeholders to raise concerns about rate impacts of energy efficiency programs, and to

recommend that budgets be limited in order to mitigate against rate impacts that are perceived to be too high. I believe that this is an appropriate time for the Board to clarify that the Nova Scotia DSM budgets should not be limited for the purpose of mitigating rate impacts, unless there is sufficient analysis and clear evidence that the rate impacts are unacceptable relative to the benefits offered by the efficiency programs.

Q. Why have you raised concerns about the rate impacts of the 2012 DSM plan?

A. I raise this issue at this time because the ENSC energy efficiency budgets are relatively high and expected to increase in future years. I expect that one or more stakeholders will raise this issue in future DSM Plan proceedings. The extent to which ENSC will be able to achieve the aggressive ramp-up schedule in the 2009 IRP may hinge upon stakeholder concerns about rate impacts.

Q. What is your primary recommendation with regard to addressing rate impacts of energy efficiency programs?

I recommend that the Board establish several key principles regarding how to quantify and assess rate impacts, so that they can be properly evaluated if and when the issue is brought to the Board.

Q. Why is it important to establish key principles about how to quantify and assess rate impacts of energy efficiency programs?

A. First, if stakeholders argue that rate impacts should be a factor limiting the ramp-up of energy efficiency programs, it is important that the actual rate impacts be properly quantified and analyzed. Such analysis should provide concrete evidence as to the magnitude of potential rate impacts, relative to the benefits provided by the efficiency programs. Otherwise, the important decision of energy efficiency program size and ramp-up rate will be based on abstract arguments and perceived, undocumented concerns.

Second, there are many different ways to quantify and present rate impacts. With many energy efficiency programs there may be a trade-off between short-term increases in rates versus long-term reductions in customer bills. It is important

that the full, long-term impact on rates and bills be assessed in a comprehensive way.

Third, there are several other considerations that should be kept in mind when evaluating rate impacts of energy efficiency programs. In particular, equity issues between program participants and non-participants are of critical importance, and these issues should be addressed in a meaningful way.

Q. Please elaborate. What principles would you recommend be applied when quantifying rate impacts of efficiency programs?

A. I recommend the following principles be applied when quantifying rate impacts of energy efficiency programs:

- 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, avoided distribution costs, and avoided environmental compliance costs.

Q. Once rate and bill impacts of energy efficiency programs are properly quantified, what are the additional factors to consider in deciding whether specific rate impacts are acceptable?

A. I recommend that three important factors be considered in deciding whether specific rate impacts are acceptable: the level of program participation, program design issues, and overall benefits of the efficiency programs.

Q. Why should the level of program participation be considered when assessing rate impacts of energy efficiency programs?

A. The primary concern about rate impacts has to do with customer equity. In general, customers who participate in energy efficiency programs will benefit directly in terms of lower bills – despite any rate increases. Customers who do not participate in the programs will see their bills increase. These are the customers that the Board, and other stakeholders, should be most concerned about when considering the rate and bill impacts of energy efficiency programs. In order to assess the rate and bill impacts on non-participants, it is important to take a look at who they are and what portion of total customers they represent.

Q. Once the number of program participants and non-participants has been properly estimated, how should this information be used?

A. 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. If a large portion of customers participate in energy efficiency programs, then the Board and other stakeholders should be willing to accept relatively high rate impacts, because many customers will experience bill reductions and few customers will experience bill increases. Once energy efficiency programs reach a point where the majority of customers participate in the programs, then concerns about rate impacts should be significantly mitigated.

Q. Are there actions that the Board and ENSC can take to maximize customer participation in the energy efficiency programs?

A. Yes. First, the energy efficiency program budgets can be set in a way to increase customer participation. The typical response to rate impact concerns is to limit or even reduce energy efficiency program budgets. Unfortunately, this response tends to limit customer participation and increase the number of customers that experience bill increases – even though the bill increase might be smaller. A better response might be to do just the opposite: to increase energy efficiency program budgets in order to reduce the number of customers that experience bill increases.

Q. Is there another approach that the Board and ENSC can take to maximize customer participation in the energy efficiency programs?

A. Yes. The energy efficiency programs can be designed in a way that encourages as much participation as possible, across as broad a variety of customer types as possible. In particular, energy efficiency programs can be designed to:

- promote all types of end-uses that offer cost-effective savings;
- provide all customer types with an opportunity to participate, including hard-to-reach customers such as low-income customers;
- offer efficiency measures that are specifically tailored to many different customer types;
- provide financial and other incentives that are sufficient to help overcome the market barriers that prevent customers from participating; and
- identifying, targeting and actively pursuing non-participants.

Programs that incorporate these design principles will be more likely to reach a large number of customers, and eventually increase program participation.

Q. You have emphasized that non-participants typically see bill increases from energy efficiency programs. Are you suggesting that non-participants do not experience any benefits of energy efficiency programs?

A. No, not at all. It is important to remember that all customers experience benefits of energy efficiency programs – regardless of whether they participate in the

programs. Energy efficiency provides benefits to the entire electricity system, and these benefits are shared by all customers. In particular, energy efficiency can improve system reliability, reduce the need for generation, reduce transmission and distribution costs, reduce the costs of complying with environmental mandates, and reduce reliance upon fossil fuels. Efficiency also results in societal benefits such as reduced environmental impacts and increased economic development.

My main point is that concerns about rate impacts are rooted in customer equity issues between participants and non-participants, because participants experience direct benefits from energy efficiency (i.e., reduced bills from reduced consumption) that non-participants do not experience. Therefore, when addressing rate impact issues, it is important to fully understand and address this customer equity issue.

Q. You mentioned above that the overall benefits of efficiency programs should be a factor in assessing rate impacts. What do you mean by this?

A. It is important to recognize that while energy efficiency can increase rates it also results in a variety of important benefits. One of the Board's goals should be to strike the appropriate balance between increasing rates and achieving the overall benefits of energy efficiency programs. When considering whether a certain level of rate impact is acceptable, the Board and other stakeholders should weigh the increased rates against the many benefits of the efficiency program – particularly the extent to which the programs reduce total electricity costs.[15]

In fact, if the Board or other stakeholders are considering limiting energy efficiency program budgets due to rate impacts, then there should be a thorough analysis to compare two different scenarios: (a) the higher efficiency budgets with higher rate impacts and greater benefits, versus (b) the lower efficiency budgets with lower rate impacts, and reduced benefits. In this way, the Board and other

[15] In this context, the Program Administrator Cost test is the best perspective to use in assessing cost reductions, as this test includes only those costs and benefits that affect customer rates. My colleague, Mel Whalen, will address cost-effectiveness tests in more detail in his testimony.

stakeholders will have the information necessary to strike the appropriate balance between program rate impacts and program benefits.

Q. Has ENSC or NSPI conducted any analyses to quantify the rate impacts associated with the 2012 DSM Plan?

A. Not to my knowledge. As noted above, I believe that this issue has not yet risen to that level.

I note that the 2009 IRP includes some information on the potential rate impacts of the various resource plans that were analyzed and compared for that study.[16] While it is encouraging that this issue was analyzed in the 2009 IRP, the analysis was not designed in a way to specifically answer the question of whether the rate impacts of the energy efficiency programs are acceptable. The analysis compared several resource plans, but each resource plan contained the same amount of energy efficiency resources. Therefore, the results do not provide any indication of the rate impacts specifically associated with the energy efficiency resources. Furthermore, the analysis in the 2009 IRP did not consider bill impacts – a critical component of the rate impact analysis.

Q. Are you recommending that ENSC conduct analyses of the rate and bill impacts of its energy efficiency programs at this time?

A. No, not necessarily. My point is that <u>if</u> concerns about rate impacts are used to slow the ramp-up rate of energy efficiency programs, then it is important for ENSC or NSPI to properly quantify and assess the rate and bill impacts of the energy efficiency programs. This is necessary in order to provide a clear basis for deciding whether and how rate impacts should affect the pace of the energy efficiency program ramp-up. Without such an analysis it is not possible to assess potential trade-offs between higher rates and the many benefits offered by greater energy efficiency savings.

Q. Does this conclude your pre-filed testimony?

A. Yes, it does.

[16] 2009 IRP, Appendix E, Attachment 1, page 75.

Tim Woolf

Vice President
Synapse Energy Economics, Inc.
485 Massachusetts Avenue, Suite 2, Cambridge, MA 02139
(617) 453-7031 • fax: (617)-661-0599
twoolf@synapse-energy.com

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

Rhode Island Public Utilities Commission (Docket No. 3790). Direct testimony regarding National Grid's Gas Energy Efficiency Programs. On behalf of the Division of Public Utilities and Carriers. April 2, 2007.

Rhode Island Public Utilities Commission (Docket No. 3765). Surrebuttal testimony regarding National Grid's Renewable Energy Standard Procurement Plan. On behalf of the Division of Public Utilities and Carriers. February 20, 2007.

Rhode Island Public Utilities Commission (Docket No. 3765). Direct testimony regarding National Grid's Renewable Energy Standard Procurement Plan. On behalf of the Division of Public Utilities and Carriers. January 17, 2007.

Minnesota Public Utilities Commission (Docket Nos. CN-05-619 and TR-05-1275). Direct testimony regarding the potential for energy efficiency as an alternative to the proposed Big Stone II coal project. On behalf of the Minnesota Center for Environmental Advocacy, Fresh Energy, Izaak Walton League of America, Wind on the Wires and the Union of Concerned Scientists. November 29, 2006.

Rhode Island Public Utilities Commission (Docket No. 3779). Oral testimony regarding the settlement of Narragansett Electric Company's 2007 Demand-Side Management Programs. On behalf of the Division of Public Utilities and Carriers. November 24, 2006.

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

Nevada Public Utilities Commission (Docket No. 06-06051). Direct testimony regarding Nevada Power Company's Demand-Side Management Plan in the 2006 Integrated Resource Plan. On behalf of the Nevada Bureau of Consumer Protection. September 13, 2006.

Nevada Public Utilities Commission (Docket Nos. 06-03038 & 06-04018). Direct testimony regarding the Nevada Power Company's and Sierra Pacfici Power Company's Demand-Side Management Plans. On behalf of the Nevada Bureau of Consumer Protection. June 20, 2006.

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.

South Dakota Public Utilities Commission (Docket No. EL04-016). Direct testimony regarding the avoided costs of the Java Wind Project. On behalf of the South Dakota Public Utilities Commission Staff. February 18, 2005.

Rhode Island Public Utilities Commission (Docket No. 3635). Oral testimony regarding the settlement of Narragansett Electric Company's 2005 Demand-Side Management Programs. On behalf of the Division of Public Utilities and Carriers. November 29, 2004.

British Columbia Utilities Commission. Direct testimony regarding the Power Smart programs contained in BC Hydro's Revenue Requirement Application 2004/05 and 2005/06. On behalf of the Sierra Club of Canada, BC Chapter. April 20, 2004.

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.

Québec Régie de l'énergie (Docket R-3473-01). Direct testimony of Timothy Woolf and Philp Raphals regarding Hydro-Québec's Energy Efficiency Plan: 2003-2006. On behalf of Regroupment national des Conseils régionaux de l'environnement du Québec. February 5, 2003.

Connecticut Department of Public Utility Control (Docket No. 01-10-10). Direct testimony regarding the United Illuminating Company's service quality performance standards in their performance-based ratemaking mechanism. On behalf of the Connecticut Office of Consumer Counsel. April 2, 2002.

Nevada Public Utilities Commission (Docket No. 01-7016). Direct testimony regarding the Nevada Power Company's Demand-Side Management Plan. On behalf of the Bureau of Consumer Protection, Office of the Attorney General. September 26, 2001.

US Department of Energy (Docket EE-RM-500). Oral testimony at a public hearing on marginal price assumptions for assessing new appliance efficiency standards. On behalf of the Appliance Standards Awareness Project. November 2000.

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.

Mississippi Public Service Commission (Docket No. 96-UA-389). Oral testimony on generation pricing and performance-based ratemaking. On behalf of the Mississippi Attorney General. February 16, 2000.

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.

New Hampshire Public Service Commission (Docket No. 99-099 Phase II). Oral testimony on standard offer services. On behalf of the Campaign for Ratepayers Rights. January 14, 2000.

West Virginia Public Service Commission (Case No. 98-0452-E-GI). Rebuttal testimony on codes of conduct. On behalf of the West Virginia Consumer Advocate Division. July 15, 1999.

West Virginia Public Service Commission (Case No. 98-0452-E-GI). Direct testimony on codes of conduct and other measures to protect consumers in a restructured electricity industry. On behalf of the West Virginia Consumer Advocate Division. June 15, 1999.

Massachusetts Department of Telecommunications and Energy (DPU/DTE 97-111). Direct testimony on Commonwealth Electric Company's energy efficiency plan, and the role of municipal aggregators in delivering demand-side management programs. On behalf of the Cape and Islands Self-Reliance Corporation. January 1998.

Delaware Public Service Commission (DPSC 97-58). Direct testimony on Delmarva Power and Light's request to merge with Atlantic City Electric. On behalf of the Delaware Public Service Commission Staff. May 1997.

Delaware Public Service Commission (DPSC 95-172). Oral testimony on Delmarva's integrated resource plan and DSM programs. On behalf of the Delaware Public Service Commission Staff. May 1996.

Colorado Public Utilities Commission (5A-531EG). Direct testimony on impact of proposed merger on DSM, renewable resources and low-income DSM. On behalf of the Colorado Office of Energy Conservation. April 1996.

Colorado Public Utilities Commission (3I-199EG). Direct testimony on impacts of increased competition on DSM, and recommendations for how to provide utilities with incentives to implement DSM. On behalf of the Colorado Office of Energy Conservation. June 1995.

Colorado Public Utilities Commission (5R-071E). Oral testimony on the Commission's integrated resource planning rules. On behalf of the Colorado Office of Energy Conservation. July 1995.

Colorado Public Utilities Commission (3I-098E). Direct testimony on the Public Service Company of Colorado's DSM programs and integrated resource plans. On behalf of the Colorado Office of Energy Conservation. April 1994.

REPORTS

Cape Light Compact Energy Efficiency Plan 2007-2012: Providing Comprehensive Energy Efficiency Services to Communities on Cape Cod and Martha's Vineyard, prepared for the Cape Light Compact, February 2007.

Comments on the Potential for Energy Efficiency Resources to Meet the Demand for Electricity in North Carolina, submitted to the North Carolina Utilities Commission, Docket E-100, Sub 110, prepared for the Southern Alliance for Clean Energy, February 2007.

Review of the District of Columbia Reliable Energy Trust Fund and Natural Gas Trust Fund Working Group and Regulatory Processes, prepared for the District of Columbia Office of People's Counsel, January 30, 2007.

Cape Light Compact Annual Report on Energy Efficiency Activities in 2005, sumbitted to the Massachusetts Department of Telecommunications and Energy and the Massachusetts Division of Energy Resources, prepared for the Cape Light Compact, July 2006.

Integrated Portfolio Management in a Restructured Supply Market, prepared for the Ohio Office of Consumer Counsel, with Resource Insight, June 2006.

Incorporating Energy Efficiency into the ISO-New England Forwared Capacity Market, prepared on behalf of Conservation Services Group. June 5 2006.

Climate Change and Power: Carbon Dioxide Emission Costs and Electricity Resource Planning, prepared for the Tallahassee Electric Utility, May 2006.

Study of Potential Mohave Alternative/Complementary Generation Resources, Pursuant to CPUC Decision 04-12-016, prepared for Southern California Edison, with Sargent and Lundy, November 2005.

Potential Cost Impacts of a Renewable Portfolio Standard in New Brunswick, prepared for the New Brunswick Department of Energy, October 2005.

Feasibilty Study of Alternative Energy and Advanced Energy Efficiency Technologies for Low-Income Housing in Massachusetts, prepared for the Low-Income Affordability Network, Action for Boston Community Development, and Action Inc., with Zapotec Energy, August 2005.

The Cape Light Compact Energy Efficiency Plan: Phase III 2005-2007: Providing Comprehensive Energy Efficiency Services to Communities on Cape Cod and Martha's Vineyard, prepared for the Cape Light Compact, April 2005.

Review of Avoided Costs Used in Minnesota Electric Utility Conservation Improvement Programs, prepared for the Minnesota Office of Legislative Auditor, November 2004.

NEEP Strategic Initiative Review: Qualittive Assessment and Initiative Ranking for the Residential Sector, prepared for the Northeast Energy Efficiency Partnerships, Inc., October 1, 2004.

A Balanced Energy Plan for the Interior West, prepared for the Hewlett Foundation Energy Series, with Western Resource Advocates and Tellus Institute, May 2004.

OCC Comments on Alternative Transitional Standard Offer, prepared for the Connecticut Office of Consumer Counsel, October 20, 2003.

Potential Cost Impacts of a Vermont Renewable Portfolio Standard, prepared for the Vermont Public Service Board, presented to the Vermont RPS Collaborative, October 16, 2003.

Portfolio Management: How to Procure Electricity Resources to Provide Reliable, Low-Cost, and Efficient Electricity Services to All Retail Customers, prepared for the Regulatory Assistance Project and the Energy Foundation, October 10, 2003.

Air Quality in Queens: Cleaning Up the Air in Queens County and Neighboring Regions, prepared for a collaboration of Natural Resources Defense Council, Keyspan Energy, and the Coalition Helping to Organize a Kleaner Environment, May 2003.

The Maryland Renewable Portfolio Standard: An Assessment of Potential Cost Impacts, prepared for the Maryland Public Interest Research Group, March 18, 2003.

The Cape Light Compact Energy Efficiency Plan: Phase II 2003-2007: Providing Comprehensive Energy Efficiency Services to Communities on Cape Cod and Martha's Vineyard, prepared for the Cape Light Compact, with Cort Richardson, the Vermont Energy Investment Corporation, and Optimal Energy Incorporated, March 2003.

Green Power and Energy Efficiency Opportunities for Municipalities in Massachusetts: Promoting Community Involvement in Energy and Environmental Decisions, prepared for the Massachusetts Energy Consumers Alliance, May 20, 2002.

The Energy Efficiency Potential in Williamson County, Tennessee: Opportunities for Reducing the Need for Transmission Expansion, prepared for the Harpeth River Watershed Association and the Southern Alliance for Clean Energy, April 4, 2002.

Electricity Restructuring Activities in the US: A Survey of Selected States, prepared for the Arizona Corporation Commission Utilities Division Staff, March 15, 2002.

Powering the South: A Clean and Affordable Energy Plan for the Southern United States, prepared with and for the Renewable Energy Policy Project and a coalition of Southern environmental advocates, January 2002.

Survey of Clean Power and Energy Efficiency Programs, prepared for the Ozone Transport Commission, January 14, 2002.

Proposal for a Renewable Portfolio Standard for New Brunswick, prepared for the Conservation Council of New Brunswick, presented to the New Brunswick Market Design Committee, December 12, 2001.

A Retrospective Review of FERC's Environmental Impact Statement on Open Transmission Access, prepared for the North American Commission for Environmental Cooperation, with the Global Development and Environment Institute, October 19, 2001.

Repowering the Midwest: The Clean Energy Development Plan for the Heartland, prepared for the Environmental Law and Policy Center and a coalition of Midwest environmental advocates, February 2001.

Marginal Price Assumptions for Estimating Customer Benefits of Air Conditioner Efficiency Standards, comments on the Department of Energy's proposed rules for efficiency standards for central air conditioners and heat pumps, on behalf of the Appliance Standards Awareness Project, December 2000.

The Cape Light Compact Energy Efficiency Plan: Providing Comprehensive Energy Efficiency Services to Communities on Cape Cod and Martha's Vineyard, prepared for the Cape Light Compact, November 2000.

Comments of the Citizens Action Coalition of Indiana, Workshop on Alternatives to Traditional Generation Resources, June 23, 2000.

Investigation into the July 1999 Outages and General Service Reliability of Delmarva Power & Light Company, prepared for the Delaware Public Service Commission Staff, with Exponent Failure Analysis, Docket No. 99-328, February 1, 2000.

Market Distortions Associated With Inconsistent Air Quality Regulations, prepared for the Project for a Sustainable FERC Energy Policy, November 18, 1999.

Measures to Ensure Fair Competition and Protect Consumers in a Restructured Electricity Industry in West Virginia, prepared for the West Virginia Consumer Advocate Division, Case No. 98-0452-E-GI, June 15, 1999.

Competition and Market Power in the Northern Maine Electricity Market, prepared for the Maine Public Utilities Commission, with Failure Exponent Analysis, November 1998.

New England Tracking System, a methodology for a region-wide electricity tracking system to support the implementation of restructuring-related policies, prepared for the New England Governors' Conference, with Environmental Futures and Tellus Institute, October 1998.

The Role of Ozone Transport in Reaching Attainment in the Northeast: Opportunities, Equity and Economics, prepared for the Northeast States for Coordinated Air Use Management, with the Global Development and Environment Institute, July 1998.

Grandfathering and Environmental Comparability: An Economic Analysis of Air Emission Regulations and Electricity Market Distortions, prepared for the National Association of Regulatory Utility Commissioners, with the Global Development and Environment Institute, June 1998.

Performance-Based Regulation in a Restructured Electric Industry, prepared for the National Association of Regulatory Utility Commissioners, with Resource Insight, the National Consumer Law Center, and Peter Bradford, February 1998.

Massachusetts Electric Utility Stranded Costs: Potential Magnitude, Public Policy Options, and Impacts on the Massachusetts Economy, prepared for the Union of Concerned Scientists, MASSPIRG and Public Citizen, November 1997.

The Delaware Public Service Commission Staff's Report on Restructuring the Electricity Industry in Delaware, prepared for the Delaware Public Service Commission Staff, Tellus Study No. 96-99, August 1997.

Preserving Public Interest Obligations Through Customer Aggregation: A Summary of Options for Aggregating Customers in a Restructured Electricity Industry, prepared for the Colorado Office of Energy Conservation, Tellus Study No. 96-130, May 1997.

Zero Carbon Electricity: the Essential Role of Efficiency and Renewables in New England's Electricity Mix, prepared for the Boston Edison Settlement Board, Tellus Study No. 94-273, April 1997.

Regulatory and Legislative Policies to Promote Renewable Resources in a Competitive Electricity Industry, prepared for the Colorado Governor's Office of Energy Conservation, Tellus Study No. 96-130-A5, January 1997.

Comments Regarding the Investigation of Restructuring the Electricity Industry in Delaware, on behalf of the Staff of the Delaware Public Service Commission, Docket No. 96-83, Tellus Study No. 96-99, November 1996.

Response of Governor's Office of Energy Conservation, Colorado Public Utilities Commission Questionnaire on Electricity Industry Restructuring,. Docket No. 96Q-313E, Tellus No. 96-130-A3, October 1996.

Position Paper of the Vermont Department of Public Service. Investigation into the Restructuring of the Electric Utility Industry in Vermont, Docket No. 5854, Tellus Study No. 95-308, March 1996.

Can We Get There From Here? The Challenge of Restructuring the Electricity Industry So That All Can Benefit, prepared for the California Utility Consumers' Action Network, Tellus Study No. 95-208 February 1996.

Promoting Environmental Quality in a Restructured Electric Industry, prepared for the National Association of Regulatory Utility Commissioners, Tellus Study No. 95-056, December 1995.

Comments to the Pennsylvania Public Utilities Commission Regarding an Investigation into Electric Power Competition, on behalf of the Pennsylvania Office of Consumer Advocate, Docket No. I-00940032, Tellus Study No. 95-260, November 1995.

Systems Benefits Funding Options. Prepared for Wisconsin Environmental Decade, Tellus Study No. 95-248, October 1995.

Achieving Efficiency and Equity in the Electricity Industry Through Unbundling and Customer Choice, Initial and Reply Comments of the New Jersey Division of Ratepayer Advocate, in an investigation into the future structure of the electric power industry, Docket No. EX94120585Y, Tellus Study No. 95-029-A3, September 1995.

Non-Price Benefits of BECO Demand-Side Management Programs, prepared for the Boston Edison Settlement Board, Tellus Study No. 93-174, August 1995.

Electric Resource Planning for Sustainability, prepared for the Texas Sustainable Energy Development Council, Tellus Study No. 94-114, February 1995.

ARTICLES AND PRESENTATIONS

Managing Electricity Industry Risk with Clean and Efficient Resources, The Electricity Journal, with John Nielson, David Berry and Ronald Lehr, Volume 18, Issue 2, March 2005.

Local Policy Measures to Improve Air Quality: A Case Study of Queens County, New York, Local Environment, Volume 9, Number 1, February 2004.

Future Outlook for Electricity Prices in Massachusetts, guest speaker before the Boston Green Buildings Task Force, December 18, 2003.

A Renewable Portfolio Standard for New Brunswick, guest speaker before the New Brunswick Market Design Committee, January 10, 2002.

What's New With Energy Efficiency Programs, Energy & Utility Update, National Consumer Law Center, Summer 2001.

Clean Power Opportunities and Solutions: An Example from America's Heartland, The Electricity Journal, July 2001.

Potential for Wind and Renewable Resource Development in the Midwest, speaker at WINDPOWER 2001, Washington, DC, June 7, 2001.

Electricity Market Distortions Associated With Inconsistent Air Quality Regulations, The Electricity Journal, April 2000.

Generation Information Systems to Support Renewable Potfolio Standards, Generation Performance Standards and Environmental Disclosure, on behalf of the Union of Concerned Scientists, presentation at the Massachusetts Restructuring Roundtable, March 2000.

Grandfathering and Coal Plant Emissions: the Cost of Cleaning Up the Clean Air Act, Energy Policy, with Ackerman, Biewald, White and Moomaw, vol. 27, no 15, December 1999, pages 929-940.

Challenges Faced by Clean Generation Resources Under Electricity Restructuring, speaker at the Symposium on the Changing Electric System in Florida and What it Means for the Environment, Tallahassee Florida, November 1999.

Follow the Money: A Method for Tracking Electricity for Environmental Disclosure, The Electricity Journal, May 1999.

New England Tracking System Project: An Electricity Tracking System to Support a Wide Range of Restructuring-Related Policies, speaker at the Ninth Annual Energy Services Conference and Exposition, Orlando Florida, December 1998

Efficiency, Renewables and Gas: Restructuring As if Climate Mattered, The Electricity Journal, Vol. 11, No. 1, January/February, 1998.

Flexible Pricing and PBR: Making Rate Discounts Fair for Core Customers, Public Utilities Fortnightly, July 15, 1996.

Overview of IRP and Introduction to Electricity Industry Restructuring, training session provided to the staff of the Delaware Public Service Commission, April, 1996.

Performance-Based Ratemaking: Opportunities and Risks in a Competitive Electricity Industry, The Electricity Journal, Vol. 8, No. 8, October, 1995.

Competition and Regulation in the UK Electric Industry, speaker at the Illinois Commerce Commission's workshop on Restructuring the Electric Industry, August, 1995.

Competition and Regulation in the UK Electric Industry, speaker at the British Columbia Utilities Commission Electricity Market Review, Vancouver, British Columbia, February, 1995.

Retail Competition in the Electricity Industry: Lessons from the United Kingdom, The Electricity Journal, Vol. 7, No. 5, June, 1994.

A Dialogue About the Industry's Future, The Electricity Journal, June, 1994.

Energy Efficiency in Britain: Creating Profitable Alternatives, Utilities Policy, July 1993.

It is Time to Account for the Environmental Costs of Energy Resources, Energy and Environment, Volume 4, No. 1, First Quarter, 1993.

Developing Integrated Resource Planning Policies in the European Community, Review of European Community & International Environmental Law, Energy and Environment Issue, Vol. 1, Issue 2. 1992.