Before the
New York Public Service Commission

Proceeding on Motion of the Commission as to the Rates, Charges, Rules and Regulations of Central Hudson Gas and Electric Corporation for Electric Service	))))	Case 17-E-0459

Direct Testimony of
Tim Woolf

On the Topic of
Energy Efficiency Earnings Adjustment Mechanisms

On Behalf of
The Natural Resources Defense Council

November 21, 2017

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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 economic and technical assessments of demand-side and supply-side energy resources; energy efficiency policies and programs; integrated resource planning; electricity market modeling and assessment; renewable resource technologies and policies; and climate change strategies. Synapse works for a wide range of clients, including state attorneys general, offices of consumer advocates, trade associations, public utility commissions, environmental advocates, the U.S. Environmental Protection Agency, U.S. Department of Energy, U.S. Department of Justice, the Federal Trade Commission, and the National Association of Regulatory Utility Commissioners. Synapse has over 25 professional staff with extensive experience in the electricity industry.

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) from 2007 through 2011. In that capacity, I was responsible for overseeing a substantial expansion of clean energy policies, including significantly increased ratepayer-funded energy efficiency programs; an update of the

DPU energy efficiency guidelines; the implementation of decoupled rates for electric and gas companies; the promulgation of net metering regulations; review and approval of smart grid pilot programs; and review and approval of long-term contracts for renewable power. I was also responsible for overseeing a variety of other dockets before the Commission, including several electric and gas utility rate cases.

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 at 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. My resume, attached as Exhibit TW-1, presents additional details of my professional and educational experience.

Q. Please summarize your professional experience regarding the New York Reforming the Energy Vision proceedings and earnings adjustment mechanisms in general.

A. I have participated in the New York Reforming the Energy Vision (REV) proceeding in several forums. I prepared a report for Advanced Energy Economy Institute on conducting benefit-cost analyses of distributed energy resources.[1] I helped prepare multiple comments and reply comments on behalf of the Natural Resources Defense

[1] Synapse Energy Economics, *Benefit Cost Analysis for Distributed Energy Resources: A Framework for Accounting for All Relevant Costs and Benefits*, prepared for Advanced Energy Economy Institute, October 2014, available at: http://www.synapse-energy.com/project/benefit-cost-analysis-distributed-energy-resources.

Council and others in the proceedings on the Commission's Track One Straw Proposal, the Commission's Benefit-Cost Analysis White Paper, the Commission's Track Two White Paper, and the New York electric utilities' Distribution System Implementation Plans. I also prepared a white paper for multiple parties on the potential for implementing greater amounts of cost-effective energy efficiency resources in New York.[2]

I have been engaged in several other states in developing performance incentive mechanisms (i.e., earnings adjustment mechanisms), including Hawaii, Massachusetts, New Hampshire, and Rhode Island. I have also prepared a manual for regulators for how to design performance incentive mechanisms, which has been highly utilized throughout many states.[3]

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

A. I am testifying on behalf of the Natural Resources Defense Council.

Q. Have you previously testified before the New York Public Service Commission?

A. Yes. I testified in the Niagara Mohawk rate case, Case 17-E-0238, on behalf of Advanced Energy Economy, on the topic of Earning Adjustment Mechanisms (EAMs).

[2] Synapse Energy Economics, *Aiming Higher: Realizing the Full Potential of Cost-Effective Energy Efficiency in New York*, prepared for Natural Resources Defense Council, E4TheFuture, CLEAResult, Lime Energy, Association for Energy Affordability, and Alliance for Clean Energy New York, April 2016, available at: http://www.synapse-energy.com/project/support-ny-rev-track-2-changes-regulatory-designs-and-incentives-structures.

[3] Synapse Energy Economics, *Performance Incentive Mechanisms: A Handbook for Regulators*, prepared for the Western Interstate Energy Board, March 9, 2015, available at: http://www.synapse-energy.com/project/performance-incentives-utilities.

Q. What is the purpose of your testimony?

A. The purpose of my testimony is to review and critique the Earnings Adjustment Mechanisms (EAMs) proposed by Central Hudson Gas & Electric Company (CHG&E or the Company), with a focus on the energy efficiency (EE) EAM. I offer recommendations for how the EE EAM should be modified to increase the Company's efficiency savings, reduce costs to customers, and be better aligned with the goals of the New York REV proceeding.

2. SUMMARY OF FINDINGS AND RECOMMENDATIONS

Q. Please summarize your findings.

A. My findings are summarized as follows:

- The Company's proposed EE savings targets are much too low, do not reflect all the cost-effective efficiency savings available, are not consistent with the directives of the NY REV process, and will result in higher costs to customers.
- The Company's EE savings targets do not account for the potential for market-based energy efficiency initiatives.
- Neither the Company's 2014 Efficiency Potential Study nor its 2016 Energy Efficiency Transition Implementation Plan (ETIP) provide a good basis for establishing EAM energy efficiency savings targets, because they do not reflect all cost-effective efficiency savings.
- The Company's EE savings targets suffer from a lack of statewide coordination and long-term planning, and they have not been given the type of oversight and

review that is warranted for a resource that plays such a critical role in meeting New York state energy policy goals.

Q. Please summarize your primary recommendations.

A. My recommendations are summarized as follows:

- The Commission should establish new CHG&E efficiency savings targets that more accurately reflect the potential for cost-effective efficiency savings, are consistent with the Commission's guidance in the REV process, are consistent with savings that leading utilities are achieving, and are consistent with New York clean energy goals and policies.

- The Commission should clarify that the Company's efficiency savings targets must recognize and account for the potential efficiency savings that can be achieved through market-based initiatives.

- The Commission should establish new minimum efficiency savings targets that are equal to the Company's 2016 and 2017 ETIP savings levels. The Commission should establish new maximum efficiency savings targets based on the assumption that the Company can increase its efficiency savings by 0.4 percent per year, in terms of percent of retail sales, beginning in 2018 and continuing through 2021 and beyond.

- The Commission should modify the basis points allocated to the energy efficiency EAM, by allowing the Company to earn 30 basis points for achieving the maximum efficiency savings targets. The Commission should also allow the Company to earn incentives for savings that exceed the maximum savings targets.

- The Commission should approve the Company's request to recover incremental efficiency funding through the existing Energy Efficiency Tracker surcharge, as long as the incremental efficiency savings have a benefit-cost ratio of greater than one.

- The Commission should establish a central, statewide energy efficiency planning process that allows for robust and effective Commission and stakeholder input. Energy efficiency savings targets and other long-term efficiency planning decisions should be coordinated through this central process, rather than being addressed piecemeal and inconsistently in utility rate cases.

3. THE COMPANY'S ENERGY EFFICIENCY EAM PROPOSAL

Q. Please summarize the Company's proposal for an energy efficiency EAM.

A. The Company proposes two metrics for the energy efficiency EAM: a MWh Reduction metric, designed to encourage the Company to increase energy savings; and a cost per kWh metric, designed to encourage the Company to reduce the cost of efficiency savings. My testimony is focused on the MWh Reduction metric.[4]

Q. Please describe the MWh Reduction metric.

A. The Company proposes a minimum and a maximum energy savings target, where it would earn 5 basis points for achieving the minimum level and 15 basis points for achieving the maximum.[5] Awards for savings between these levels would be calculated

[4] Central Hudson Gas & Electric, Direct Testimony of the Earnings Adjustment Mechanism Panel, page 23.
[5] Central Hudson Gas & Electric, Direct Testimony of the Earnings Adjustment Mechanism Panel, page 23.

by linear interpolation. The Company would not earn incentives for savings above the maximum savings targets.

Q. How did the Company determine the efficiency savings targets for the MWh Reduction metric?

A. The minimum and maximum energy savings targets are based on the Company's 2014 Potential Study, which was completed in 2016 by Applied Energy Group using data from 2014.[6] That study estimated the technical potential, the economic potential, and the achievable market potential for energy efficiency savings in the Company's service territory through 2035. The achievable market potential includes two possible scenarios: the reasonably achievable potential (RAP), assuming expected program participation; and the maximum achievable potential (MAP), assuming ideal market, implementation, and customer conditions.[7]

Q. What are the Company's efficiency savings targets, and how do they compare with its historical savings and its ETIP savings targets?

A. Figure 1 presents the historical EE savings for 2015–2016, the ETIP savings targets for 2015–2018, and the proposed EE EAM targets for 2018–2021.[8]

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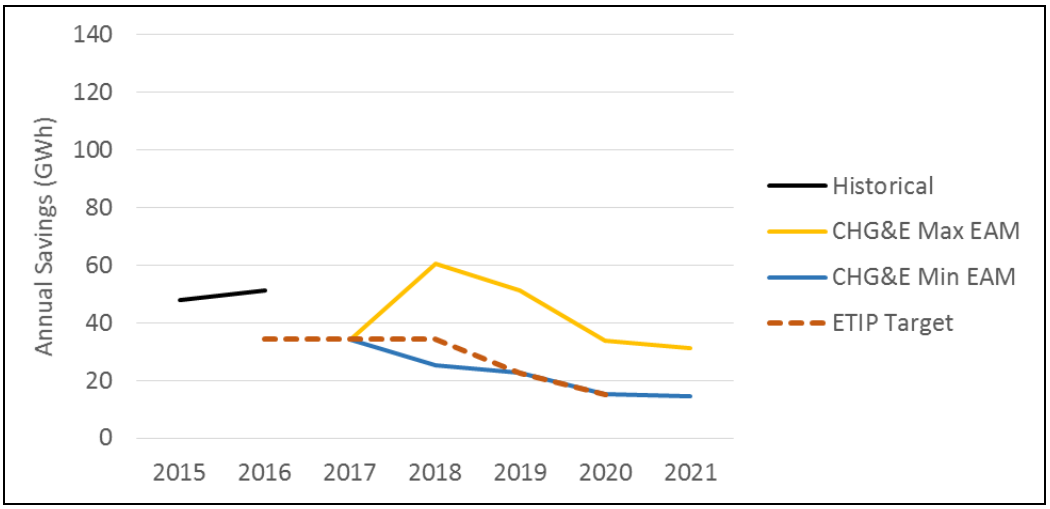
[6] Central Hudson Gas & Electric, Direct Testimony of the Earnings Adjustment Mechanism Panel, page 23.

[7] Applied Energy Group, *Central Hudson Gas & Electric Company Energy Efficiency Potential Study*, Final Report, May 3, 2016, page 3.

[8] The 2015 historical savings are from the New York Public Service Commission, *Energy Efficiency Portfolio Standard Database*, available at http://documents.dps.ny.gov/public/EEPS/EEPSReport.aspx. The 2016 historical savings are from Central Hudson Gas & Electric, *ETIP Scorecard Q4 2016*, March 30, 2017. The 2016 ETIP target is from NY Public Service Commission, Case 15-M-0252, *Order Authorizing Utility-Administered Energy Efficiency Portfolio Budgets and Targets for 2016 - 2018*, January 21, 2016, Appendix B. The 2017–2020 ETIP targets are from Central Hudson Gas and Electric Company, *2017–2020 Energy Efficiency Transition Plan*, page 6. The EAM targets are from the Direct Testimony of the Earnings Adjustment Mechanism Panel, Exhibit__(EAMP-5).

Figure 1. Historical savings, ETIP targets, and EAM efficiency targets (GWh)



4. THE EFFICIENCY SAVINGS TARGETS

The Company's Efficiency Savings Targets Are Much Too Low

Q. Do you have any concerns about the efficiency savings targets proposed by the Company in this docket?

A. Yes. The proposed efficiency savings targets are too low for several reasons:

- The energy savings targets are not consistent with the goals and directives from the NY REV dockets.
- The Company's energy savings targets are not incremental to the ETIP savings targets, as required by the Track Two order.
- The Company's energy savings targets represent a significant reduction in efficiency savings relative to historical savings, especially in the later years.

- The minimum efficiency savings targets are based on the 2016 ETIP efficiency plan, which significantly understates the potential for cost-effective energy efficiency resources.
- The minimum and maximum efficiency savings targets are based upon the 2014 EE Potential Study, which significantly understates the potential for cost-effective energy efficiency resources.
- The Company's energy savings targets do not recognize or account for the potential for market-based energy efficiency initiatives.
- The energy savings targets are below those of other New York utilities that have recently filed rate cases with the Commission.
- The energy savings targets are well below the amount of efficiency savings that leading utilities in the region are able to achieve.

These points are discussed in more detail below.

If the efficiency savings goals are too low, then customers will ultimately pay higher costs for electricity. A recent study found that the New York utilities could reduce the costs of complying with the state's Clean Energy Standard by as much as $3 billion between now and 2030 with higher efficiency savings than those proposed by the New York utilities.[9]

[9] Synapse Energy Economics, *Aiming Higher: Realizing the Full Potential for Cost-Effective Energy Efficiency in New York*, prepared for the Natural Resources Defense Council, E4TheFuture, CLEAResult, Lime Energy, Association for Energy Affordability, and Alliance for Clean Energy New York, April 2016, page ii.

Q. Please explain why the efficiency savings targets are not consistent with the Commission's NY REV directives and state energy policy goals.

A. Throughout the REV dockets, the Commission has been clear that energy efficiency is a high priority resource for meeting state energy policy goals. In opening the REV proceeding, the Commission identified system-wide efficiency and carbon reductions as two of the six policy objectives of the proceeding.[10] In the Track Two order, the Commission stated that developing "an incentive approach for energy efficiency is essential, in part because energy efficiency is critically important to state energy policy and the Clean Energy Standard..."[11]

The Company's proposed efficiency savings targets, however, do not reflect this high priority that the Commission has placed on energy efficiency resources. To the contrary, the Company's savings targets (a) are mostly lower than the ETIP targets, (b) are lower than historical efficiency savings, and (c) steadily decline over time rather than increase over time to help reduce the costs of complying with the Clean Energy Standard.

Q. Please describe how the EAM efficiency savings targets are not based on incremental efficiency savings.

A. In the Track Two order the Commission is clear that efficiency EAMs should be incremental to ETIP targets, stating that the "ETIP targets themselves will serve as a

[10] New York Public Service Commission, *Order Instituting Proceeding*, Case 14-M-0101, Proceeding on Motion of the Commission in Regard to Reforming the Energy Vision, April 25, 2014, page 2.

[11] New York Public Service Commission, *Order Adopting a Ratemaking and Utility Revenue Model Policy Framework*, Case 14-M-0101, Proceeding on Motion of the Commission in Regard to Reforming the Energy Vision, May 19, 2016, page 79.

baseline, but for purposes of a utility earning opportunity, a long term and more expansive efficiency target will be developed."[12]

The Company's proposed efficiency savings targets, however, are not incremental to its ETIP targets. As indicated in Figure 1, the Company's proposed minimum efficiency savings targets are equal to or less than the 2016 ETIP targets. Furthermore, the ETIP targets decline over time, resulting in 2020 and 2021 EAM minimum savings targets that are well below the 2016 and 2017 ETIP targets, and maximum savings targets that are roughly equal to the 2016 and 2017 ETIP targets. In 2019 through 2021 the Company will be able to earn roughly half of the EAM incentives by simply achieving efficiency savings equal to the 2016 and 2017 ETIP targets.

Q. Please describe how the EAM efficiency savings targets compare with historical efficiency savings.

A. As indicated in Figure 1, the minimum efficiency savings targets are well below the efficiency savings achieved in 2015 and 2016, and in later years they are less than half of those. The maximum efficiency savings targets are also below the historical savings levels, except for 2018 and 2019, when they are roughly equal to historical levels.

The Company appears to recognize the importance of setting EAM targets that are higher than historical savings levels. In justifying the cost per kWh metric, the Company notes that in "order to achieve New York state clean energy goals, energy efficiency measures

[12] New York Public Service Commission, *Order Adopting a Ratemaking and Utility Revenue Model Policy Framework*, Case 14-M-0101, Proceeding on Motion of the Commission in Regard to Reforming the Energy Vision, May 19, 2016, page 81. See also page 82, where the Commission explicitly stated that the EAM savings targets should be "incremental to ETIP targets."

must be significantly higher than historic[al] levels."[13] However, the Company's proposed efficiency savings targets for the minimum energy efficiency EAM are inconsistent with this concept, because they are well below historical levels of savings.

Q. Please explain why the efficiency savings targets should not be based on Central Hudson's 2014 Potential Study.

A. The 2014 Potential Study is out of synch with the Commission's directives in the NY REV proceeding, and the study fails to identify the full potential for cost-effective efficiency resources in New York.

First, the 2014 Potential Study uses the Total Resource Cost test to identify the economic potential for energy efficiency. This is inconsistent with the Commission's directive requiring the utilities to primarily use the Societal Cost tests, supplemented by the Utility Cost test, and it is similarly inconsistent with the Company's BCA Handbook.[14] In general, the Total Resource Cost test identifies significantly less cost-effective energy efficiency savings than the Societal Cost or the Utility Cost test.

Second, the 2014 Potential Study does not account for the potential for energy efficiency savings from market-based efficiency initiatives. According to that study, the maximum achievable potential (MAP) "represents savings that are possible through *utility programs*

[13] Direct Testimony of EAM Panel, page 27, lines 9–10.

[14] New York Public Service Commission, *Order Establishing the Benefit Cost Analysis Framework*, Case 14-M-0101, Proceeding on Motion of the Commission in Regard to Reforming the Energy Vision, January 21, 2016, page 12. Central Hudson Gas & Electric, *Benefit-Cost Analysis Handbook*, Version 1.1, August 30, 2016, page 17.

under ideal market, implementation, and customer preference conditions and an appropriate regulatory framework."[15]

Third, like most energy efficiency potential studies of this nature, the 2014 Potential Study understates the full potential for efficiency savings for several methodological reasons. The 2014 Potential Study accounts for only technologies that are currently available, and it does not recognize the potential for new, more efficient technologies in the future. The study does not account for the fact that the costs of efficient technologies tend to decline over time. The 2014 Potential Study does not account for the synergies of offering multiple measures to customers, such as in whole-building retrofit programs, which can increase customer engagement and increase the savings per customer. The study does not account for innovative program designs, such as upstream buy-down programs, that can dramatically increase measure adoption and reduce efficiency costs.

Q. Please explain why Company's 2016 ETIP efficiency savings should not be used to set the efficiency savings target.

First, as described above, the EAMs are intended to encourage a utility to go well beyond the historical level of energy efficiency savings. The 2016 ETIP efficiency savings are well below the amount of savings the Company achieved in 2015 and 2016, especially in the later years, as indicated in Figure 1.

Second, the Company's ETIP efficiency programs are limited in scope, and they could be expanded considerably. CHG&E's ETIP focuses largely on promoting energy efficient

[15] Applied Energy Group, *Central Hudson Gas & Electric Company Energy Efficiency Potential Study*, Final Report, May 3, 2016, page 41. *Emphasis added.*

lighting but neglects several market segments that are commonly targeted in other jurisdictions. Just to name a few, the ETIP fails to address new construction, comprehensive retrofits, multi-family buildings, or retro-commissioning. There is far more efficiency savings that the Company can achieve in these areas.

Q. Please explain how the Company's efficiency savings targets are well below the savings achieved by other utilities.

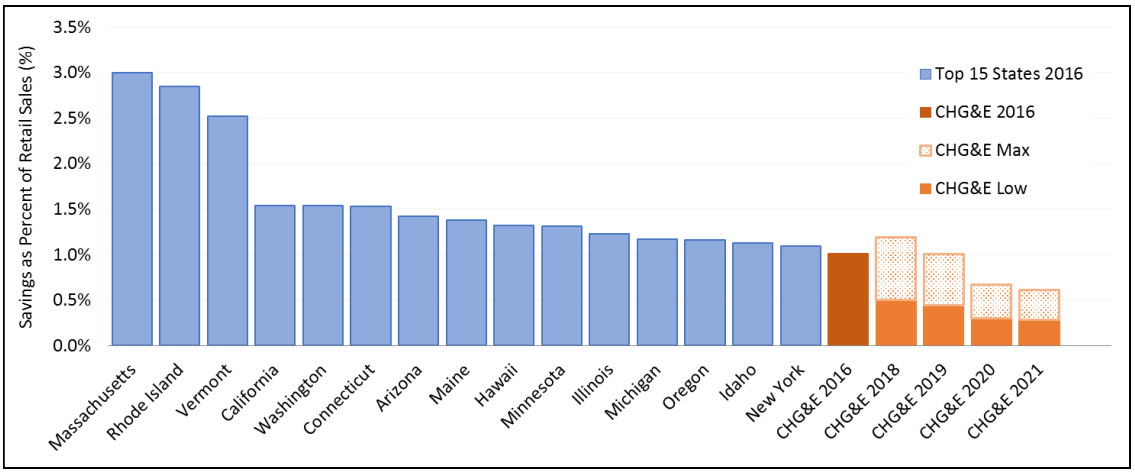
A. Efficiency savings as a percent of retail sales is a commonly used metric to compare efficiency savings across utilities and across states. It provides an indication of the magnitude of efficiency savings relative to the size of the utility, in terms of retail sales.

Figure 2 presents efficiency savings as a percent of sales for actual savings achieved in 2016 for the 15 leading states, including New York State.[16] It also includes the actual efficiency savings for CHG&E in 2016, and the Company's minimum and maximum efficiency savings goals for 2018 through 2021.

As indicated in Figure 2, the Company's minimum and maximum efficiency savings targets are well below the level of savings that many states have already been able to achieve. This is inconsistent with the Commission's directives in the REV proceeding to make New York a leader in developing efficient and clean energy resources.

[16] American Council for and Energy-Efficient Economy, *2017 State Energy Efficiency Scorecard*, September 2017, page 29.

Figure 2. The Company's savings targets relative to historical savings from other utilities



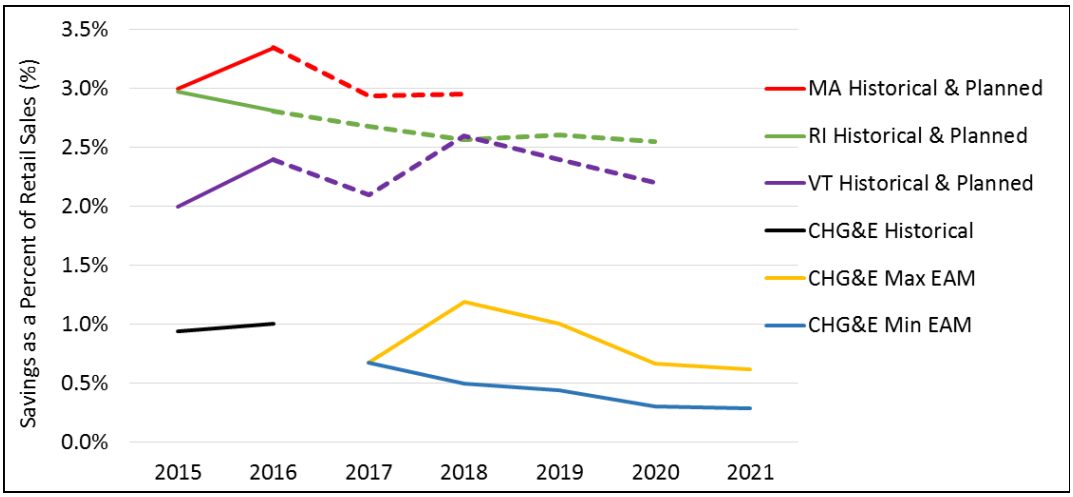
Q. The information for other utilities in Figure 2 is for 2016 only. Is it reasonable to expect the Company's future efficiency savings (for 2018 through 2021) to match or exceed these historical levels?

A. Yes. Several states expect to continue achieving high levels of efficiency savings over the next several years. Figure 3 presents future efficiency savings targets from the recent efficiency plans in Vermont, Rhode Island, and Massachusetts, and compares them with the Company's efficiency savings targets.[17]

As indicated in Figure 3, the Company's minimum and maximum efficiency savings targets are well below those of these leading states, even though these states have already been achieving significantly greater savings than the Company in recent years.

[17] Vermont Public Utilities Commission, *Order Re: Development and Support Service Budgets, Evaluation Budgets, Other Program Budgets, Forecasts of Expected Savings, and Performance Targets*, EEU-2016-03, October 12, 2017. Narragansett Electric Company, *National Grid 2018–2020 Energy Efficiency and System Reliability Procurement Report*, RIPUC Docket No. 4684, August 30, 2017. Massachusetts electric and gas utilities, *Massachusetts Joint Statewide Three-Year Electric and Gas Energy Efficiency Plan*, October 30, 2015.

Figure 3. The Company's Savings Targets Relative to Future Savings Targets of Other States



The Role of Market-Based Efficiency Initiatives

Q. Please describe the role that market-based initiatives can play in developing energy efficiency resources in New York.

A. The Commission has been clear throughout the REV process that it seeks to promote a "transition toward elevating market opportunities for greater achievement at lower cost to customers."[18] The Commission has also been clear that efficiency incentives should encourage "both targeted efficiency that is enabled by newly monetized value streams and transactional platforms, and also efficiency implemented by customers and third-party market participants with a reduced need for utility support."[19]

[18] New York Public Service Commission, *Order Adopting a Ratemaking and Utility Revenue Model Policy Framework*, Case 14-M-0101, Proceeding on Motion of the Commission in Regard to Reforming the Energy Vision, May 19, 2016, page 79.

[19] New York Public Service Commission, *Order Adopting a Ratemaking and Utility Revenue Model Policy Framework*, Case 14-M-0101, Proceeding on Motion of the Commission in Regard to Reforming the Energy Vision, May 19, 2016, page 79.

Market-based efficiency initiatives can take a variety of forms, each involving different degrees of utility involvement. As described in the Energy Efficiency Procurement and Markets Report, energy efficiency resources can be procured through standard offers, requests for proposals, auctions, and energy efficiency credits.[20] Efficiency resources can also be developed as a result of other initiatives driven by customers and third-party market participants, particularly if they are provided with proper price signals and incentives.

Q. Do the Company's EAM efficiency savings targets account for the potential savings from market-based efficiency initiatives?

A. No. This is a glaring omission in the Company's proposal, completely inconsistent with a key directive from the Commission in the REV proceedings. The direct testimony of the EAM panel does not even mention market-based efficiency opportunities anywhere.

Q. The Company's proposal also includes a "cost per kWh" metric to encourage the reduction in energy efficiency resource costs. Does this help promote market-based efficiency initiatives?

A. No. First, the direct testimony of the EAM panel does not refer to market-based initiatives as a means for reducing the cost per kWh, suggesting that the Company has not considered that option.

Second, the cost-per kWh metric might encourage the Company to reduce the cost of efficiency savings, but it does not provide incentive to increase the magnitude of

[20] *Energy Efficiency Procurement and Markets Report*, prepared by the Efficiency Procurement and Markets Working Group of the Clean Energy Advisory Council, May 19, 2017, pages 15–34.

efficiency savings. In fact, the low energy efficiency savings targets proposed by the Company essentially create a cap on the amount of efficiency savings on which it will be allowed to earn incentives. Once the Company reaches the maximum efficiency savings target, it will receive no further incentive for achieving additional efficiency savings, including market-based efficiency savings.

Third, innovative market-based initiatives offer the potential for long-term cost reductions, but may be more expensive in the short term. Thus, were market-based initiatives ultimately included in the Company's EAMs and the cost-per kWh metric applied to them, they could actually discourage the Company from transitioning from existing programs to new market-based initiatives.

In sum, there is nothing in the Company's proposed efficiency EAM that will encourage it to promote market-based efficiency initiatives.

Q. Could outcomes-based EAMs be used to promote market-based efficiency initiatives?

A. Properly designed outcome-based EAMs could potentially provide a utility with some incentive to promote market-based efficiency initiatives.

However, that is not the case with the Company's EAM proposal. The System Efficiency (SE) EAM is designed to encourage the Company to reduce peak demand. The MW Peak Load Reduction target is based on: the current non-wires alternatives program; the flat peak load forecast; wholesale electricity market prices; AMI deployment; target

appliances; and customer profiles.[21] The Company expects to achieve this target through its energy efficiency programs, distributed photovoltaic resources, other distributed generation resources, and time-of-use rate enrollments. There is no mention of market-base efficiency resources being used to meet the SE EAM.

In sum, the Company's outcome-based EAMs do not encourage the Company to promote market-based efficiency savings.

Q. What should the Company do if the market-based efficiency savings initiatives are not as substantial or timely as expected?

A. The Commission should be clear that the Company has the obligation to implement cost-effective efficiency resources, and that the Company will be appropriately rewarded for doing so. This means that the Company should optimize both its own energy efficiency programs and market-based efficiency initiatives. The key issue is that the cost-effective efficiency savings are obtained somehow, and that the Company should have the incentive to make it happen at a low cost to customers. Otherwise, efficiency resources will be forgone, electricity costs will be higher, and customers will pay higher bills than necessary.

If the market-based resources are not as substantial or as timely as expected, then the Company should make up the difference with its own energy efficiency programs.

[21] Central Hudson Gas & Electric, Direct Testimony of the Earnings Adjustment Mechanism Panel, pages 31–33.

Recommendations Regarding the Efficiency Savings Targets

Q. What do you recommend regarding the EE EAM savings targets?

A. I recommend that the Commission establish new energy savings targets that are considerably higher than the Company's proposal. The new targets should reflect efficiency savings that are higher than historical savings, incremental to the ETIP savings levels, reflect the potential for market-based efficiency initiatives, and reflect the Commission's directives in the REV proceedings to promote increased efficiency and reductions in carbon emissions.

Q. How should the minimum energy savings targets be determined?

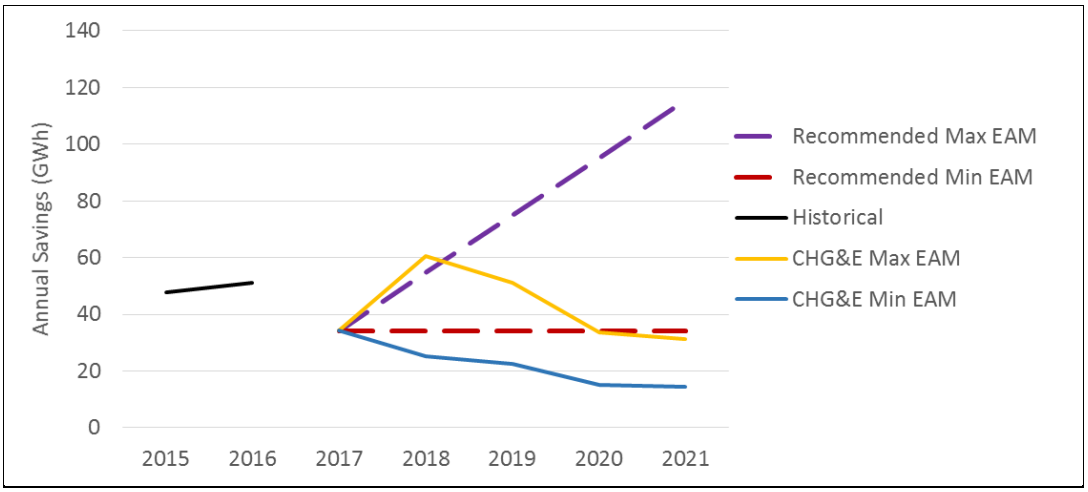
A. I recommend that the minimum energy savings targets be set at the 2016 and 2017 ETIP savings levels of 34 GWh. This sends an important signal to the Company that it must achieve levels of energy efficiency savings at least as high as recent experience before it can earn efficiency incentives, and that it must do so at least through 2021.

Q. How should the maximum energy savings targets be determined?

A. I recommend that the maximum energy savings targets be based on the assumption that the Company can increase its energy efficiency savings by 0.4 percent per year, beginning in 2018 and continuing through 2021. This ramp rate is similar to ramp rates achieved by other leading utilities in recent years. Also, the maximum savings target for 2021 reaches 115 GWh, which is roughly 2.3 percent of retail sales. This is a reasonable goal to reach within four years, particularly given the priority that the Commission has given to energy efficiency resources in the REV process.

Figure 4 indicates how my recommended minimum and maximum targets compare with those proposed by CHG&E.

Figure 4. Recommended Efficiency Savings Targets Relative to the Company's Proposal



Q. Are there any risks to the Company or the customers of including efficiency savings targets that turn out to be too high?

A. No. If the efficiency savings targets turn out to be too high, and the Company cannot achieve them, then the Company will earn less incentive than it otherwise would have. Customers will not be harmed in any way. On the other hand, if the efficiency savings targets turn out to be too low, and the Company achieves them easily without implementing some of the efficiency resources, then the Company is unduly rewarded, cost-effective efficiency resources are forgone, and customers will pay higher costs as a result.

In sum, the Company faces no risk either way. While the customers have no risk if the targets are too high, they do face the likelihood of higher costs if the targets are too low.

5. THE EFFICIENCY INCENTIVE AMOUNTS

The Company Should Be Rewarded for Increased Levels of Efficiency Savings

Q. Please summarize the Company's proposal for the amount of incentives it can earn from the energy efficiency EAM.

A. The Company proposal includes the following elements for each year from 2018 through 2021:

- The total maximum incentive for the energy efficiency EAM is 30 basis points.
- The maximum incentive for the energy savings portion of the EAM is 15 basis points. The maximum incentive for the cost per kWh portion of the EAM is also 15 basis points.
- If the Company achieves its minimum energy savings target, then it will be awarded 5 basis points. If the Company achieves its maximum energy savings target, then it will be awarded the full 15 basis points.
- If the Company achieves energy savings that are somewhere between the minimum and maximum targets, then it will be awarded an amount based on a linear interpolation between the minimum and maximum awards.

Q. Do you agree with the Company's efficiency incentive proposals?

A. I agree with many elements of the Company's proposal. However, I recommend that it be modified slightly to account for my recommendations regarding the savings targets.

Also, I recommend that the maximum efficiency savings target is not used as a cap on the potential efficiency incentives. If the Company can achieve additional cost-effective

efficiency savings beyond the maximum target, then it should be rewarded for doing so. In fact, it should be encouraged to do so.

I recommend the following:

- If the Company achieves my recommended minimum energy savings target, then it will be awarded 5 basis points.
- If the Company achieves my recommended maximum energy savings target, then it will be awarded 30 basis points.
- If the Company achieves energy savings that are somewhere between my recommended minimum and maximum targets, then it will be awarded an incentive amount based on a linear interpolation between the minimum and maximum awards.
- If the Company achieves energy savings that are higher than my recommended maximum target, then it will be awarded an incentive amount based on a linear extrapolation of the line between the minimum and maximum award amounts. The total amount of the incentive for energy savings should be capped at 50 basis points.
- The cost per kWh metric and incentive amount should remain unchanged, with a maximum incentive of 15 basis points.

Multiple Incentives for Energy Efficiency

Q. Please explain how the Company's proposal will allow the Company to earn multiple incentives for the same energy efficiency savings.

A. The Company has proposed that the energy savings from its energy efficiency programs be used as part of the targets for the CO_2 EAM, the System Efficiency EAM, and the DER Utilization EAM.[22] This means that for each MWh saved by its energy efficiency programs, it will earn financial incentives four times; for the EE EAM and for the other three EAMs.

Q. Is this a problem with the Company's EAM proposal?

A. Not necessarily. It may be appropriate for a utility to earn multiple incentives for certain outcomes, such as energy efficiency savings. It is important, however, to ensure that the total magnitude of incentives that is earned for one particular initiative such as energy efficiency is not unduly high.

Q. What do you recommend regarding the multiple incentives proposed by the Company?

A. At a minimum, the Commission should recognize the potential for receiving multiple incentives for efficiency savings when setting the efficiency savings targets. This means the efficiency savings targets should be fairly aggressive and challenging so that the

[22] Central Hudson Gas & Electric, Direct Testimony of the Earnings Adjustment Mechanism Panel, pages 17, 33, and 48.

Company is not provided a large amount of incentives for a modest level of effort and efficiency savings.

In addition, the Commission should consider the potential for receiving multiple incentives for EE energy savings when allocating basis points to the SE, CO_2, and DER EAMs. The Commission may wish to reduce the basis points allocated to these other EAMs, in recognition of the fact that the Company will be earning multiple incentives for energy efficiency.

6. FUNDING FOR ENERGY EFFICIENCY INITIATIVES

Q. Is the Company proposing that it be provided with funding to support its energy efficiency programs?

A. Yes. The Company is proposing that it be allowed to collect any additional funding above the level of ETIP funding, as long as the incremental efficiency savings have a benefit-cost ratio of greater than one. The Company requests that these incremental expenditures be recovered through the existing Energy Efficiency Tracker surcharge.[23]

Q. Do you agree that the Company should be allowed to recover funding to achieve efficiency savings beyond the ETIP savings?

A. Yes. The Company needs to have sufficient funding to invest in efficiency resources, just as it requires sufficient funding to invest in other types of electricity resources. While market-based efficiency initiatives might help to reduce the cost of efficiency resources, some amount of funding will be necessary regardless of whether the efficiency savings

[23] Central Hudson Gas & Electric, Direct Testimony of the Earnings Adjustment Mechanism Panel, page 28.

come from the Company's programs or from the market. As long as the efficiency resources are cost-effective, the up-front investments will be more than offset by long-term cost reductions.

Q. Do you agree that the Company should be allowed to recover these incremental expenditures through the Energy Efficiency Tracker?

A. Yes. This surcharge provides the Company with certainty that it will be able to recover efficiency program investments. It also offers flexibility for the Company to modify program budgets over time in response to changing customer demand and market conditions, without running the risk of providing the Company with too much or too little funding.

7. ENERGY EFFICIENCY PLANNING AND COORDINATION

Q. Please describe the role of energy efficiency planning and coordination for the purpose of designing energy efficiency EAMs.

A. The energy efficiency savings targets are the most important element in an efficiency EAM. If the efficiency savings targets are too low, then the utility will be unduly rewarded for low benefits, cost-effective efficiency savings will be foregone, and customers will pay higher costs than necessary.

Therefore, the efficiency savings targets must be developed with a thorough understanding of energy efficiency potential, of the various programs and initiatives available to achieve efficiency savings, of best practices for educating and working with customers, and of newly emerging opportunities for working with efficiency trade allies, vendors, distributors, service companies, and other market players.

Experience has demonstrated that energy efficiency savings targets, and energy efficiency plans in general, are most effective when developed through a formal, central, statewide planning process with robust commission and stakeholder input. Several northeastern states that lead the country on energy efficiency savings have demonstrated the value of this approach. For example:

- Rhode Island. Since 2008, Rhode Island efficiency programs have been overseen by the Energy Efficiency Resource Management Council (EERMC), which is composed of stakeholders representing a variety of interests. The EERMC has funding to hire expert consultants, and it works closely with National Grid, the primary utility in the state, to develop one-year and three-year energy efficiency plans.[24] In 2016, Rhode Island ranked second in energy efficiency savings, with net incremental savings of 2.8 percent of retail sales.[25]

- Vermont. The Vermont Public Utility Commission uses a Demand Resources Plan (DRP) proceeding to establish budgets, performance targets, and monetary performance incentives for each of the state's three energy efficiency utilities (EEUs). The process takes approximately 18 months and sets the parameters for the following three years. This proceeding involves the Department of Public Service, the EEUs, and interested stakeholders such as distribution utilities, trade associations, and environmental advocates. The EEUs work with the Department and others to develop and model scenarios for the savings that can be achieved

[24] For more information see: https://rieermc.ri.gov/.
[25] American Council for and Energy-Efficient Economy, *2017 State Energy Efficiency Scorecard*, September 2017, page 29.

with different budget levels or that prioritize different performance metrics. Model results are shared amongst participants and subject to informal review. In addition to the values for the coming three-year period, the DRP establishes forecast budgets and savings for the rest of a 20-year period, so that both efficiency and supply utilities can develop long-term plans. In 2016, Vermont ranked third in energy efficiency savings, with net incremental savings of 2.5 percent of retail sales.[26]

- Connecticut. The Connecticut Energy Efficiency Board (EEB) has 15 members representing private and public entities that provide representation for residential, business, agricultural, community, and municipal consumers. The EEB has 10 appointed voting members and five non-voting representatives from Connecticut's electric and gas utility companies. The EEB evaluates, advises, and assists the state's utility companies in developing and implementing comprehensive, cost-effective energy conservation and market transformation plans.[27] In 2016, Connecticut ranked sixth in energy efficiency savings, with net incremental savings of 1.5 percent of retail sales.[28]

- Massachusetts. Since 2008, Massachusetts efficiency programs have been overseen by an Energy Efficiency Advisory Council (EEAC) composed of stakeholders representing a variety of government agencies, consumer advocates,

[26] American Council for and Energy-Efficient Economy, *2017 State Energy Efficiency Scorecard*, September 2017, page 29.
[27] For more information see: https://www.energizect.com/connecticut-energy-efficiency-board.
[28] American Council for and Energy-Efficient Economy, *2017 State Energy Efficiency Scorecard*, September 2017, page 29.

efficiency experts, and more. The utilities are responsible for preparing a statewide efficiency plan, as well as individual efficiency plans based upon the statewide effort, using consistent program designs and outreach efforts. The EEAC provides significant guidance throughout the development of the efficiency plans, and the DPU reviews and ultimately approves the plans.[29] In 2016, Massachusetts ranked first in energy efficiency savings, with net incremental savings of 3.0 percent of retail sales.[30]

Statewide efficiency planning initiatives can also offer a variety of benefits in terms of sharing lessons learned and best practices for efficiency resource design and implementation. It allows utilities to provide consistent information, directions, and incentives to customers, efficiency trade allies, distributors, vendors, energy service companies, and other market players, many of whom are located in several utility territories throughout the state. Statewide coordination also allows for economies of scale and sharing of costs across utilities, for example, by pooling resources to hire evaluation, measurement, and verification contractors to work statewide at lower cost than for each utility.

Q. Does this rate case allow for sufficient analysis and review of the Company's proposed efficiency savings targets?

A. No, for several reasons. First, rate cases typically require the Commission and intervenors to address many issues where the potential customer impacts are larger than the impacts

[29] For more information see: http://ma-eeac.org/.
[30] American Council for and Energy-Efficient Economy, *2017 State Energy Efficiency Scorecard*, September 2017, page 29.

of energy efficiency. Consequently, energy efficiency issues become secondary to other issues addressed in a rate case. This does not provide the Commission, the Commission Staff, or any of the intervenors sufficient time to evaluate, discuss, and resolve all the issues that are relevant for setting effective efficiency savings targets.

Second, setting efficiency savings targets in individual utility rate cases does not allow for coordination or consistency between New York utilities. As noted above, statewide efficiency planning offers a variety of benefits in terms of setting efficiency targets, sharing best practices, and coordination across customers and other market players. These potential benefits are lost by addressing efficiency in separate rate cases. Further, this approach might require the Commission to work out the same issues multiple times, instead of all at once. This might result in Commission findings and directives that are inconsistent across utilities.

Third, rate cases tend to be contentious environments, where parties stake out and hold on to initial positions, with little interest in addressing the positions or proposals of other parties. In this setting, it is difficult to share lessons learned, develop best practices, or cooperate towards developing optimal efficiency plans.

Fourth, rate cases do not allow for long-term efficiency planning or long-term regulatory guidance, because they occur on a three-year cycle. Implementing efficiency resources is a multi-year endeavor, and the most successful efficiency initiatives are based on long-term planning with consistent, long-term guidance from commissions and other state agencies. If efficiency targets, and EAMs in general, are only established for the three years of the current rate case, then the utility will be faced with uncertainty about the

following years. This typically leads to less innovation and less aggressive efficiency initiatives.

Fifth, many stakeholders do not have the resources to intervene and participate in every utility rate case. Between paying for legal counsel, hiring expert witnesses, attending all the relevant hearings, and participating in the settlement discussions, rate cases can be an expensive endeavor. If this level of effort is required for each of the major electric and gas utilities in the state, then meaningful participation becomes out of reach for many efficiency stakeholders.

Sixth, the settlement process that is frequently used to resolve rate cases in New York, and the corresponding lack of specific findings and directives from the Commission, limit the ability of the Commission to articulate clear and consistent regulatory policy guidance on this important resource. Setting energy efficiency savings targets through settlements severely limits the Commission's ability to provide guidance on how efficiency resources should be used to meet state energy policy goals.

Seventh, New York State Energy and Research Development Authority (NYSERDA) plays a critical role in implementing energy efficiency resources throughout New York state, particularly regarding low-income efficiency programs. Optimizing efficiency resources across the state requires close coordination and consistent practices between NYSERDA and the investor-owned utilities. Addressing critical utility energy efficiency planning issues in individual rate cases creates barriers to this type of coordination.

Q. The Commission has encouraged the New York utilities to seek market-based approaches to obtain increased energy efficiency savings. Is there a role for planning and coordination if utilities are increasingly relying upon market-based energy efficiency initiatives?

A. Yes. The benefits of coordinated, statewide efficiency planning are potentially even higher as utilities increasingly rely upon market-based efficiency initiatives. Coordination could facilitate the development of market-based efficiency initiatives by providing consistency, predictability, and stability for energy efficiency vendors and other efficiency market players. This point was emphasized in the recent Energy Efficiency Procurement and Markets Report, which noted that the PSC:

> could send clearer market signals by establishing a centralized and unified process to decide EE procurement funding rules, targets, and performance incentives out to 2030. Such a unified process would be easier for market actors to follow.[31]

In a coordinated, statewide efficiency planning process, the Commission could solicit representatives from efficiency vendors, energy service companies, trade allies, and other market players to participate in setting the efficiency savings targets and identifying the lowest cost opportunities for achieving those savings. As discussed below, one of the biggest problems with the Company's proposed efficiency savings targets is that they do not account for the potential for market-based efficiency savings. This problem could be

[31] *Energy Efficiency Procurement and Markets Report*, prepared by the Efficiency Procurement and Markets Working Group of the Clean Energy Advisory Council, May 19, 2017, page 10.

addressed with robust input from market players, which would be much more feasible and likely through a single, statewide planning process.

Q. Is there any role for rate cases to play in designing and implementing EAMs?

A. Yes. There are two very important roles that rate cases can play in designing and implementing EAMs. First, rate cases can be used to determine the magnitude of the incentive payments that the utilities can earn from the EAMs. This question can fit naturally in a rate case, where similar information regarding utility revenues and returns is readily available, and where similar decisions regarding utility incentives are made. I recommend that the initial magnitude of the incentive payments be determined as part of the statewide efficiency planning process, for statewide consistency purposes, and that the final amounts be determined and awarded to the Company through the rate case process.

Second, rate cases should be used to provide a mechanism for utilities to pay for investments to meet the efficiency savings targets established in the statewide process. Sufficient funding for energy efficiency resources will be essential, regardless of whether the resources are developed by the utilities or are market-based. This point was also emphasized in the recent Energy Efficiency Procurement and Markets Report, which recommended that the PSC:

> Develop a clear framework for funding energy efficiency procurement that recognizes its value as an operational and carbon reducing resource... In addition, some members of the Working Group stress that size of funding is

also extremely important if New York wishes to cultivate a large and growing EE market.[32]

Q. What do you recommend regarding the process for setting utility energy efficiency targets in New York?

A. I recommend that the Commission establish a central, statewide energy efficiency planning process that allows for robust and effective Commission and stakeholder input. Energy efficiency savings targets and other long-term efficiency planning decisions should be coordinated through this central process, rather than being addressed piecemeal and inconsistently in utility rate cases.

I recommend that the Commission articulate the key goals of this statewide planning process, which should include: (a) identifying the full potential for cost-effective energy efficiency resources in New York; (b) identifying the procurement mechanisms that will be used to implement those resources; (c) establishing statewide and utility-specific efficiency savings targets; (d) articulating the roles and responsibilities of NYSERDA, the utilities, customers, and third-party efficiency providers for achieving those targets; (e) providing third-parties and market developers with sufficient support to facilitate a robust development of market-based efficiency resources; and (f) ensuring that the combined energy efficiency initiatives will achieve the state's efficiency and carbon goals.

[32] *Energy Efficiency Procurement and Markets Report*, prepared by the Efficiency Procurement and Markets Working Group of the Clean Energy Advisory Council, May 19, 2017, page 10.

The statewide planning process should ensure meaningful and robust stakeholder input. This process should build on, and improve upon, the Clean Energy Advisory Council (CEAC) process currently in place. This statewide efficiency planning process should include at least the following elements: (a) broad representation of relevant stakeholders; (b) management of the process by a party that is independent of the utilities; (c) clearly defined rules and protocols for management, membership, participation, communications, and preparation of materials; (d) clearly defined practices for making resolutions, taking positions, or making recommendations; (e) clearly defined practices for bringing resolutions, positions, or recommendations to the Commission, with an opportunity for the Commission to make findings on them; and (f) frequent, periodic meetings and conference calls, with all agendas and relevant materials provided well in advance.

This statewide efficiency planning process should build on, and be closely coordinated with, the utilities' distribution system implementation planning process. The Commission should require utilities to identify all cost-effective energy efficiency resources in their DSIPs, based upon all the different mechanisms that might be used to procure them. It is essential that each utility forecast and assess the full range of efficiency resources that might be implemented in their service territory, regardless of the method used to procure those resources or the entity that implements them. Otherwise, the utility will overbuild its distribution system and incur higher costs than necessary.

Q. Does this conclude your testimony?

A. Yes, it doe

Tim Woolf, Vice President

Synapse Energy Economics I 485 Massachusetts Avenue, Suite 2 I Cambridge, MA 02139 I 617-453-7031
twoolf@synapse-energy.com

PROFESSIONAL EXPERIENCE

Synapse Energy Economics Inc., Cambridge, MA. *Vice President*, 2011 – 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 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

Boston University, Boston, MA
Master of Business Administration, 1993

London School of Economics, London, England

Diploma, Economics, 1991

Tufts University, Medford, MA
Bachelor of Science in Mechanical Engineering, 1982

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Bachelor of Arts in English, 1982

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Woolf, T. 1996. *Can We Get There From Here? The Challenge of Restructuring the Electricity Industry So That All Can Benefit*. Tellus Institute for The California Utility Consumers' Action Network. Tellus Study No. 95-208.

Woolf, T. 1995. *Promoting Environmental Quality in a Restructured Electric Industry.* Tellus Institute for The National Association of Regulatory Utility Commissioners. Tellus Study No. 95-056.

Woolf, T. 1995. *Systems Benefits Funding Options*. Tellus Institute for Wisconsin Environmental Decade. Tellus Study No. 95-248.

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Woolf, T., B. Biewald. 1995. *Electric Resource Planning for Sustainability*. Tellus Institute for the Texas Sustainable Energy Development Council. Tellus Study No. 94-114.

TESTIMONY

New York Public Service Commission (Case 17-E-0238): Direct and rebuttal testimony of Tim Woolf and Melissa Whited regarding Earnings Adjustment Mechanisms proposed by National Grid. On behalf of Advanced Energy Economy Institute. August 25 and September 15, 2017.

Utah Public Service Commission (Docket No. 14-035-114): Direct and rebuttal testimony of Tim Woolf regarding the Pacificorp's analysis of the benefits and costs associated with distributed generation resources. On behalf of Utah Clean Energy. June 8, 2017 and July 25, 2017.

Massachusetts Department of Public Utilities (D.P.U. 17-05): Direct and surrebuttal testimony of Tim Woolf and Melissa Whited regarding performance-based regulation, the monthly minimum reliability contribution, storage pilots, and rate design in Eversource's petition for approval of rate increases and a performance-based ratemaking mechanism. On behalf of Sunrun and the Energy Freedom Coalition of America, LLC. April 28, 2017 and May 26, 2017.

Massachusetts Department of Public Utilities (D.P.U. 15-120, D.P.U. 15-121, D.P.U. 15-122/15-123): Direct testimony of Tim Woolf and Ariel Horowitz, PhD, regarding the petitions by National Grid, Unitil, NSTAR, and Eversource Energy for approval of their grid modernization plans. On behalf of Conservation Law Foundation. March 10, 2017.

Massachusetts Department of Public (D.P.U. 16-169): Direct testimony of Tim Woolf and Erin Malone regarding Nation Grid's petition for ruling regarding the provision of gas energy efficiency services. On behalf of the Cape Light Compact. November 2, 2016.

New Jersey Board of Public Utilities (Docket No. ER16060524): Direct testimony regarding Rockland Electric Company's proposed advanced metering program. On behalf of the New Jersey Division of Rate Counsel. September 9, 2016.

Colorado Public Utilities Commission (Proceeding No. 16AL-0048E): Answer testimony regarding Public Service Company of Colorado's rate design proposal. On behalf of Energy Outreach Colorado. June 6, 2016.

Georgia Public Service Commission (Docket No. 40161 and Docket No. 40162): Direct testimony regarding the demand-side management programs proposed by Georgia Power Company in its Certification, Decertification, and Amended Demand-Side Management Plan and its 2016 Integrated Resource Plan. On behalf of Sierra Club. May 3, 2016.

Massachusetts Department of Public Utilities (Docket No. 15-155): Joint direct and rebuttal testimony with M. Whited regarding National Grid's rate design proposal. On behalf of Energy Freedom Coalition of America, LLC. March 18, 2016 and April 28, 2016.

Maine Public Utilities Commission (Docket No. 2015-00175): Direct testimony on Efficiency Maine Trust's petition for approval of the Triennial Plan for Fiscal Years 2017-2019. On behalf of the Natural Resources Council of Maine and the Conservation Law Foundation. February 17, 2016.

Nevada Public Utilities Commission (Docket Nos. 15-07041 and 15-07042): Direct testimony on NV Energy's application for approval of a cost of service study and net metering tariffs. On behalf of The Alliance for Solar Choice. October 27, 2015.

New Jersey Board of Public Utilities (Docket No. ER14030250): Direct testimony on Rockland Electric Company's petition for investments in advanced metering infrastructure. On behalf of the New Jersey Division of Rate Counsel. September 4, 2015.

Utah Public Service Commission (Docket No. 14-035-114): Direct, rebuttal, and surrebuttal testimony on the benefit-cost framework for net energy metering. On behalf of Utah Clean Energy, the Alliance for Solar Choice, and Sierra Club. July 30, 2015, September 9, 2015, and September 29, 2015.

Nova Scotia Utility and Review Board (Matter No. M06733): Direct testimony on EfficiencyOne's 2016-2018 demand-side management plan. On behalf of the Nova Scotia Utility and Review Board. June 2, 2015.

Missouri Public Service Commission (Case No. ER-2014-0370): Direct and surrebuttal testimony on the topic of Kansas City Power and Light's rate design proposal. On behalf of Sierra Club. April 16, 2015 and June 5, 2015.

Missouri Public Service Commission (File No. EO-2015-0055): Rebuttal and surrebuttal testimony on the topic of Ameren Missouri's 2016-2018 Energy Efficiency Plan. On behalf of Sierra Club. March 20, 2015 and April 27, 2015.

Florida Public Service Commission (Dockets No. 130199-EI et al.): Direct testimony on the topic of setting goals for increasing the efficiency of energy consumption and increasing the development of demand-side renewable energy systems. On behalf of the Sierra Club. May 19, 2014.

Massachusetts Department of Public Utilities (Docket No. DPU 14-86): Direct and rebuttal Testimony regarding the cost of compliance with the Global Warming Solution Act. On behalf of the Massachusetts Department of Energy Resources and the Department of Environmental Protection. May 16, 2014.

Kentucky Public Service Commission (Case No. 2014-00003): Direct testimony regarding Louisville Gas and Electric Company and Kentucky Utilities Company's proposed 2015-2018 demand-side management and energy efficiency program plan. On behalf of Wallace McMullen and the Sierra Club. April 14, 2014.

Maine Public Utilities Commission (Docket No. 2013-168): Direct and surrebuttal testimony regarding policy issues raised by Central Maine Power's 2014 Alternative Rate Plan, including recovery of capital costs, a Revenue Index Mechanism proposal, and decoupling. On behalf of the Maine Public Advocate Office. December 12, 2013 and March 21, 2014.

Colorado Public Utilities Commission (Docket No. 13A-0686EG): Answer and surrebuttal testimony regarding Public Service Company of Colorado's proposed energy savings goals. On behalf of the Sierra Club. October 16, 2013 and January 21, 2014.

Kentucky Public Service Commission (Case No. 2012-00578): Direct testimony regarding Kentucky Power Company's economic analysis of the Mitchell Generating Station purchase. On behalf of the Sierra Club. April 1, 2013.

Nova Scotia Utility and Review Board (Matter No. M04819): Direct testimony regarding Efficiency Nova Scotia Corporation's Electricity Demand Side Management Plan for 2013 – 2015. On behalf of the Counsel to Nova Scotia Utility and Review Board. May 22, 2012.

Missouri Office of Public Counsel (Docket No. EO-2011-0271): Rebuttal testimony regarding IRP rule compliance. On behalf of the Missouri Office of the Public Counsel. October 28, 2011.

Nova Scotia Utility and Review Board (Matter No. M03669): Direct testimony regarding Efficiency Nova Scotia Corporation's Electricity Demand Side Management Plan for 2012. On behalf of the Counsel to Nova Scotia Utility and Review Board. April 8, 2011.

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.

North Carolina Utilities Commission (Docket E-100, Sub 110): Filed comments with Anna Sommer regarding the Potential for Energy Efficiency Resources to Meet the Demand for Electricity in North Carolina. Synapse Energy Economics on behalf of the Southern Alliance for Clean Energy. February 2007.

Rhode Island Public Utilities Commission (Docket No. 3765): Direct and Surrebuttal testimony regarding National Grid's Renewable Energy Standard Procurement Plan. On behalf of the Division of Public Utilities and Carriers. January 17, 2007 and February 20, 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 Pacific 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 with 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.

United States Department of Energy (Docket Number-EE-RM-500): Comments with Bruce Biewald, Daniel Allen, David White, and Lucy Johnston of Synapse Energy Economics regarding 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.

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 regarding 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 regarding 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 regarding maintaining electric system reliability. On behalf of Delaware Public Service Commission Staff. February 2, 2000.

Delaware Public Service Commission (Docket No. 99-328): Filed expert report ("Investigation into the July 1999 Outages and General Service Reliability of Delmarva Power & Light Company," jointly authored with J. Duncan Glover and Alexander Kusko). Synapse Energy Economics and Exponent Failure Analysis Associates on behalf the Delaware Public Service Commission Staff. February 1, 2000.

New Hampshire Public Service Commission (Docket No. 99-099 Phase II): Oral testimony regarding 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 regarding 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 regarding 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.

Public Service Commission of West Virginia (Case No. 98-0452-E-GI): Filed expert report ("Measures to Ensure Fair Competition and Protect Consumers in a Restructured Electricity Industry in West Virginia," jointly authored with Jean Ann Ramey and Theo MacGregor) in the matter of the General Investigation to determine whether West Virginia should adopt a plan for open access to the electric power supply market and for the development of a deregulation plan. Synapse Energy Economics and MacGregor Energy Consultancy on behalf of the West Virginia Consumer Advocate Division. June 1999.

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

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

Delaware Public Service Commission (DPSC 95-172): Oral testimony regarding 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 regarding the 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 regarding the 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.

Delaware Public Service Commission (Docket No. 96-83): Filed comments regarding the Investigation of Restructuring the Electricity Industry in Delaware (Tellus Institute Study No. 96-99). On behalf of the Staff of the Delaware Public Service Commission. November 1996.

Colorado Public Utilities Commission (Docket No. 96Q-313E): Filed comments in response to the Questionnaire on Electricity Industry Restructuring (Tellus Institute Study No. 96-130-A3). On behalf of the Colorado Governor's Office of Energy Conservation. October 1996.

State of Vermont Public Service Board (Docket No. 5854): Filed expert report (Tellus Institute Study No. 95-308) regarding the Investigation into the Restructuring of the Electric Utility Industry in Vermont. On behalf of the Vermont Department of Public Service. March 1996.

Pennsylvania Public Utility Commission (Docket No. I-00940032): Filed comments (Tellus Institute Study No. 95-260) regarding an Investigation into Electric Power Competition. On behalf of The Pennsylvania Office of Consumer Advocate. November 1995.

New Jersey Board of Public Utilities (Docket No. EX94120585Y): Initial and reply comments ("Achieving Efficiency and Equity in the Electricity Industry Through Unbundling and Customer Choice," Tellus Institute Study No. 95-029-A3) regarding an investigation into the future structure of the electric power industry. On behalf of the New Jersey Division of Ratepayer Advocate. September 1995.

ARTICLES

Woolf, T., E. Malone, C. Neme, R. LeBaron. 2014. "Unleashing Energy Efficiency." *Public Utilities Fortnightly,* October, 30-38.

Woolf, T., A. Sommer, J. Nielson, D. Berry, R. Lehr. 2005. "Managing Electricity Industry Risk with Clean and Efficient Resources." *The Electricity Journal* 18 (2): 78–84.

Woolf, T., A. Sommer. 2004. "Local Policy Measures to Improve Air Quality: A Case Study of Queens County, New York." *Local Environment* 9 (1): 89–95.

Woolf, T. 2001. "Clean Power Opportunities and Solutions: An Example from America's Heartland." *The Electricity Journal* 14 (6): 85–91.

Woolf, T. 2001. “What’s New With Energy Efficiency Programs.” *Energy & Utility Update, National Consumer Law Center*: Summer 2001.

Woolf T., B. Biewald. 2000. “Electricity Market Distortions Associated With Inconsistent Air Quality Regulations.” *The Electricity Journal* 13 (3): 42–49.

Ackerman, F., B. Biewald, D. White, T. Woolf, W. Moomaw. 1999. “Grandfathering and Coal Plant Emissions: the Cost of Cleaning Up the Clean Air Act.” *Energy Policy* 27 (15): 929–940.

Biewald, B., D. White, T. Woolf. 1999. “Follow the Money: A Method for Tracking Electricity for Environmental Disclosure.” *The Electricity Journal* 12 (4): 55–60.

Woolf, T., B. Biewald. 1998. “Efficiency, Renewables and Gas: Restructuring As if Climate Mattered.” *The Electricity Journal* 11 (1): 64–72.

Woolf, T., J. Michals. 1996. “Flexible Pricing and PBR: Making Rate Discounts Fair for Core Customers.” *Public Utilities Fortnightly,* July 1996.

Woolf, T., J. Michals. 1995. “Performance-Based Ratemaking: Opportunities and Risks in a Competitive Electricity Industry.” *The Electricity Journal* 8 (8): 64–72.

Woolf, T. 1994. “Retail Competition in the Electricity Industry: Lessons from the United Kingdom.” *The Electricity Journal* 7 (5): 56–63.

Woolf, T. 1994. “A Dialogue About the Industry's Future.” *The Electricity Journal* 7 (5).

Woolf, T., E. D. Lutz. 1993. “Energy Efficiency in Britain: Creating Profitable Alternatives.” *Utilities Policy* 3 (3): 233–242.

Woolf, T. 1993. “It is Time to Account for the Environmental Costs of Energy Resources.” *Energy and Environment* 4 (1): 1–29.

Woolf, T. 1992. “Developing Integrated Resource Planning Policies in the European Community.” *Review of European Community & International Environmental Law* 1 (2) 118–125.

PRESENTATIONS

Woolf, T., M. Whited. 2016. “Show Me the Numbers: A Framework for Balanced Distributed Solar Policies.” Presentation for Consumers Union Webinar, December 2016.

Woolf, T. 2016. “Show Me the Numbers: Balancing Solar DG with Consumer Protection.” Public workshop on solar distributed generation for the Federal Trade Commission, June 2016.

Woolf, T. 2016. “Rate Designs for Distributed Generation: State Activities & A New Framework.” Presentation at the NASUCA 2016 Mid-Year Meeting, June 2016.

Woolf, T., M. Whited. 2016. “3rd Annual 21st Century Electricity System Workshop – Implications of Different Rate Designs.” Presentation at the Advanced Energy Economy Institute, April 2016.

Woolf, T., M. Whited. 2016. “Decoupling in Pennsylvania: Advantages, Disadvantages, and Design Issues.” Presentation to Pennsylvania Decoupling Stakeholders, February 2016.

Woolf, T. 2016. “Earnings Impact Mechanisms: Energy Efficiency.” Presentation at the New York REV Technical Conference, January 2016.

Lowry, M. N., T. Woolf. 2015. “Performance-Based Regulation in a High Distributed Energy Resources Future.” Webinar on January 2016.

Woolf, T. 2015. “Performance Incentive Mechanisms: A Catalyst for Change.” Webinar for Power Sector Transformation Group, December 2015.

Woof, T. 2015. “Energy Efficiency Valuation: Boogie Men, Time Warps, and other Terrifying Pitfalls.” Presentation at ACEEE Conference on Energy Efficiency as a Resource, September 2015.

Woolf, T., M. Whited, A. Napoleon. 2015. “Thoughts on How to Design Clean Energy Performance Incentive Mechanisms.” Webinar for the Western Clean Energy Advocates, April 2015.

Woolf, T. 2015. “Properly Valuing the Benefits and Costs of Energy Efficiency.” Presentation at the 2015 National Efficiency Advocates Meeting, April 2015.

Woolf, T. 2015. “Non-Energy Benefits & Efficiency Program Screening.” Presentation for Georgia DSM Work Group, March 2015.

Woolf, T. 2014. “Performance Incentive Mechanisms And Their Role in New Regulatory Models.” Presentation at Acadia Center Conference, Envisioning Our Energy Future, December 2014.

Woolf, T., M. Whited., A. Napoleon. 2014. “Guiding Utility Performance: A Handbook for Regulators.” Webinar for the Western Interstate Energy Board, December 2014.

Woolf, T. 2014. “Planning for Distributed Energy Resources.” Presentation for Advanced Energy Economy Webinar, November 2014.

Woolf, T. 2014. “Benefit-Cost Analysis for Distributed Energy Resources in New York: A Framework for Accounting for All Relevant Costs and Benefits.” Presentation to NARUC ERE Committee, November 2014.

Woolf, T. 2014. “Presenting the Full Value of Energy Efficiency: Creating a Better Message.” Presentation at Sierra Club Beyond Coal Conference, October 2014.

Woolf, T., C. Neme. 2014. “Regulatory Policies to Support Energy Efficiency in Virginia.” Presentation for the 2014 Virginia Energy Efficiency Workshop, October 2014.

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Woolf, T. 2014. “Performance Incentive Mechanisms: Digging Deeper Into Performance-Based Regulation.” Presentation for National Governor’s Association Conference: Utility Business Models That Align with State Clean Energy Goals, September 2014.

Woolf, T. 2014. “The Resource Value Framework: Reforming Energy Efficiency Cost-Effectiveness Screening.” Presentation at the ACEEE Summer Study, August 2014.

Woolf, T. 2014. “Cost-Effectiveness of Demand Response.” Presentation at MADRI Working Group Meeting #34, July 2014.

Woolf, T. 2014. “Time to Overhaul Our Energy Efficiency Screening Practices.” Presentation for U.S. Environmental Protection Agency Energy Efficiency Cost-Effectiveness Webinar, January 2014.

Woolf, T. 2013. “Survey of Energy Efficiency Screening Practices in the Northeast and Mid-Atlantic.” Presentation for Northeast Energy Efficiency Partnerships EM&V Forum Annual Public Meeting, December 2013.

Woolf, T. 2013. “Recommendations for Reforming Energy Efficiency Cost-Effectiveness Screening in the United States.” Presentation at the National Association of Regulatory Commissioners Annual Meeting, November 2013.

Woolf, T. 2013. “Energy Efficiency Program Screening: Let’s Get Beyond the TRC Test.” Presentation for 7th Annual ENERGY STAR Certified Homes Utility Sponsor Meeting, October 2013.

Woolf, T. 2013. “Decoupling in Maine: Why Decoupling is in Consumers’ Interest.” Presentation for Office of Public Advocate- Decoupling Debate, October 2013.

Woolf, T. 2013. “NHPC Efficiency Screening Initiative: Unleashing the Potential for Energy Efficiency.” Presentation for Advocates Meeting, September 2013.

Woolf, T. 2013. “Energy Efficiency: Rate, Bill and Participation Impacts.” Presentation for ACEEE’s Energy Efficiency as a Resource Conference, September 2013.

Woof, T. 2013. “Energy Efficiency Screening: Challenges and Opportunities.” Presentation for NARUC Summer Meeting Consumer Affairs Panel, July 2013.

Woolf, T., R. Sedano. 2013. “Decoupling Overview.” Presentation for Finding Common Ground Meeting, July 2013.

Woolf, T. 2013. “Utility Incentives for Energy Efficiency.” Presentation for Finding Common Ground Meeting, July 2013.

Woolf, T. 2013. “Energy Efficiency: Rate, Bill and Participation Impacts.” Presentation for State Energy Efficiency Action Webinar, June 2013.

Woolf, T., B. Biewald, and J. Migden-Ostrander. 2013. “NARUC Risk Workshop for Regulators.” Presentation at the Mid-Atlantic Conference of Regulatory Utility Commissioners, June 2013.

Woolf, T. 2013. “Energy Efficiency Screening: Accounting for ‘Other Program Impacts’ & Environmental Compliance Costs.” Presentation for the Consortium for Energy Efficiency Summer Meeting, May 2013.

Woolf, T. 2013. “Best Practices in Energy Efficiency Program Screening.” Presentation at ACI National Home Performance Conference, May 2013.

Woolf, T. 2013. “Utility Shareholder Incentives to Support Energy Efficiency Programs.” Presentation to Common Ground, May 2013.

Woolf, T. 2013. “Energy Efficiency Screening: Accounting for ‘Other Program Impacts’ & Environmental Compliance Costs.” Presentation for Regulatory Assistance Project Webinar, March 2013.

Woolf, T. 2013. “Energy Efficiency: Rates, Bills, Participants, Screening, and More.” Presentation at Connecticut Energy Efficiency Workshop, March 2013.

Woolf T. 2013. “Best Practices in Energy Efficiency Program Screening.” Presentation for SEE Action Webinar, March 2013.

Woolf, T. 2013. “Energy Efficiency: Rates, Bills and Participants.” Presentation for Rhode Island Energy Efficiency Collaborative, February 2013.

Woolf, T. 2013. “Energy Efficiency Screening: Application of the TRC Test.” Presentation for Energy Advocates Webinar, January 2013.

Woolf, T. 2012. “Best Practices in Energy Efficiency Program Screening.” Presentation for American Council for an Energy-Efficient Economy Webinar, December 2012.

Woolf, T. 2012. Indian Point Replacement Analysis: A Clean Energy Roadmap. Presentation for Natural Resource Defenses Council and Environmental Entrepreneurs, November 2012.

Woolf, T. 2012. “In Pursuit of All Cost-Effective Energy Efficiency.” Presentation at Sierra Club Boot Camp, October 2012.

Woolf, T. 2012. “Best Practices in Energy Efficiency Program Screening.” Webinar for Northeast Energy Efficiency Partnerships, September 2012.

Woolf, T., L. Schwartz. “What Remains to be Done with Demand Response? A National Forum from the FERC National Action Plan on Demand Response Tries to Give an Answer.” Presentation at NARUC National Town Meeting on Demand Response, July 2012.

Woolf, T. 2012. “Best Practices in Energy Efficiency Program Screening.” Presentation at NARUC Summer Meetings – Energy Efficiency Cost-Effectiveness Breakfast, July 2012.

Woolf, T. 2012. “Avoided Cost of Complying with Environmental Regulations in MA.” Presentation for Mass Energy Consumer’s Alliance, January 2012.

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Woolf, T. 2011. “Why Consumer Advocates Should Support Decoupling.” Presentation at the 2011 ACEEE National Conference on Energy Efficiency as a Resource, September 2011.

Woolf, T. 2011. “A Regulator’s Perspective on Energy Efficiency.” Presentation at the Efficiency Maine Symposium *In Pursuit of Maine’s Least-Cost Energy*, September 2011.

Woolf, T. 2010. “Bill Impacts of Energy Efficiency Programs: The Importance of Analyzing and Managing Rate and Bill Impacts.” Presentation at the Energy in the Northeast Conference, Law Seminar International, September 2010.

Woolf, T. 2010. “Bill Impacts of Energy Efficiency Programs: The Implications of Bill Impacts in Developing Policies to Motivate Utilities to Implement Energy Efficiency.” Presentation to the State Energy Efficiency Action Network, Utility Motivation Work Group, November 2010.

Woolf, T. 2010. “Bill Impacts of Energy Efficiency Programs.” Presentation to the Energy Resources and Environment Committee at the NARUC Winter Meetings, February 2010.

Woolf, T. 2009. “Price-Responsive Demand in the New England Wholesale Energy Market: Description of NECPUC’s Limited Supply-Side Proposal.” Presentation at the NEPOOL Markets Committee Meeting, November 2009.

Woolf, T. 2009. “Demand Response in the New England Wholesale Energy Market: How Much Should We Pay for Demand Resources?” Presentation at the New England Electricity Restructuring Roundtable, October 2009.

Woolf, T. 2008. “Promoting Demand Resources in Massachusetts: A Regulator’s Perspective.” Presentation at the Energy Bar Association, Northeast Chapter Meeting, June 2008.

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Woolf T. 2002. “A Renewable Portfolio Standard for New Brunswick.” Presentation to the New Brunswick Market Design Committee, January 10, 2002.

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Woolf, T. 2000. “Generation Information Systems to Support Renewable Portfolio Standards, Generation Performance Standards and Environmental Disclosure.” Presentation at the Massachusetts Restructuring Roundtable on behalf of the Union of Concerned Scientists, March 2000.

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Woolf, T. 1996. “Overview of IRP and Introduction to Electricity Industry Restructuring.” Training session provided to the staff of the Delaware Public Service Commission, April 1996.

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