Via electronic submission: craig.diamond@energizect.com

June 7, 2016

Craig Diamond
Executive Secretary
Connecticut Energy Efficiency Board

RE: NEEP Input on Updates to Connecticut's 2016-2018 Conservation and Load Management Plan

Executive Secretary Diamond:

On behalf of Northeast Energy Efficiency Partnerships (NEEP)[1], please accept our comments regarding the 2017 update to Connecticut Energy Efficiency Fund's Conservation and Load Management Plan for 2016-2018. NEEP is a regional non-profit organization that works to accelerate energy efficiency in homes, buildings and industry across the Northeast and Mid-Atlantic states. Our Policy Outreach and Analysis group serves as an information resource for policymakers, program administrators, and others to support the adoption and implementation of public policies and programs that advance energy efficiency. NEEP is one of six Regional Energy Efficiency Organizations (REEOs), as designated by the U.S. Department of Energy (US DOE), which works in cooperation with the US DOE to disseminate their guidance and products to states and municipalities.

Introduction

We thank the Connecticut Energy Efficiency Board (EEB), Department of Energy and Environmental Protection (DEEP), Eversource, United Illuminating, Connecticut Natural Gas, Southern Connecticut Gas and the Connecticut Municipal Electric Cooperative (the program administrators or "PAs") for the opportunity to provide input on 2017 update to the 2016-2018 Conservation and Load Management Plan. In November 2015, NEEP made extensive comments on the plan, which are posted at neep.org. These comments are supplemented by the brief thoughts below, as well as oral comments at the public input session on June 8.

Connecticut has proven itself as a leader in energy efficiency programs and policies for several years. NEEP often cites the state's work in best-practice examples to other states, in terms of the programs for customers, and collaboration between stakeholders on the EEB, program administrators, DEEP, and the Green Bank. Representatives of the utilities and of DEEP are actively engaged in regional working groups facilitated by NEEP, and are also partnering with NEEP and the U.S. Department of Energy on several projects.

Keep Funding Strong & Stable, Ramp up Goals

The one overarching area where we will continue to urge progress is in setting electric and natural gas savings targets and budgets that live up to the stated policy goal of capturing all cost-effective energy efficiency. As you

[1] These comments are offered by NEEP staff and do not necessarily represent the view of the NEEP Board of Directors, sponsors or partners. NEEP is a 501 (c)(3) non-profit organization that does not lobby or litigate.

can see in NEEP's recent analysis,[2] at 1.5% of retail electric sales and 0.6% for retail gas sales, Connecticut trails most of its neighbors in savings goals, while a number of states have goals nearly twice as high. Per Connecticut statute,[3] utilities are directed to capture all cost-effective energy efficiency. Yet even with the various funding mechanisms at play, the efficiency potential has been limited due to capped budgets. Strong, stable budgets and that help overcome barriers to participation are vital to program uptake and confidence of market actors involved in delivering the programs.

Move towards "Next Generation Energy Efficiency"

In our 2016 policy report, *The Regional Roundup,*[4] NEEP describes a number of trends we see as key to harnessing energy efficiency as an integral and integrated part of our clean energy future. At its most basic, we believe Next Generation Energy Efficiency includes:

- Deep and comprehensive cost-effective energy savings for all fuels.
- Controls and other intelligent efficiency technologies; data analytics to maximize savings and optimize building energy performance via systems-level approaches; advanced building designs and cutting-edge installation, operation and maintenance of energy systems.
- Integration of energy efficiency with demand side and distributed resources, including energy storage solutions, combined heat and power (CHP) and electric vehicles (EVs).
- Strategic electrification and geo-targeting to defer or limit the need for further investments in distribution and transmission system assets.
- Engagement and animation of private markets to deliver high efficiency products and solutions.

As a leading state in promoting energy efficiency policies, we encourage Connecticut's efficiency program administrators and policymakers to think of ways to keep mining for deeper, more comprehensive savings, and integrate efficiency offerings with demand response and distributed resources to help lower total energy use, costs, and environmental impacts such as carbon emissions.

Program Input

Funding limitations not-withstanding, NEEP wishes to commend the program administrators on several areas, and encourage continued progress on others. The following includes input from various members of NEEP's team:

Reconsider Copay for Home Energy Solutions: NEEP shares the concern of the program administrators that low energy costs are having a dampening effect on program participation, particularly on the residential side. While we understand the case for customer co-pays, we note that not all states/programs require an upfront cash commitment from customers. At this time, we believe that the Connecticut program administrators should seek to reduce or remove any barriers to participation. Now is not the time to raise co-pays. In fact, we would urge at

[2] See NEEP's Policy Snapshot, pg. 5: http://www.neep.org/sites/default/files/resources/Energy%20Efficiency%20Snapshot%20Spring%202016_FINAL_0.pdf

[3] Public Act 11-80: https://www.cga.ct.gov/2011/act/pa/pdf/2011PA-00080-R00SB-01243-PA.pdf

[4] For more on Next Generation Efficiency, see our recent report: http://www.neep.org/2016-regional-roundup

least a temporary suspension on co-pays to bolster participation and provide market certainty for the delivery contractor community. While it would require additional investment to increase marketing and target customer engagement, such spending can help to keep the pipeline filled and move customers toward deeper savings.

Home Energy Management Systems (HEMS): We encourage Connecticut to explore integration of home energy management systems and devices into the programs as a way to educate and empower customers to take more control of their energy use. HEMS include any hardware and/or software system that can monitor and provide feedback about a home's energy usage, and/or enable advanced control of energy-using systems and devices in the home. Often marketed through comfort and security lenses, HEMS ultimately have the opportunity to help provide deeper energy savings and harness the energy components of today to have the smart home of tomorrow. Connecticut has been actively promoting smart thermostats in residential programs, but comprehensive home energy management goes beyond just thermostats to technologies such as smart lighting, in-home displays, home energy monitors and controls, among others.

HEMS could help program administrators to advance cost-effectiveness calculations, provide more accurate and timely EM&V, and lead to new approaches in residential program delivery. For homeowners, HEMS could be the key to transitioning the analog homes of the present to the responsive, comfortable, and zero energy homes of the future. HEMS could help the programs integrate demand response offerings with energy efficiency to more effectively address peak consumption. HEMS can offer many of the capabilities desired in "smart meters," in terms of two-way communication and control. While advanced metering systems may be considered a longer-term investment for some utilities, HEMS could be looked at as a similarly important tool in a slightly more near-term toolbox. NEEP recently published a research report[5] on HEMS and maintains a regional working group on the topic. We thank both Eversource and United Illuminating for participating in the group.

E-commerce and online customer experience: Integrating e-commerce into efficiency program offerings is a critical way to capture consumers as they are making decisions. Through Connecticut's efforts in the e-commerce space, from early support of TopTen USA to current use of the Enervee platform, Connecticut has been a leader in online promotions. This effort should continue and NEEP encourages the PAs to consider new opportunities for successful online promotion of products. We are pleased that Eversource is planning on building out its customer engagement platform to incorporate e-commerce. Increasingly, customers are looking for integrated ways to research, learn and make purchases. They want customization, and instant access to

[5]Northeast Energy Efficiency Partnerships. Opportunities for Home Energy Management Systems (HEMS) in Advancing Residential Energy Efficiency Programs. (August 2015) Available at: http://neep.org/opportunities-home-energy-management-systems-hems-advancing-residential-energy-efficiency-programs

information and choices. NEEP has written about the emerging field of e-commerce integrated with energy efficiency programs and more details can be found in our 2015 report.[6]

Leadership on Efficient Products: Connecticut's utilities have been leaders in helping to move efficient products into the market place and creating innovative upstream and mid-stream programs to engage manufacturers, suppliers and installers. Air-source heat pumps and heat pump water heaters are two important product categories on the residential side where technology has afforded tremendous gains in efficiency. These electric products, when paired with increasing onsite renewable generation, are helping Connecticut to reduce total energy use and carbon emissions. There are more opportunities to lead in this space, including participation in EPA's Retail Products Platform (RPP).[7] NEEP is poised to help PAs engage with RPP in the coming years.

Build a Glide Path from Lighting Program Reliance: Lighting rebate programs, particularly on the residential side, have made up the preponderance of efficiency program savings for many years. As we know, rapid advances in technology and reductions in costs, together with the phased in standards under EISA,[8] are eroding what have historically been the bread and butter of program savings. Connecticut has been a leader in advancing residential lighting in partnership with ENERGY STAR®, increasing socket saturation of LED bulbs through direct install and customer education.

In less than four years, lighting programs as we know them will be phased out. It's important that the program administrators continue to seek out a variety of new product, retrofit, and behavioral programs to keep mining new forms of savings. Likewise, it is important that state energy offices and regulators provide the PAs with flexibility to innovate and try new things, understanding that not all of them will succeed, and cost-benefit ratios of efficiency measures and programs will change — while still costing less than new energy generation sources.

Outdoor Lighting Strategies: NEEP recently completed a study of LED Street Lighting in the Northeast and Mid-Atlantic on behalf of the U.S. Department of Energy.[9] A major takeaway of the study was that prices of LED street lighting luminaires have fallen precipitously in recent years, while warrantied product lifecycle has grown considerably; in short, the region is ripe for conversion to LED street lighting. Utilizing a regression analysis of street lighting inventories in Rhode Island, Vermont, and several cities in New York, the study provides a detailed

[6] Northeast Energy Efficiency Partnerships. Exploring the Nexus of E-Commerce and Energy Efficiency. (December 2015) Available at: http://neep.org/exploring-nexus-e-commerce-and-energy-efficiency

[7] Environmental Protection Agency. Retail Products Platform. One Pager. Available at: https://www.energystar.gov/sites/default/files/asset/document/ESRPP_1pager_10-07-15.pdf

[8] Energy Independence and Security Act of 2007: https://www.epa.gov/cfl/how-energy-independence-and-security-act-2007-affects-light-bulbs

[9] Arnold, G. and Buckley, B. Northeast Energy Efficiency Partnerships. LED Street Lighting Assessment and Strategies in the Northeast and Mid-Atlantic. (January 2015) Available at: http://www.neep.org/sites/default/files/resources/DOE_LED%20Street%20Lighting%20Assessment%20and%20Strategies%20for%20the%20Northeast%20and%20Mid-Atlantic_1-27-15.pdf

breakdown of estimated potential energy and cost savings for each state in the Northeast and Mid-Atlantic. It also summarizes the state of LED street lighting conversion in each state. Connecticut's state-specific analysis begins on page 30 of the report, with the state's savings estimates detailed in Table 1 below. We note that this analysis uses estimates rather than actual inventories, and suggest that the information provided pursuant to Condition 3 of the C&LM plan would provide an even greater insight into savings potential in Connecticut.

Table 1. Connecticut LED Street Lighting Savings Potential

Connecticut LED Street Lighting Conversion Summary	
Estimated current number of street lights	312,140
Annual street light energy usage	192 GWh
Annual potential energy savings	96 GWh
Annual potential energy cost savings	$12,600,000
Annual potential maintenance cost savings[10]	$15,600,000
LED conversion installed costs	$87,700,000
Annual potential lighting controls energy savings	8.6 GWh
Annual potential lighting controls cost savings	$1,040,000
Lighting controls installed costs	$9,360,000

Source: NEEP LED Street Lighting Assessment and Strategies in the Northeast and Mid-Atlantic[11]

The study identifies technical, regulatory, and financial barriers to widespread conversion of LEDs. Amongst the most prevalent of these barriers are: 1) The duration of time from study to approval of company-owned LED lighting; and 2) The stranded costs of the legacy fixtures. The study identifies jurisdictions which have surmounted these, and other barriers, including New Hampshire and Vermont.

In New Hampshire, Eversource offers a customer-contributed rate which allows a municipality to contribute fixtures to the electric utility who then owns and operates the fixtures on behalf of the customers.[12] This strategy overcame some of the regulatory barriers related to fixture testing and tariff approval, which in some cases can delay conversion for several years. Likewise, Vermont was able to overcome the problem of stranded costs when the state's major utility partnered with the energy efficiency program administrator to perform a statewide analysis of undepreciated value of the legacy fixtures. After determining the amount of projected lifecycle energy savings, the program administrator offered conversion incentives roughly equivalent to any undepreciated costs of the legacy assets, the majority of which were leased by municipalities from their electric utility.[13] This strategy effectively overcame the stranded costs barrier in the state of Vermont.

[10] Assumes full realization of maintenance savings documented in cast studies of municipally owned fixtures published by the U.S. Department of Energy.
[11] *Supra*, at note 1
[12] New Hampshire Public Utilities Commission. Docket No. DE 12-248. Petition to Amend Rate EOL to Include Light Emitting Diode Technology. Settlement Agreement. Accessed: 1/12/15. Available at: http://puc.nh.gov/Regulatory/Docketbk/2013/13-248/LETTERS-MEMOS-TARIFFS/13-248%202014-07-01%20PSNH%20SETTLEMENT%20AGREEMENT.PDF
[13] Arnold, G. (et al.) A Win-Win-Win for Municipal Street Lighting: Converting Two-Thirds of Vermont's Street Lights to LED by 2014. (August 2012) Available at: http://aceee.org/files/proceedings/2012/data/papers/0193-000144.pdf

Since converting to LED street lighting can reduce municipal electric bills by a significant percentage for those municipalities who own their luminaires, we encourage those municipalities to consider recapturing a portion of their energy savings in a revolving fund. The recaptured energy and maintenance savings can then be used to drive ever deeper retrofits at schools and other municipal buildings. One example of a widely adopted tool developed by a nonprofit organization that municipalities could use is the Green Revolving Investment Tracking System.[14] While the tool is normally available to states, municipalities, and universities for a small fee, an agreement with the American Public Power Association makes the tool freely available to most municipal utilities, such as those that participate in the Connecticut Municipal Electric Energy Cooperative.

Connecticut has been a leader on tackling regulatory barriers to LED conversion, and in fact, recently granted approval for a tariff allowing Eversource to offer a company-owned LED fixture for customers seeking to convert.[15] We applaud the state's efforts to move the dial forward on efficient street lighting and encourage stakeholders to further review the solutions offered within NEEP's recent study to examine how a rapid conversion to LED technologies might cost-effectively advance energy efficiency programs within the state.

Building Energy Issues

NEEP commends the utilities and DEEP for their work to advance building energy rating and labeling. Connecticut has some of the most robust data in the region through its Home Energy Score, and we again thank the parties for their involvement and support of the Home Energy Labeling Exchange (HELIX), a project funded by the U.S. DOE that will help catapult the valuation of efficiency in the real estate market. Following are a few other points on buildings:

Code Compliance: Connecticut should be commended for its recognition of the importance of verifying energy code compliance as an important opportunity to identify previously untapped sources for energy savings. DEEP and the utilities will help to ensure energy safety, security, and certainty as well as occupant health, productivity, and comfort by continuing to support this process. The state should be encouraged to continue to use a percentage of permitting fees to afford training opportunities for code officials. Rigorous compliance will allow the state to accurately claim energy saving based on building energy code attribution.

Whole Building Data: One barrier which still remains for customers with multiple individually metered tenants (such as multifamily, office, retail, and warehouse) is the lack of reasonably accessible whole-building energy data access for the purposes of benchmarking and portfolio energy management. We support efforts by the electric distribution utilities to develop their systems for providing streamlined access for building owners to aggregated whole-building energy data.

[14] Green Revolving Investment Tracking System. Available at: http://greenbillion.org/grits/

[15] Connecticut Light and Power Company DBA Eversource Energy. Street and Security Lighting Rate 116. Page 2. Available at: https://www.eversource.com/Content/docs/default-source/rates-tariffs/rate116.pdf?sfvrsn=8

Industrial Efficiency Opportunities

The Connecticut efficiency program administrators have done a good job and engaging with and understanding the needs of commercial and industrial customers, particularly very large customers. Finding ways to reach and better serve large commercial and industrial customers, in ways that satisfy their business needs, is crucial for many reasons, not the least of which is that if large customers don't feel they get high value from the programs, they are less likely to participate and may seek ways to "opt out." When this happens, decreased budgets risk undermining program offerings for all business customers, and mean that less efficiency happens overall.

The following guidance is excerpted from a recent SEE Action Network paper, *Sustained Energy Savings Achieved through Successful Industrial Customer Interaction with Ratepayer Programs: Case Studies*[16]

- **Develop multiple-year relationships** between program administrator and industrial company personnel, involving a steadily evolving program of support and efforts to identify multiple projects over time (rather than a single project).
- **Develop programs that can target energy efficiency gains in manufacturing processes**, in addition to energy used in support systems.
- **Develop programs involving Strategic Energy Management (SEM)** that support internal company platforms for continual identification and implementation of energy savings measures, high-impact and low-cost behavioral changes, and operational and maintenance improvements.
- **Promote smart manufacturing and enhanced metering practices**, such as installing sensors and embedding devices in software that communicate with one another and with other systems through networks.

The use of multi-year MOUs in Connecticut is helping to build relationships and long-term plans for efficiency investments. We encourage the PAs to continue these advances, including bringing the programs down to scale for smaller customers, and to explore the creation of Strategic Energy Management programs, as recommend by the U.S. DOE. SEM represents a very exciting emerging practice that has the potential to greatly reduce energy use in the industrial sector. By teaming with C&I customers to provide powerful tools that help them strategically manage their energy use, utilities can realize significant savings and deepen their customer relationships. NEEP has received funding from the U.S. Department of Energy to conduct research, improve definitions and share best practices related to cost-effectiveness of SEM programs.

Policymaker Understanding and Support is Vital

To further opportunities for success in industrial energy efficiency programs, agencies such as DEEP can:

- Encourage energy efficiency program administrators to set aggressive savings targets;
- Encourage the programs to quantify and claim the numerous non-energy benefits when it comes to Industrial energy efficiency programs;

[16] https://www4.eere.energy.gov/seeaction/system/files/documents/IEE%20Case%20Studies_1002.pdf

- Afford flexibility with rolling program budgets;
- Encourage PAs to explore and pilot new program approaches; and,
- Understand that non-measure programs and services, including technical expertise and information systems, deliver valued benefits to customers and help ensure continuous engagement and operational efficiency gains.[17]

Cost-Effectiveness Issues

As the 2016-18 C&LM Plan notes, "The Companies will work collaboratively with the Energy Efficiency Board and DEEP to identify and quantify additional non-energy benefits that can be used in Total Resource Cost Testing going forward. It is anticipated that this work will begin in late 2015, and that additional NEBs may be included in B/C testing upon completion of this process." We applaud stakeholders for striving to incorporate additional non-energy benefits, or non-energy impacts, and offer insights on the subject below.

We encourage the utilities and DEEP to learn from neighboring states, and to explore the work of the National Efficiency Screening Project (NESP)[18] to inform the evolution cost-effectiveness screening. We also encourage DEEP to review the methodologies utilized by their neighbors in the region to consider the benefits associated with non-energy impacts. Table 1. Represents an overview how states within the region assign value to non-energy impacts,[19] with direct quantification, cost adders, and alternative screening benchmarks being amongst the most popular tools.

Table 1. Methodologies for Quantifying Non-energy Impacts

Primary Test	Total Resource Cost Test					Societal Cost Test	
State	*MA*	*RI*	*NY*	*NH*	*DE*	*VT*	*DC*
Utility-Perspective NEIs	Quantified	Quantified				15% Adder	
Low-Income / Economic Development	Quantified	Quantified	Alt. Benchmark	Alt. Benchmark		30% Adder	10% Adder
Improved Operations	Quantified	Quantified	Alt. Benchmark			O&M Quantified	O&M Quantified
Comfort	Quantified	Quantified				15% Adder	10% Adder
Health & Safety	Quantified	Quantified				15% Adder	10% Adder
Home Improvements	Quantified	Quantified				15% Adder	10% Adder
Participant's Utility Savings	Quantified	Quantified				15% Adder	10% Adder
Education and Contributions						15% Adder	10% Adder
Other Participant-Perspective						15% Adder	10% Adder
Societal-Perspective NEIs		Quantified				15% Adder	10% Adder

Source: NEEP Evaluation, Measurement, and Verification Forum's Cost-Effectiveness Screening Principles and Guidelines.[20]

[17] For more ideas, see NEEP's 2016 *Regional Roundup:* http://www.neep.org/2016-regional-roundup

[18] http://www.nationalefficiencyscreening.org/

[19] Since the report's publication, New York has embraced the Societal Cost Test as the threshold test for measure screening.

[20] NEEP Evaluation, Measurement, and Verification Forum's Cost-Effectiveness Screening Principles and Guidelines. Page 63. (November 2014) Available at: http://www.neep.org/sites/default/files/resources/Forum_C-E_Screening_Guidelines_Final_No_2014.pdf

Table 2 describes the quantitative values that three states within the Northeast and Mid-Atlantic have placed on non-energy impacts. The Massachusetts and Rhode Island figures are derived from each state's technical reference manual, while the Maryland figures are derived from a recent Order of the Maryland Public Service Commission.

Table 2. Quantification of Non-Energy Impacts in Massachusetts, Rhode Island, and Maryland.

Perspective/NEB Category	Massachusetts Dollar Range	Rhode Island Dollar Range	Maryland Dollar Range[21]
Utility Perspective • Financial and Accounting • Customer Service	 $2.61 - $39.90 $0.34 - $8.43	 $2.61 - $3.74 $0.34 - $8.34	$60/Lim. Inc. only*
Participant Perspective • Improved Operations • Comfort • Health & Safety • Home Improvements	 $0.96 - $124 $31 - $125 $4 - $45 $17* - $1,998*	 $0.96 - $102.40 $1.42 - $125 $0.13 - $45 $0.32* - $678.52*	$7.73 - $30.7 (C&I only) $27 - $34
Societal Perspective • Economic Development • Air Emissions Benefit		*$0.39/kWh saved	*$0.002/kWh saved

Source: NEEP Evaluation, Measurement, and Verification Forum's Cost-Effectiveness Screening Principles and Guidelines.[22] **Indicates a one-time benefit, not an annual benefit that accrues for the duration of a measure's life. Dollars are per household per year. Disparity in home improvement values between Rhode Island and Massachusetts is likely a result of property value and building stock characteristics.*

In addition to reviewing the above mentioned resources, we also draw stakeholders' attention to a recent presentation to the Massachusetts Energy Efficiency Advisory Council discussing preliminary finding of a low-income program impact assessment. Recent research quantifying health impacts of such programs indicates that their non-energy impacts are much larger than previously thought. Pending final publication, the study suggests revising current value for health impacts of low income programs from their current estimate of $19 per household weatherized, instead to more than $900 per household weatherized.[23] We encourage the

[21] Maryland figures derived from recently filed EmPOWER Energy Efficiency Programs Strategic Evaluation Guidance. Appendix C, page 8-9. (April 2016) Available at: http://webapp.psc.state.md.us/newIntranet/Casenum/NewIndex3_VOpenFile.cfm?filepath=C:\Casenum\9100-9199\9154\Item_713\\9153-57-ImpactEvaluationGuidanceReport-wg-041816.pdf

[22] *id*. at Page 68.

[23] Massachusetts Energy Efficiency Advisory Council EM&V Briefing, presented May 25, 2016. Slide 21. Available at: http://ma-eeac.org/wordpress/wp-content/uploads/EEAC-EMV-Briefing-May-25-2016.pdf

Companies, DEEP, and the Energy Efficiency Board to review this study when considering value of low-income programs in their cost-benefit analysis.

Conclusion

NEEP commends the program administrators, DEEP, and the Board for their continuing support of energy efficiency in Connecticut. We hope these comments are helpful, and remind the parties that NEEP stands ready to help Connecticut's efforts to make efficiency a first-order resource and a bridge to a clean energy future.

Sincerely,

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