The Regional Roundup of Energy Efficiency Policy:

Next Generation Energy Efficiency

Northeast Energy Efficiency Partnerships

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The Regional Roundup of Energy Efficiency Policy:
Next Generation Energy Efficiency

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ABOUT NEEP

Northeast Energy Efficiency Partnerships (NEEP) is a non-profit that supports the expansion and implementation of policies and programs to accelerate energy efficiency in the Northeast and Mid-Atlantic region. Founded in 1996 as a collaborative of utilities, government and the private sector, we work in four key areas: speeding the adoption of high-efficiency products, reducing building energy use, advancing knowledge and best practices and generally increasing the visibility of the benefits of efficiency.

Our vision is that the region will fully embrace energy efficiency as a cornerstone of sustainable energy policy to help achieve a cleaner environment and a more reliable and affordable energy system. NEEP is available to assist state energy offices, legislators, regulators or administration officials in any of these areas. NEEP works through funded partnerships with the U.S. Department of Energy (DOE), as well as with utilities, third party program administrators, public officials, various non-governmental groups, businesses and foundations.

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The *Regional Roundup of Energy Efficiency Policy* is intended to give policymakers, regulators, efficiency proponents, program administrators and other stakeholders a comparative view of the progress of energy efficiency policies and programs across the Northeast/Mid-Atlantic region. Along with state-level highlights, the report examines regional trends and shared challenges in harnessing the potential of energy efficiency to meet today's pressing energy and environmental challenges — controlling energy costs, improving system reliability, reducing the need for expensive new generation and transmission projects, modernizing the electric grid, strengthening the economy, growing jobs, improving public health and curbing emissions of greenhouse gases and other pollutants.

The theme of the 2016 *Roundup* is "Next Generation Efficiency," which, in NEEP's view, represents the convergence of technological, program, and policy developments that are both impacting and being shaped by states, efficiency program administrators (PAs) and market actors. Next Generation Efficiency includes new ways of reaching customers, integration of home and building efficiency with other demand-side resources, intelligent technology and smart grid solutions. It means employing data, powerful analytics, controls and two-way customer communication, and moving beyond traditional product rebates towards more comprehensive market transformation and all-fuel, whole-building approaches.

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The report includes an overview of various trends facing the efficiency world — both positive and concerning. We examine new program and evaluation, measurement and verification (EM&V) trends; locational or "geo-targeting" of energy efficiency where it's needed most to address demand challenges; strategic electrification of our energy system, including the growth of electric vehicles and what it may mean for our energy grid; new approaches to rate design on the part of both regulators and utilities, as well as the policy and program opportunities and challenges they pose.

As we look at states from Maine to Maryland, we include highlights of efficiency policy developments, examples of best practices to watch, and the most recently-available electric and natural gas investment and savings data for regulated programs. Among the key characteristics we see among states that are leading or advancing in energy efficiency are: acknowledgement of and appreciation for the full range of benefits provided by efficiency; sustained support by leaders in the executive, regulatory and legislative branches; and program administrators that are driven to, and rewarded for, their innovation and commitment to putting customers front and center. In leading states like Massachusetts, Vermont and Rhode Island, we see governors striving to bring a new clean energy vision to life, more choices and deeper savings for residential and business customers, and notable job growth.[1]

Finally, NEEP offers our take on policy strategies to advance Next Generation Efficiency, with an array of useful references, tables and charts in the appendices and many more links and resources available on our website — including our **state policy pages**, the **Regional Energy Efficiency Database**, the **NEEP blog**, and our frequently-updated **Policy Tracker and Policy Snapshot**.

[1] See recent studies on job growth https://www.nationalgridus.com/aboutus/a3-1_news2.asp?document=8074, and http://www.masscec.com/2015-massachusetts-clean-energy-industry-report

INTRODUCTION

This report represents NEEP's annual assessment of the major policy developments of the last year, as well as our look into the immediate future, where we gauge states' progress toward capturing cost-effective energy efficiency (EE) as a first-order resource.* While looking at the region as a whole, we also provide summary and analysis of some of the biggest building energy efficiency successes and setbacks among the states — including significant energy efficiency legislative and regulatory developments and their impacts on investment levels for energy efficiency programs.

The *Regional Roundup* is intended to give policymakers, regulators, efficiency proponents, program administrators and other stakeholders a comparative view of the progress of energy efficiency policies and programs across the region. Along with state-level highlights, the report examines regional trends and shared challenges in harnessing the potential of energy efficiency to meet today's pressing energy and environmental challenges — controlling energy costs, improving system reliability, modernizing the electric grid, strengthening the economy, growing jobs, improving public health and curbing emissions of greenhouse gases and other pollutants.

** NEEP focuses our work in Vermont, New Hampshire, Maine, Massachusetts, Connecticut, Rhode Island, New York, New Jersey, Pennsylvania, Delaware, Maryland and Washington, D.C.*

"NEEP and the northeast region have changed enormously over the past 20 years. Twenty years ago, NEEP was primarily providing coordination between the many energy saving programs in a region that was achieving moderate incremental savings each year. Today, leading states in the region have more than doubled their incremental annual savings and NEEP is helping the region to continue its leadership role by emphasizing next generation opportunities such as intelligent efficiency (smart buildings and smart manufacturing), zero energy buildings, advanced lighting systems and controls, more efficient plug loads and high-performance heat pumps. Rather than having to pick higher-hanging fruit, NEEP is helping to grow new fruit on the lower branches of the energy efficiency tree."

— Steve Nadel, Executive Director of the American Council for an Energy-Efficient Economy, and founding board member of NEEP

20 YEARS

Reflecting on the History of Energy Efficiency, while Looking to the Future

Sue Coakley, Executive Director of NEEP

It's been twenty years since utility companies, policymakers and efficiency leaders got together to form what would become "the Northeast Energy Efficiency Partnerships" (NEEP). In 2016, as we navigate a period of rapid change in the energy landscape, NEEP looks back on the maturation of efficiency and how far the nation, the region and the industry have come in embracing efficiency as a resource that can help enable the energy systems of the future: clean, smart, responsive, resilient.

According to founding Executive Director Sue Coakley, NEEP and other early regional energy efficiency organizations (REEOs) were formed when it became clear that strategic multi-state collaboration among energy efficiency actors — utilities, state agencies and federal efficiency programs — was needed to effectively advance energy efficiency and transform markets for the long term.

Below, Coakley reflects on the history of energy efficiency, and where we are headed in this next generation.

The First Generation of Efficiency Programs: "Just Use Less"

The beginning of energy efficiency as we know it was in the 1970s and '80s, and was called "conservation." Responding to the price shocks of the Arab Oil Embargo, Congress established the Department of Energy in 1977 to, among other things, diversify energy resources and promote conservation. The Low Income Weatherization Assistance Program (WAP) was among its first programs. To date, WAP has served over 7.4 million homes, helping the nation's most vulnerable reduce energy costs while increasing comfort and safety. Another early program, the Residential Conservation Service (RCS), established by the 1978 National Energy Conservation Act, promoted energy audits and asked consumers to insulate their homes, weather-strip windows, wrap water heaters, turn down thermostats and turn-off lights.

Seeing Efficiency as an Energy Resource

Energy efficiency as a resource got a boost in our region when states implemented the Public Utility Regulatory Policy Act of 1978 (PURPA), which required regulated utilities to purchase power from independent power producers at an "avoided cost" based on the price they would otherwise pay to build a power plant or procure supply to meet customer demand for electricity. Faced with dual rate shocks from natural gas and petroleum price spikes and rate-basing expensive nuclear power plants, public utility commissions reasoned that utilities should be just as willing to pay this avoided cost for a kWh saved as a kWh generated.

This led to "standard offer" efficiency programs that offered a price per kilowatt hour paid for verified energy savings, a strategy that advanced the nascent energy performance contracting industry. This greatly increased energy efficiency investments and led to evaluation, measurement and verification (EM&V) protocols to validate claimed energy

"The collaborative platform that NEEP has built over the past 20 years has truly enhanced the work of all the partners in the industry. If NEEP didn't already exist, we'd need to create it."

— Stephen Cowell, President E4TheFuture and founding board member of NEEP

savings. Regulators, however, realized that a significant amount of energy savings could be achieved at a cost much lower than the avoided cost of new supply, and that ratepayers would be better served if utilities acquired energy savings at their actual cost versus always paying the avoided cost of new supply. Thus began a new generation of targeted efficiency programs that offered incentives to customers and utilities to acquire energy savings.

Emergence of Resource Acquisition Programs

Integrated least-cost resource planning spawned efficiency program portfolios with differentiated products designed to overcome sector-specific market barriers to increased energy efficiency. These "resource acquisition" programs offered customers financial incentives, rebates and financing, along with technical assistance to unlock cost-effective energy savings as a strategy to defer more costly energy supplies. Some utilities implemented radio-controlled demand response programs that "cycled-off" air conditioners and water heaters during high cost periods of peak energy need. As resource acquisition programs became more sophisticated, so did regulatory policies that offered utilities performance incentives to meet energy savings goals along with dollar-for-dollar program cost recovery, and lost revenue or decoupling mechanisms with rigorous EM&V and reporting.

Working together to Transform Markets

The success of resource acquisition programs yielded market impacts beyond cost-effective energy savings. With efficiency programs ramping up across the region and growing consumer recognition of the ENERGY STAR® brand to distinguish high efficiency options, efficiency programs were also affecting manufacturer, distributor, and retailer product stocking and sales practices. They were also building the knowledge and ability of architects, engineers and builders to provide superior energy efficiency in home and building design and construction. This led to programs designed to achieve large-scale "market transformation" through coordination with supply chain actors to increase the availability of and demand for high efficiency product.

In many cases, these programs used national and regional brands to distinguish quality energy efficient products. In addition to ENERGY STAR®, efficiency programs used NEEP's regional brands such as "Motor-Up," to promote premium commercial and industrial motors across the Northeast and Mid-Atlantic, "Cool Choice," to promote high efficiency commercial HVAC, and the DesignLights Consortium,™ to distinguish high efficiency lighting design and equipment for the commercial sector.

NEEP's Northeast Collaborative for High Performance Schools Guidelines, developed in collaboration with the New Buildings Institute's Advanced Building Guidelines, offered consistent regional guidance to promote the design, construction and operation of schools with superior energy performance. These led to NEEP's introduction of model "stretch" codes adopted by states and communities to raise the bar for efficiency in new construction and renovation. Active support for new state and federal appliance standards, as well as state adoption of more stringent building energy codes, locked in these market effects such that new efficiency baselines were established for many types of equipment as well as in the design and construction of homes and buildings.

"The new ENERGY STAR® program was a catalyst for NEEP's founding," said Coakley, who noted that a grant solicitation presented by the U.S. Environmental Protection Agency in 1996 provided the first round of seed money for NEEP. "NEEP engaged efficiency program sponsorships to provide a cost match for this first three-year federal ENERGY STAR® program grant, beginning a long and very successful market transformation partnership focused on consumer products, HVAC equipment and home and building energy rating and benchmarking."

State and Local Governments Lead-by-Example

The success of efficiency programs coupled with state and local policy commitments and plans to reduce greenhouse gas emissions led to "lead-by-example" efficiency initiatives within state and local governments. These included commitments to improve public building energy performance, building energy rating and disclosure initiatives, and zero energy public building initiatives. States increased their sophistication in using performance contracting to access needed capital and services to improve building energy performance, a best practice that some states extended to local government.

States also supported the inclusion of energy efficiency in electric power system capacity and reliability markets, a development that spurred state regulators to commit to more consistent, transparent, and publicly accessible EM&V to increase the credibility and market valuation of energy efficiency. This culminated in resolutions approved at each of the ***NECPUC*** and ***MACRUC*** annual meetings in 2008. NEEP responded by establishing the Regional EM&V Forum to support state regulators in a variety of ways — use of common best-practice EM&V protocols, participation in joint studies to provide common data inputs, and creation of the Regional Energy Efficiency Database (REED) to make EM&V results transparent and readily accessible for planning, forecasting and analysis of efficiency program impacts.

In recent years, the summary impact of federal, state, community and ratepayer-funded programs is reflected in the flattening and even decline of electric energy use while business development and job growth continued.

The Digital Revolution and Putting Customers at the Center

More recently, the Digital Revolution and the Internet of Things™ have profoundly affected energy efficiency programs. First, it brings to energy efficiency programs the power of massive amounts of data and data analytics to broaden and deepen the reach and impact of efficiency programs, a trend that ACEEE calls "***Intelligent Efficiency***." This includes a wide range of products that collect and analyze customer end-use data (e.g., through advanced metering infrastructure "AMI" technology) coupled with demographic and other data sources to provide insight into customer energy use and energy efficiency and peak demand reduction savings opportunities.

Home Energy Management Systems (HEMS), building controls, and Software as a Solution (SaaS) systems now harness the power of machine learning, data analytics, social networking, and cloud computing to provide customer-specific "dashboards" of actionable information. This has spawned a new generation of behavioral programs designed to increase efficiency and reduce peak demand through customer-managed energy use.

Related to this is the use of social media and closed-loop marketing to influence consumer selection of high-efficiency products through integrated marketing of in-store and targeted on-line consumer messaging. The Digital Revolution has ushered in a proliferation of plug-in devices that increase home and business use of electricity — a broad, diverse and rapidly growing end-use that calls for new strategies to increase efficiency. In response, efficiency programs encourage customer selection of high-efficiency electronics as well as the use of energy management systems such as smart power strips that limit energy use when electronics are dormant. In addition, the Digital Age has introduced new data collection and analytic tools that assist program EM&V by collecting and assessing customer and program data.

20 YEARS

Next Generation Efficiency: Integrating Efficiency and Distributed Energy Resources

With efficiency programs setting annual savings targets of up to three percent of electric retail energy sales, and the rapid advancement of cost-effective distributed energy resources, the next frontier is about engaging customers and markets to create new solutions and business models. Efficiency programs are evolving now to focus more on customer engagement and market solutions that provide comprehensive, progressive services that have the potential to completely change how we receive energy and how it is provided. Next Generation Energy Efficiency is responsive to what customers are asking for and what the market is providing. It is about a very vibrant market with new players coming in and offering things in ways we've not seen before. It's because of data, electronic media, and the lower cost of renewables. It's due to the success of efficiency to reduce footprints, save money and enable people to invest in other things.

I think of how we've watched technology change over the 20 years NEEP has been here. We've almost always underestimated how fast technology will change. Take lighting, for example. Four years ago, conventional wisdom was that high quality, white LED bulbs were a long way off. Now, they have come so far in quality and performance with competitive pricing, CFLs — once the workhorse of residential lighting programs — are now becoming only a "niche" product with limited shelf space.

Change is coming quickly. For the innovators in markets and programs, it's hard to be in the current regulated structure as these new markets develop. We are trying to figure out answers to questions like: What is the role of the grid? Who will pay for the grid that will enable the future we want to see? The questions are very large and market solutions are coming very rapidly. Of course, energy storage is a game-changer in matching distributed renewable energy production to customer and grid needs. In this Wild West market, there are pioneers who are forging ahead, takeovers and mergers, and technologies and services that are no longer needed.

Going forward, energy efficiency enables the transition to a new energy future. It's the money we're saving, the smaller footprint we're serving. It's the controls we use to manage our energy and be smart about it, and allow us to integrate other options and be connected to the grid. Who will provide those services, technologies, and solutions? That story is being written today.

MILESTONES OF ENERGY EFFICIENCY POLICY

1974
Under Governor Ronald Reagan, California creates first appliance standards with Warren-Alquist Act

1976
The National Conservation Act

1977
U.S. Department of Energy established Under President Carter

1978
Public Utility Regulatory Policy Act (PURPA)

1980
ACEEE founded by leading energy researchers

1987
Power to Spare: A Plan for Increasing New England's Competitiveness through Energy Efficiency is published

1990s
Utility deregulation and restructuring

1992
U.S. EPA Launches Energy Star

1996
NEEP, the country's first Regional Energy Efficiency Organization (REEO) is founded, with funding from U.S. EPA

U.S. DOE begins awarding State Energy Program Grants

N.Y. first calls for Systems Benefits Charge to fund programs, other states also considering.

1998
NEEP & utilities launch first regional market transformation efforts: clothes washers, residential lighting, commercial lighting motors and HVAC.

1999
Appliance Standards Project created

2000
IECC creates first national model building energy code

NEEP and its sponsors awarded first of its recognition awards from ENERGY STAR, which are awarded to the organization every year thereafter

2005 - 2008
The concept of "all cost effective energy efficiency" is advanced as the defining policy in Vt., R.I., Ct. and Mass.

2006 & 2011
Governors in Massachusetts and Connecticut combine their environmental and energy secretariats, emphasizing the important linkage between energy and the environment

2007
Vermont's electric load *curve* is bent downwards, thanks to investments in efficiency

2008
RGGI is launched as the country's first cap-and-trade program

Passage of Green Communities Act in Massachusetts

2009
First "Stretch Code" Published as informative appendix to Mass. building code

ARRA SEP grants contingent on promise to update building codes

2010
NEEP accepts Jeffrey Johnson Award for Excellence in Advancement of Building Energy Codes from the U.S. DOE on behalf of the Massachusetts stretch code team.

2012
ISO-New England first includes efficiency in regional system forecast

2013
Delaware passes legislation to create first statewide efficiency programs

2014
Mass. opens grid modernization proceeding, N.Y. begins Reforming the Energy Vision

2015
Vermont embarks on strategic electrification.

2016
FERC Order 745 upheld by U.S. Supreme Court.

*This list is by no means exhaustive. Please visit ***neep.org*** for more history, as we celebrate our 20th year of advancing efficiency in partnerships across the region.

20 YEARS

CHARTING A COURSE: Next Generation Energy Efficiency

As we enter 2016, we see a convergence of technological, program, and policy developments that NEEP and its stakeholders have identified as "Next Generation Energy Efficiency." This was a prevailing theme uncovered during the recent development of NEEP's three-year strategic plan. It is also the lens through which we assess states progress in this year's *Regional Roundup*.

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).**
- ✓ **Engagement and animation of private markets to deliver high efficiency products and solutions.**

While identifying a set of common characteristics might have been relatively straightforward, understanding all of the implications is much more challenging. For example, if we acknowledge a new paradigm where customers are placed at the center of the delivery of energy services — via controls, advanced analytics, or other elements of intelligent energy efficiency — we will need to fundamentally alter the ways in which our energy infrastructure has operated for generations. Thus, our electric grid will need to be built out and operated in a vastly different way, with far more emphasis on distributed energy generation, demand response, storage and microgrids.

Such a scenario requires significantly different public policy actions, evolving quickly from current models of utility investment and reward, and focused far more than has been the case on relieving local and regional energy system peaks and constraints. Customer/supplier interaction also evolves from being one way — i.e., the delivery of energy — to a more dynamic scenario where customer load can move both ways, especially with greater deployment of electric vehicles.

Likewise, energy policies have to acknowledge the commitments to carbon reductions that our states have made, while also supporting resiliency for homes, buildings and communities. All the while, they will be tested by the political realities of trying to squeeze every kWh or therm of savings at the least possible upfront cost.

Wading even further into the weeds, policies will need to begin looking very differently at issues such as program cost-effectiveness, recognizing the full array of energy and non-energy benefits that accrue not only to program participants, but to society, and not just in the short term, but for years to come.

In our fifth annual *Regional Roundup*, NEEP offers a look back at some of the biggest state developments in policies, programs and high-level data. We also offer our analysis of the trends shaping our region and the energy landscape on a broader level. How are states doing on their efficiency goals? Where are areas of concern, and which states are really embracing the elements of and commitments to Next Generation Energy Efficiency? Read on for NEEP's insights and analysis.

"Change is coming quickly. For the innovators in markets and programs, it's hard to be in the current regulated structure as these new markets develop. We are trying to figure out answers to questions like: What is the role of the grid? Who will pay for the grid that will enable the future we want to see?" — Sue Coakley, NEEP Executive Director

STATES AT A GLANCE

Based on several indicators — sustained support of efficiency programs and policies by gubernatorial administrations, new regulatory, legislative or programmatic initiatives to advance Next Generation themes, and inclusion of complementary policies such as building energy rating and leading by example — NEEP offers its view of how states are doing in policy commitments and related savings results. "Leading States" that are doing the most to embrace efficiency as a resource and engage on Next Generation topics; "Advancing States" that have yet to make the same level of progress, but are making some advances; and "Trailing States" that are falling behind their peers in the region. We note that NEEP's analysis is admittedly subjective; even in the leading states, there remain some major issues to be addressed, while, conversely, there are also encouraging stories to highlight even from the states with more nascent efficiency programs. Our intent is to neither idolize nor demonize state leadership, but to encourage an important and needed examination of how the Northeast/ Mid-Atlantic can maintain and build upon its national leadership in energy efficiency.

LEADING:

Connecticut | Massachusetts | New York | Rhode Island
Vermont

All of these states are taking notable steps to embrace Next Generation themes, including grid modernization/utility of the future proceedings; serious examinations of the integration of efficiency, distributed resources and storage; and strong, sustained support for efficiency program investments. Critical decisions regarding the future of energy efficiency are still pending in New York, where its Reforming the Energy Vision regulatory proceeding may result in strong, binding energy efficiency savings goals, or may leave open to untried forces a transition to greater reliance on market actors for the delivery of efficiency savings. Vermont gets credit for initiating no less than an "Energy Transformation," including strategic electrification. Massachusetts maintains a commitment to nation-leading energy savings goals, while urging innovations from its program administrators. And Rhode Island exhibits strong executive leadership on energy and climate issues, continuing to show that big things can, indeed, come in small packages.

ADVANCING:

Delaware | District of Columbia | Maine | Maryland
New Hampshire

Both New Hampshire and Delaware are making solid progress on efficiency policies — New Hampshire working towards its first Energy Efficiency Resource Standard, and Delaware for laying the framework for the first broad statewide, ratepayer-funded efficiency programs. Maryland continues on with EmPOWER programs, despite concerning trends at the highest levels of state government that seem to question the value of energy efficiency. The District of Columbia continues to see leadership on building energy from the mayor's administration and the Sustainable Energy Utility. Maine broadened its natural gas programs significantly this year, while its legislature voted unanimously to expand program funding, and the Efficiency Maine Trust proposed targets in the next Triennial Plan that exceed two percent of retail sales.

TRAILING:

New Jersey | Pennsylvania

Under Governor Chris Christie, energy efficiency and climate policies have suffered in New Jersey. Repeated diversion of energy efficiency funds to the state's general operating budget and a lack of support for the Regional Greenhouse Gas Initiative (RGGI) have limited energy efficiency's role as a resource in New Jersey. Pennsylvania is making notable strides thanks to leadership from Governor Wolf, whose administration has voiced support for energy efficiency and its role in the Clean Power Plan. However, Pennsylvania remains the only jurisdiction in the NEEP region without comprehensive gas efficiency programs. Further, a recent order extending Act 129's electric efficiency programs until 2021 failed to address the constraints of the non-inflation adjusted funding level prescribed more than a decade earlier, and therefore limited savings targets to about .8 percent of retail sales.

While each of the NEEP states has bright spots on the efficiency/clean energy front, some of the biggest areas of concern stem from gubernatorial administrations that have not fully accepted the value of efficiency in saving consumers and businesses money and contributing to broader policy goals. As the Northeast and Mid-Atlantic region continues to face high fuel supply costs, as climate goals at both the state and federal levels are strengthened, and as technological, programmatic and financing innovations become the norm, we encourage governors and legislatures across the region to fully embrace the next generation of energy efficiency programs and policies as the most cost-effective energy resource available to their residents and businesses.

TOP TRENDS AND STATES THAT ARE EMBRACING OR EXPLORING THEM

TREND	NEXT GENERATION POLICY	STATES
Grid Modernization	Examining new utility frameworks responsive to emerging technologies/ societal challenges and anticipating proliferation of multi-directional power flows, while also emphasizing greater customer engagement.	MA, NY, CT, RI, DC, NH
Strategic Electrification and Geo-targeting	Planning to procure savings from energy systems as a whole — across all fuels — with an emphasis on targeting distributed energy resources and their capabilities to defer or limit the need for further investments in distribution and transmission system assets.	VT, RI, NY, MA, ME
Advanced Building Policies	Shifting toward a whole-building approach to efficiency emphasizing advanced building energy codes, code compliance mechanisms, and building energy rating and labeling practices that drive toward "zero energy."	RI, MA, CT, VT, DC, NY, DE
New Program Strategies	Harnessing new technology and policy innovations within utility program plans to enhance customer understanding around energy usage through expanded energy data access, information communication technologies, and strategic energy management strategies.	MA, VT, CT, NY
Integrating Energy Efficiency and Demand Response	Pairing energy efficiency program planning with opportunities for demand response in a manner that enhances cost-effectiveness and reduces peak load growth.	MD, CT, RI, MA, PA
EM&V 2.0	Coupling new data collection technologies and software-as-a-service analytic tools with traditional evaluation, measurement, and verification strategies for real-time feedback of efficiency program impacts that is less costly and sufficiently accurate.	*Many states exploring, none fully implementing*
Ongoing Evolution of Financing Tools	Leveraging private capital investments to increase funding available for energy efficiency programs through the use of Green Banks and related credit facilities, while also preserving proven program structures.	NY, CT, PA, NJ

The *Trends Section* below offers a more in-depth examination of what NEEP has defined as Next Generation Energy Efficiency, *State-by-State Assessments* provide some of the biggest recent policy developments and efficiency investment and savings data, and the *Going Deeper* articles provide more insights from NEEP's Policy Outreach and Analysis team.

Hallmarks of Next Generation Energy Efficiency

In early 2015, NEEP began a process that brought together our Board of Directors, staff and a group of selected stakeholders to help chart a strategic direction for the organization for the next three years. The goal was to inform energy efficiency program development and respond to those critical issues and trends that are reshaping the energy industry in the Northeast and Mid-Atlantic region. The process included interviews with stakeholders from 14 different organizations representing government, industry, non-profits, and funders; a broader survey of stakeholders; a Board and staff retreat; and market research on evolving utility business models, climate change, infrastructure developments, and the digital revolution. The resulting Strategic Plan included a lot of different elements, but at the cornerstone was an acknowledgment of and commitment to helping deliver "Next Generation Energy Efficiency."

What do we mean by ***Next Generation Energy Efficiency?*** For the stakeholders in our strategic planning process, it included the following characteristics, which we have summarized as a list of public policy or program objectives that are currently facing our states, or will be in the very near future. The extent to which states are acting on these challenges and trends played a significant role in our assessment of a state's status as "Leading," "Advancing" or "Trailing." Overall, we categorized the states based on whether there is strong and clear policy leadership that acknowledges energy efficiency as a first-order resource, as well a recognition of the need to adapt to Next Generation Efficiency strategies and best practices. ***So, what are those trends?***

TRENDS

Energy efficiency programs that achieve deep and sustained savings, utilizing advanced strategies such as customer-centric commercial/industrial offerings, staged upgrades, and market segmentation.

Home and building energy system controls, behavioral programs and advanced information and communication technologies enable greater customer engagement (i.e., Home Energy Management Systems, etc.).

Embrace of "Big Data," advanced analytics and EM&V 2.0 methods.

Integration of efficiency with other distributed energy resources, including demand response, storage, renewable energy and electric vehicles.

Enhanced private market animation, and an expanded slate of market actors.

Evolving financing tools that complement ratepayer-funded programs.

Modernization of our energy grid and new models for delivering energy efficiency and an array of energy services by regulated utilities.

Evolving rate structures to take advantage of new technologies, including "intelligent" energy efficiency mechanisms and tools.

Regional Trends

The Northeast and Mid-Atlantic region has traditionally been a leader in advancing energy efficiency policies and programs, so it is no surprise that the same would be true about the region as it sits at the leading edge of Next Generation Energy Efficiency. Following is a summary of policy and program trends within the region.

Signs of Progress

Grid Modernization — Several states/jurisdictions, including Massachusetts, New York, New Hampshire, Connecticut, Rhode Island and the District of Columbia have opened regulatory proceedings aimed at addressing of the salient issues of Next Generation Energy Efficiency: new utility frameworks that are responsive to emerging technologies, multi-directional power flow, and incorporate two-way communication, monitoring and controls, etc., all within the context of resiliency, security, and greater focus on the customer.

Strategic Electrification and Geo-targeting — While several notable projects have examined the use of efficiency, demand response and distributed resources to alleviate congested load pockets and defer costly transmission and distribution projects (such as *Con Ed's Brooklyn/Queens Demand Management Program*), Vermont is poised to break the mold with its Energy Transformation Initiative. Maine is another state making progress in this area, with a strong programmatic focus on electric air source heat pumps.

Advanced Building Policies — Many states and their efficiency programs are shifting toward a whole building approach to efficiency, providing customers with information through asset rating and labeling. Other trends include advancements in "zero energy" buildings (formerly called zero net energy) that integrate deep efficiency with onsite renewable generation, storage and electric vehicles. Schools and other public buildings as facilities that have resiliency and occupant health and comfort in mind from the beginning are often the focus. (For more, please see the *Next Generation Building Policies* section of this report on page 14.)

New Program Strategies — States with long track records of delivering successful efficiency programs are on the leading edge of reaching customers in ways that go far beyond simple rebates. The region is seeing an increased focus on total energy use — including multi-fuel and operational — and new strategic approaches that incorporate operational savings measures as well as occupant behavior. Greater and more granular data, in real-time or interval, is helping owners and occupants take charge of how and when they use energy.

This is true for the emerging ***home energy management systems*** or (HEMs), which can include everything from smart thermostats and other networked devices to circuit level energy monitoring. On the commercial and industrial side, the increased prevalence of Strategic Energy Management systems and similar continuous energy improvement programs[2] are gaining momentum, as are long-term customer memoranda of understanding to gain executive commitment to multi-year efficiency plans.

Integration of Efficiency and Demand Response — As efficiency program administrators begin to leverage the "Internet of things," programs throughout the region are piloting integration of both energy efficiency and demand response coupled with new rate offerings. New technologies such as wireless thermostats, advanced lighting controls, and smart outlets are capable of broadband communication via ubiquitous wireless routers. These technologies are bringing automated demand response — and associated measurement and verification — beyond the large commercial & industrial sector realm and into our homes and small businesses. Despite an uncertainty around the Federal Energy Regulatory Commission's authority to set compensation rates in wholesale energy and capacity markets, regional trends indicate that demand response is likely to grow as a component of statewide energy efficiency programs far into the foreseeable future.

EM&V 2.0 — Thanks to the evolving world of "big data"— or, perhaps more appropriately, the use of new analytics to extract value from large tracts of data — the means of conducting evaluation, measurement and verification (EM&V) is changing as well. As state policymakers and program administrators dive into this new world, the need for consistency, transparency and reliability remain. (See our special section on *Evolving Program Evaluation, Measurement*, and Verification on page 24, or our recent report on the **Changing EM&V Paradigm**.)

Ongoing Evolution of Financing Tools — Seeking greater program savings at a time of rising baselines and program funding concerns, policymakers and program administrators throughout the region are exploring opportunities for leveraging private capital to complement ratepayer funding. Recent examples within the region include investments in Green Banks to supplement program administration, expansion of property assessed clean energy districts, piloting of "pay for performance" models, and exploration of the "as a service" business model that revolutionized the rooftop solar industry.

"The structure of rate designs and the prices set by these designs can either encourage or discourage usage at certain times of the day, for example, which in turn affects resource development and utilization choices. It can also affect the amount of electricity customers consume and their attention to conservation. These choices then have indirect consequences in terms of total costs and benefits to society, environmental and health impacts, and the overall economy."

— Jim Lazar, The Regulatory Assistance Project, "Smart Rate Design for a Smart Future"

Areas of Concern

The Need for Strong, Sustained Policy Leadership — In states where efficiency is so well-engrained that changing governors doesn't mean changing course (think Rhode Island and Vermont's long track-records) efficiency policies and programs have enjoyed broad support, allowing continued progress. In states where the efficiency value proposition may not be as well-understood or prioritized by governors and their appointees, the future is less certain. Maine and New Jersey are two states where governors have questioned the value of energy efficiency, with program success occurring almost in spite of weak support. In Maryland and Massachusetts, two historically-leading states, changing political winds have impacted the efficiency sector to varying degrees. A strict focus on the *cost* of energy efficiency programs without acknowledgement of the benefits. While Massachusetts maintains nation-leading goals and programs, the situation in Maryland has been much more concerning — with policy and staffing changes at the state's Energy Administration causing efficiency businesses to wonder if they have a future of growth in the state.

The Role of Public Targets While Animating Private Markets — While it's exciting to see states seeking ways to engage new market actors to deliver a range of energy services, it's important to ensure that tried and true programs with many remaining cost-effective opportunities can continue, and that measurable saving targets are established and supported by policy directives. Throughout 2014 and 2015, we've watched the enormous undertaking of Reforming the Energy Vision and related proceedings in New York, where many questions still remain as to who will ultimately be responsible for delivering energy efficiency savings, and what future state targets will be.

Ensuring New Rate Structures Aligned with Broader Goals — The changing utility paradigm, including the proliferation of on-site renewables, storage, efficiency, two-way communication and power flow, electric vehicles, combined heat and power, micro-grids, among other resources, is requiring state regulators to re-examine how utilities earn revenue and what customers are charged for on their bills. The challenge, as a new paper by the Regulatory Assistance Project (RAP)[3] points out, is to balance concerns of utilities, consumer advocates, industry, power plants, and broader societal interests. 2015 saw rate cases in Rhode Island, Massachusetts and New York where leading utilities sought increases in fixed customer charges that could inadvertently provide disincentives to energy efficiency program. Indeed, requests for higher fixed charges has been cited as one of the biggest issues facing utility commissioners today.[4] For additional information, see the Acadia Center's 2015 resource brief on utility rate design principles.[5]

Large User Program Opt-Out — In recent years, large commercial and industrial customers, citing insufficient value from ratepayer-funded efficiency programs, have lobbied for the means to "opt out" of those programs, or self-direct their own energy efficiency efforts. When this happens, decreased budgets risk undermining program offerings for all business customers. This means simply, that less efficiency happens overall. Designing and delivering programs that effectively meet the needs of large customers, particularly those with complex industrial processes, is key to successfully capturing some of the most cost-effective efficiency potential. Policymakers and program administrators can learn from **best practices**, many of which are described in a series of guidance materials from the State Energy Efficiency Action (SEE Action) Network.[6]

[2] See the SEE Action industrial efficiency case studies: https://www4.eere.energy.gov/seeaction/system/files/documents/IEE%20Case%20Studies_1002.pdf

[3] Lazar, J. and Gonzalez, W. (2015) Smart Rate Design for a Smart Future. Montpelier, Vt.: Regulatory Assistance Project - http://www.raponline.org/featured-work/smart-rate-design

[4] http://www.greentechmedia.com/articles/read/top-10-utility-commission-issues-of-2015

[5] http://acadiacenter.org/document/utility-rate-design-principles/

[6] The State and Local Energy Efficiency Action Network (SEE Action) is a project of U.S. DOE and U.S. EPA

Going Deeper: Next Generation Technology Innovations, Program Strategies, and Building

For states that have long been at the forefront of energy efficiency program excellence, delivering even greater savings has been a challenge. But a suite of new technology innovations, program strategies, and building policies are leading the way toward Next Generation Energy Efficiency.

Technology Innovations

While there are a number of technologies that are changing the way energy and services are delivered — notably lighting and controls,[7] in this report we've chosen to highlight two. Below, we describe these rapidly evolving technologies with the potential to revolutionize policies around energy efficiency:

- **Home Energy Management Systems; and**
- **Cold-Climate Air Source Heat Pumps**

→ Home Energy Management Systems: Communication and Controls Enable Deep Savings

Home Energy Management Systems (HEMS) refer to "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." Whether a widget or an app, HEMS are tangible. These products are being installed and downloaded in homes throughout the world and being displayed in retailers around the country. Dozens of utilities have explored incorporating HEMS products, especially smart thermostats, into their program offerings. As data-collecting devices, HEMS can be used as measurement and verification tools or to provide near real-time information to help improve program evaluation. HEMS are the physical representation of the future we know is coming, where energy efficiency interplays with big data, advanced analytics, distributed energy resources, and helps manage peak constraints.

NEEP focuses on the regional opportunities in HEMS. In addition to publishing Opportunities for HEMS in Advancing Residential Energy Efficiency Programs in 2015, NEEP has also been convening a regular working group with industry and efficiency stakeholders to align efforts and advance the technology since 2014. The 2015 report found that HEMS products, especially those that relate to HVAC, provide significant opportunities for savings. Even further, many smart home devices that draw a smaller load and have some energy efficiency savings can provide demand response and peak load reduction opportunities that were previously unattainable in the residential sector. Imagine a demand signal that could be sent to a home to control small loads (such as turning off a TV or gaming system, or delaying the start time for clothes dryer) without adverse affecting the homeowner; or a HEMS device that informs a customer about upcoming peak energy pricing and encourages them to change their actions to save energy through behavioral demand response. HEMS can enable these new avenues to address our systems' needs and challenges into the future and open up new pockets of opportunity for energy savings.

When it comes to distributed energy resources (DER), including renewable generation, battery storage, and further electrification of the consumer transportation sector, HEMS can play a major role. By connecting to each piece of the DER puzzle, a HEMS can optimize a homes' energy use to help ensure harmony with the traditional grid. Advanced metering infrastructure, where installed, can help augment the analysis capabilities of HEMS; a HEMS on its own can only monitor and manage the energy-using components that can connect to it. Smart meters can help provide deeper insight into the rest of the home as we are still waiting for each individual device to become connected. Ultimately, a HEMS that connects to each of the external energy-related components of our future will become akin to an "air traffic controller" for 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. As policymakers and efficiency

[7] See the NEEP products page (http://www.neep.org/initiatives/high-efficiency-products) for more areas of innovation, including residential lighting and commercial lighting and controls

program administrators consider entering this world, they should bear in mind that HEMS are a long-term play. Whether it's through a smart thermostat or a behavioral demand response program — or even an energy efficient appliance that happens to be "connected" — consumers have started to enter the smart home space, but there's still a long way to go before that market is transformed. A smart LED bulb, while providing virtually no energy savings over traditional LEDs, is one of the lowest costs, highest "wow factor" products that might be worth investment to help customers warm up to the larger idea of a smart home. Program administrators and policymakers have a major role to play to help the uptake of this technology, and the benefits are easy to find.

HEMS have the ability to work in nearly every type of dwelling, in every region in the country, to address nearly every household system, and can manage energy loads as well as peak demand, renewable generation, and energy storage. HEMS could help program administrators to advance cost-effectiveness calculations, 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.

As the HEMS world evolves, policymakers and program administrators will face challenges and questions such as:

- Should there be standard protocols to ensure interoperability and prevent rapid obsolescence?
- What are the best ways to engage market actors, while maintaining customer choice, security and privacy?
- Who should own or get access to energy usage data?
- If HEMS can do so much, does it still make sense – from a cost perspective – for utilities that have not already invested in smart meters on a broad scale to do so? Or are there enough other compelling reasons — outage repair, ensuring interoperability, data collection, demand response — where advanced meters might still be a preferable technological solution?

NEEP will continue to facilitate dialog and work to understand and share best practices to help ensure that HEMS advance smartly — keeping energy efficiency and other demand-side resources in mind — so that wise energy use and all its benefits are baked in to new policies, programs and technologies.

→ Electric Air Source Heat Pumps: The Next Generation for Heating and Cooling

Variable-capacity electric air-source heat pumps (ASHPs) for both space heating and cooling represent the evolution of a technology that has been around for decades. A new generation of variable-capacity ASHPs has come to market that are capable of providing significant amounts of heat, even during the coldest times of year in the Northeast, and doing so while maintaining remarkable efficiencies. This new class of products is referred to as "**cold-climate**" *ASHPs*. Beyond the important kWh savings that the deployment of this technology represents lie a number of exiting opportunities that relate to Next Generation Energy Efficiency — including deep carbon reductions via strategic electrification, symbiotic relationships with on-site renewable energy generation, and demand management capabilities that can reduce strain on the power grid when it's needed.

To further expose these multi-faceted opportunities, in 2013 NEEP launched a regional initiative for ASHPs to accelerate the adoption of the technology. This multi-year effort has brought together many important market actors to identify key market barriers and opportunities in order to collectively develop **market intervention strategies** that drive uptake of the technology across the region.

ASHPs offer a pathway to deep energy savings, especially in instances that replace/displace electric resistance heating. Adoption of ASHPs in homes in the region that currently heat with electric resistance could provide annual energy cost savings of approximately $1.2 billion and avoid over seven million metric tons of annual carbon emissions (equivalent to the annual carbon emissions associated with the energy used by nearly 350,000 homes).[8]

[8] http://www.neep.org/northeastmid-atlantic-air-source-heat-pump-market-strategies-report-january-2014

With electric resistance heating making up only a small fraction of the primary heating systems in the Northeast, as natural gas and home heating oil provide the lion share of fuel for space heating in the region, one might wonder whether ASHPs really represent a significant opportunity to achieve deep reductions in greenhouse gas (GHG) emissions. Based on the GHG emissions associated with traditional heating systems and efficient ASHPs, there are already GHG advantages in the use of ASHPs.

Now consider that a number of states in the region have policy goals to dramatically reduce carbon emissions associated with electricity generation over the next few decades.[9] As more of the energy flowing into the grid comes from renewable sources, emissions associated with grid-powered heat pumps will also decrease. In Vermont, for example, where emissions from grid generation are approaching zero, operating a heat pump on grid electricity may be a nearly emissions-free HVAC option. Policymakers are beginning to consider this carbon advantage and whether it makes sense to proactively promote the installation of ASHPs as a replacement to traditional heating systems fueled by gas or oil. In similar fashion to how electric vehicles are being promoted as a pathway to carbon reduction in the transportation sector, ASHPs could be viewed the same on the space heating side. This concept is often referred to as **strategic electrification**.

Air source heat pumps offer compelling synergies with on-site renewable energy generation, and also offer technology solutions for the buildings of tomorrow. ASHPs offer new levels of flexibility compared to traditional forced hot air and hydronic heating systems — from a capacity, distribution and interoperability with on-site renewable generation perspective — to provide heating and cooling to the next generation of "low-load homes,"[10] including zero-energy homes (ZEH). Never before has there been an efficient electric heating system that had the potential to be powered by renewable energy — either on-site or off-site. This versatility is not available in fossil-fuel heating systems. Managers of both efficiency programs and renewable energy programs have begun to explore potential synergies in this area.

Lastly, it's important to consider that a broader deployment of ASHPs will have direct impacts of the peak demand of the electric grid. The nature of today's variable capacity ASHPs are such that the systems are naturally "variable" in that they operate over a wide range of output capacities/input power. The modulating nature of the systems offer exciting demand response capabilities that can help smooth out the peak impacts of ASHPs, whether the peak be in the winter or summer. Manufacturers have expressed some reservations about the growth of utility demand response programs on ASHP equipment as their systems have complicated controls and have not all been designed to work optimally with external control.

With the potential for strategic electrification of the space heating sector and the exciting possibilities of pairing air source heat pumps with on-site solar photovoltaics and even battery storage, it is clear that today's ASHPs represent a series of exciting opportunities that not only save energy and manage peak impacts, but also help achieve deep GHG emission reductions.

Adoption of ASHPs in homes in the region that currently heat with electric resistance could provide annual energy cost savings of approximately $1.2 billion.

[9] See: http://www.mass.gov/eea/air-water-climate-change/climate-change/massachusetts-global-warming-solutions-act/, http://www.ct.gov/deep/cwp/view.asp?a=4423&q=530290, http://energyplan.ny.gov/

[10] Homes that use half or less the amount of energy as homes built to code. For a fuller definition, see http://apps1.eere.energy.gov/buildings/publications/pdfs/building_america/issue7.hvac_lowload.pdf

Next Generation Program Strategies

Below we describe in detail seven key efficiency program strategies leading the way toward Next Generation Energy Efficiency. These strategies include:

- **Rate Design as a Conservation and Peak Reduction Strategy**
- **Industrial Efficiency Program Design, and Supporting Policies**
- **Strategic Electrification and Long-Term Planning**
- **Integrating Efficiency Programs and Demand Response**
- **Geo-Targeting Program Implementation**
- **Private Capital Supplementing Energy Efficiency Program Funding**
- **Evolving Program Evaluation Measurement, and Verification/ "EM&V 2.0"**

→ Rate Design as a Conservation and Peak Reduction Strategy

Regulators, program administrators and utilities are beginning to build upon successful end-user energy efficiency upgrades, offering system-wide market signals — automated, price-based, and behavioral — meant to encourage energy conservation and peak load reductions. Rate design has been the most common vehicle for changing these market signals, with several jurisdictions in our region considering a departure from traditional rate structures. While many of these proposals are meant to enable a more efficient system, some rate design proceedings in our region have included market actions that limit a ratepayer's incentive to reduce their energy usage.

Time Varying Rates (TVR) and associated price signals represent a major opportunity for enhancing system-wide efficiency, offering the ability to more accurately reflect the true cost of energy at a given time of the day, as well as the ability to level load peaks/ valleys as penetration of onsite solar, electric vehicles and behind-the-meter-energy storage increase. Proposals around time varying rates can include a wide range of structures including: time of use rates, critical peak pricing, peak time rebates, and real-time pricing. While such rates have been part of the regulatory discourse for decades, emerging technologies and policy levers are now encouraging regulators in the region to more seriously consider their implementation at scale.

For example, before the U.S. Department of Energy invested heavily in Advanced Metering Infrastructure (AMI) during the American Recovery and Reinvestment Act (ARRA), AMI penetration in the region had been extremely limited. Without AMI, installation of a manually read time-of-use meter was a costly prerequisite for a customer seeking to access TVR rates. Yet, thanks to ARRA funding, the vast majority of customers in Maine, Vermont, and the District of Columbia already benefit from advanced metering, which, in some cases, facilitates a switch to time varying rates.

With these recent technological advances, ratepayer-funded advanced meters are no longer the only option enabling the measurement and verification required for next generation rate design. Advanced Metering Functionality (AMF) offered by broadband-enabled home energy management systems or related components offer an alternative option, which may include funding by third-party service providers rather than ratepayers. Notably:

Massachusetts's Department of Public Utilities is actively considering TVR for electric distribution utilities as part of its Grid Modernization proceeding;

New York's Department of Public Service issued a White Paper on Ratemaking and Utility Business Models as part of the Reforming the Energy Vision Proceeding that proposes a smart home rate, intended to encourage price-responsive loads facilitating "Direct management by customers, automated controls by on-site Distributed Energy Resources, or [support of] third-party intermediaries." The proposed rate would offer opportunities for smart rate design integrated with demand response opportunities.

While rate design proceedings offer the potential to encourage system efficiency and end-user conservation, some rate structures are less amenable to investments in energy efficiency. Throughout the country, as utilities seek certainty in the face of eroding revenue streams, they are increasingly proposing increases in fixed customer charges. Such increases may end up discouraging investment in energy upgrades because they limit the portion of a customer's bill that can be reduced through energy efficiency measures. In 2015, fixed charge increases gained prominence, and, in turn, saw increased public opposition to a number of utility proposals. The NEEP region was not immune to such proposals; debates on the topic ensued in several jurisdictions, including Massachusetts, New York, Pennsylvania, Maryland, Rhode Island and Connecticut.

→ Industrial Efficiency Program Design, and Supporting Policies

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.

Sharing and implementing programmatic best practices and gaining understanding and support from policymakers will help ensure success. To that end, we encourage program administrators (PAs) and policymakers alike to read and incorporate lessons from the State and Local Energy Efficiency Action Network (SEE Action).

SEE Action's Designing Effective Programs for the Industrial Sector describes elements of Successful Industrial Energy Efficiency (IEE) Program Design, providing these recommendations for PAs:

1. Clearly demonstrate the value proposition of IEE projects to companies.
2. Develop long-term relationships with industrial customers that include continual joint efforts to identify IEE projects. Consistent account representatives are vital to continuity and progress.
3. Ensure program administrators have industrial sector credibility and offer quality technical expertise. Account managers assigned to a specific sector can learn about the nuances of the business type and speak the language of their customers.
4. Offer a combination of prescriptive and custom options to best support diverse customer needs to provide flexible choices to industry.
5. Accommodate scheduling concerns to meet industry project scheduling.
6. Use language that decision makers relate to such as cash flow or return on investment, rather than simple payback.
7. Streamline and expedite application processes, and undercover internal roadblocks to approval.
8. Conduct continual and targeted program outreach.
9. Leverage partnerships with federal, state, and regional agencies and organizations.
10. Set medium- to long-term goals as an investment signal for industrial customers.
11. Undertake proper project measurement and verification and completing program evaluations.

Sustained Energy Savings Achieved through Successful Industrial Customer Interaction with Ratepayer Programs: Case Studies is a new resource that contains further recommendations for PAs, based on what has worked best around the country:

- **Develop multiple-year relationships** between the utility/PA 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.

POLICYMAKER UNDERSTANDING AND SUPPORT IS VITAL

To further opportunities for success in industrial energy efficiency programs, state energy offices and regulators can support program in other ways, including:

- Encourage energy efficiency program administrators to set aggressive savings targets for the large commercial and industrial sector, with commensurate budgets and performance incentives, focused marketing and appropriate evaluation, measurement and verification (EM&V).
- Avoid taking an overly narrow view of cost-effectiveness, while encouraging the PAs to quantify the non-energy benefits (NEBs) that may come along with saving electricity and natural gas. These may include reduced operating and maintenance expenses, water savings, improved worker satisfaction, health and productivity.
- Afford flexibility with things like rolling program budgets, taking into consideration the fact that more involved customer engagement approaches (e.g. multi-year MOUs, Strategic Energy Management) often have long lead times and can take years to fully realize savings.
- Encourage PAs to explore and pilot new program approaches to deliver industrial programs, in particular Strategic Energy Management, energy monitoring and management software, and greater use of sub-metering and incentives for comprehensive, whole-facility performance, as well as new technologies, such as advanced roof-top HVAC units.
- 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. They also serve as a gateway to participation in shared investment opportunities, including traditional rebate programs.

More efficient and productive businesses help states keep a competitive edge, grow jobs and support a thriving economy — all while reducing wasted energy and emissions. But without innovative programs that are responsive to the needs of large customers in particular, their potential to deliver a range of benefits cannot be fully met. Policymakers can play an important role in supporting the efforts of efficiency program administrators to strive for ambitious targets and reach all customers, continuously driving deeper for savings potential.

→ Strategic Electrification and Long-Term Planning

In a major departure from traditional thinking that compartmentalized energy efficiency efforts in a way which limits cross-fuel subsidization, several states in the region are beginning to consider their energy systems as a whole. These states are contemplating resource planning that takes an integrated approach toward reducing consumption in the transportation, heating, and electric power sectors, in some cases by switching from fossil fuel technologies and measures to those using electricity.

For example, Vermont's recently enacted Act 56 directs utilities to acquire a portfolio of **Energy Transformation Projects** on an annual basis beginning at 2 percent of retail sales in 2017, rising incrementally to 12 percent of retail sales by 2032, with requirements for small municipal utilities differing slightly. Unlike energy efficiency programs, a utilities' progress in satisfying their percent-of-retail-sales targets can be measured according to completed projects, rather than energy savings attributable to a completed project.

Projects satisfying the energy transformation requirement include, but are not limited to:

- Home weatherization or other thermal energy efficiency measures;
- Air source or geothermal heat pumps;
- High efficiency heating systems;
- Increased use of biofuels;
- Biomass heating systems;
- Support for transportation demand management strategies;
- Support for electric vehicles or related infrastructure; and
- Infrastructure for the storage of renewable energy on the electric grid.

The Vermont Department of Public Service notes that "Strategic electrification resulting from energy transformation projects has the potential to lower electric rates by utilizing our existing electric infrastructure more completely." For example, an **early analysis** of the legislation concluded the energy transformation project requirement would actually lower rates for consumers, resulting in two percent lower rates by 2024, and 4.5 percent lower rates by 2032. Like energy efficiency measures, Energy Transformation Projects will be screened (see **preliminary screening tool**) for lifecycle cost-effectiveness under the societal cost test and against an alternative compliance payment of $0.06/Kwh, adjusted for inflation.

In many cases, switching from oil and natural gas to electricity will reduce overall customer bills and improve environmental health, and increasing electric usage would reduce per kWh distribution costs by spreading fixed transmission and distribution system costs across more kWhs. Our electric distribution grid is built primarily to accommodate short periods during just a few days of the year when demand on the grid reaches toward its peak capacity. If instead, the system peaks could be leveled with battery storage and the valleys filled with price-responsive electric vehicle charging and heat-pump appliances, our electric grid would have lower per kWh costs. While **technologies already exist** that could enable automated vehicle to grid demand response and other promising solutions, innovative public policies will be key to their adoption.

The chart below summarizes initial modeling provided by the Department of Public Service in their draft **2015 Comprehensive Energy Plan** approximating a scenario where weatherization projects, heat pump installations, and electric vehicle purchases collectively satisfy the distribution utilities' energy transformation project portfolio requirements. While energy transformation projects are required to reduce overall energy usage, the retail sales targets listed below will be measured by the projects themselves, rather than the amount of mmbtu equivalent they reduce energy usage.

Scenario Analysis: Energy Transformation Project Requirements (Tier III)

	2017 2% of retail sales	2032 12% of retail sales
Weatherization	500	45,000
Heat Pumps	1,100	90,000
Electric Vehicles	700	60,000 (extrapolated)

"The energy transformation requirement in Vermont's Renewable Energy Standard is an exciting opportunity for Vermont's electric utilities and efficiency providers, including Efficiency Vermont, to look at the State's energy comprehensively and reduce fossil fuel consumption and greenhouse gas emissions through initiatives like transportation demand management and electrification, thermal efficiency, and even land use planning." — *Liz Gamache, Director, Efficiency Vermont*

Vermont isn't alone in this endeavor. In states like New York, Rhode Island, and Massachusetts, governors and leading policymakers are forging a path toward strategic electrification. Below is a summary of some of their exemplary policies:

New York: NYSERDA's recent Clean Energy Fund Proposal has suggested fuel neutrality as a key attribute of its investment portfolio. While the policy has yet to gain the formal approval of regulators, it would open to the door for strategic electrification initiatives and enable the state to achieve the ambitious targets set forth in its 2015 State Energy Plan.

Rhode Island: Rhode Island's Draft Long Term Energy Plan, known as Energy 2035, suggests the expansion of the utility least cost integrated resource planning to unregulated fuels. Such an expansion would open the door for strategic electrification projects. Within this context, the Rhode Island Office of Energy Resources recently convened a System Integration Rhode Island (SIRI) working group, with recommendations for strategic electrification forthcoming.

Massachusetts: The Massachusetts Department of Energy Resources has been contemplating revision of residential conservations services regulations, which may expand funding for fuel neutral energy efficiency improvements.

→ Integrating Efficiency Programs and Demand Response

Until recently, demand response has been less cost-effective than peak coincident energy efficiency investments due to the limited duration of its impact. But due to both policy and technology evolutions, the demand response sector is growing in depth and breadth. First, we're beginning to see a proliferation of connected devices and advanced lighting controls which offer opportunities for savings via both energy efficiency and demand response measures. Second, policies promoting energy efficiency as a first order resource have kept annual electric loads flat in many regions of the United States, but been less successful at curbing the growth of peak load.

Furthermore, great potential exists for demand response to enhance the value proposition of grid-connected items like stationary energy storage and electric vehicles. These developments are making demand response a more appealing investment and, as a result, we're beginning to see distribution utilities partnering with third parties to engage customers on the issue, particularly in the area of behavioral programs and "bring your own device" automated demand response programs.

On the heels of a recent decision by the Supreme Court to uphold FERC's authority to set compensation levels for demand response in wholesale markets at the locational marginal price of power, utilities and energy efficiency

Energy Efficiency is Slowing Peak Demand Growth and Flattening Energy Use

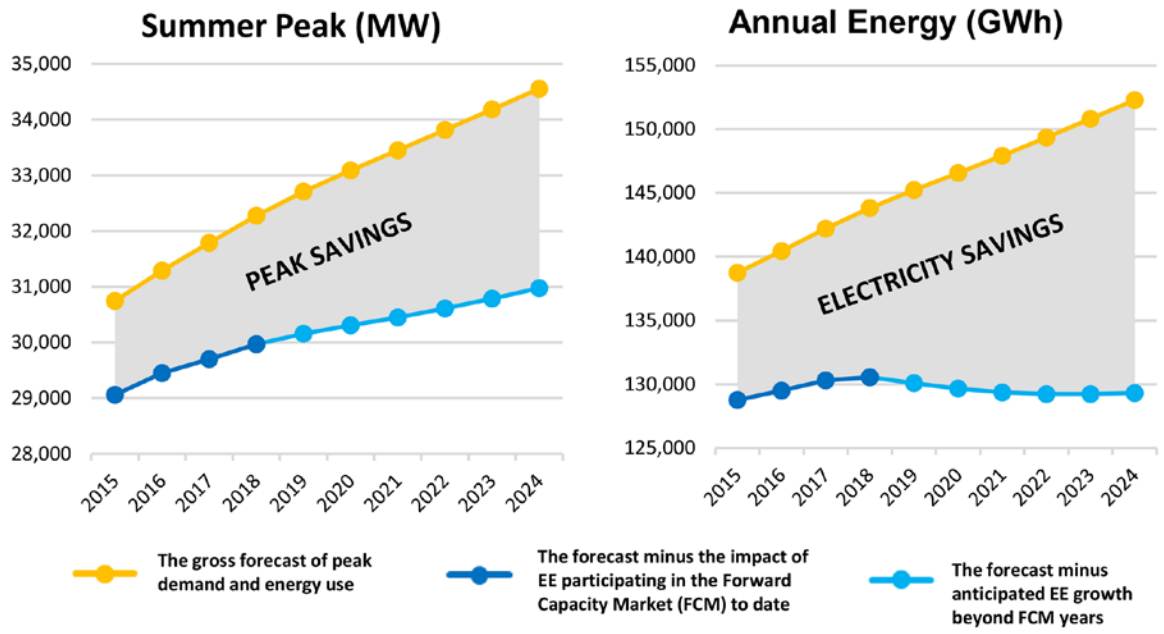


Chart Courtesy of ISO-New England

Source: Final ISO New England EE Forecast for 2019-2024 (April 2015)

program administrators throughout the region are showing a renewed interest in the domain. Below are a few examples of such interest:

Massachusetts's draft 2016-18 Energy Efficiency Program Plan include National Grid's projected acquisition of more than 50MW of demand response in 2018.

Connecticut's draft 2016-18 Conservation and Load Management Plan includes commitments to programs that embrace automated demand response, residential pilots utilizing smart outlets and Wi-Fi thermostats, and commercial/industrial pilots utilizing advanced Roof Top HVAC Units and smart energy management systems.

New York's Public Service Commission issued an Order Adopting a Dynamic Load Management framework, and demand response featured prominently as a resource meant to avoid infrastructure buildout in the ***Brooklyn Queens Demand Management*** project.

Pennsylvania's Public Utility Commission reauthorized demand response programs for Phase III of its Act 129 Energy Efficiency and Conservation Programs, which had previously been removed from the program

Maryland's EmPOWER program boasts more than half a million connected devices that the state's utilities use for direct load control, with demand response accounting for almost a third of the program's spending.

Rhode Island's Energy Efficiency Resource Management Council Consultant has **suggested** that the next three year least-cost procurement plan will include a demand response component.

→ Geo-Targeting Program Implementation

Geo-targeting is the intentional targeting of efficiency programs toward a constrained geographic area in order to defer or avoid utility transmission and distribution system investments. Geo-targeting illustrates a new way of delivering energy efficiency, in a manner that combines it with the integration of other energy services, the replacement of aging infrastructure, a means of addressing equipment failures, and, at the bottom line, creating additional energy savings. For example, in New England, **estimates of avoided T&D costs** range from about $30 per kW/year to about $200 per kW/year. As noted in NEEP's 2015 report on **Energy Efficiency as a Transmission and Distribution Resource**, one of the best known geo-targeting projects is Con Edison's **Brooklyn Queens Demand Management** (BQDM) project. This program focuses on neighborhoods in Brooklyn and Queens where the electric grid is constrained. As part of the project, Con Edison proposed a $200 million investment in distributed energy resource with the goal of dropping 52 megawatts of load from the Brooklyn/Queens area by 2018, avoiding the need for a $1 billion substation. This strategy saves ratepayers money directly when they participate in the efficiency programs, and also keeps energy costs down when large investments in the grid are deferred.

In order to identify the properties in the area that would benefit most from targeted energy management, Con Edison **utilizes energy analytics software** which pinpoints the customers with the biggest opportunity for savings. Con Edison can then more effectively target these customers with marketing and enhanced incentives that increase program participation and lead to deeper energy savings.

The BQDM program and associated incentive structures will likely inform the ratemaking reforms in New York's Reforming the Energy Vision proceeding, which aims to change the way utilities earn their return on investment. Instead of the standard price setting done by utilities (i.e., 'cost of service' ratemaking), New York is contemplating the value of performance-based ratemaking, where utility incentives are set with benchmarks to meet, and the utility revenues are adjusted based upon performance outcomes.

The New York Public Service Commission's **Final BQDM Order** can provide insight into which incentives may become an increasingly common regulatory tool as geo-targeting moves forward in the state. As part of the Order, the Commission decided:

- **Amortization periods will remain uniform:** The Commission denied a five year investment amortization period requested by Con Edison due to bill impacts, and instead the utility will be able to recover their costs over a 10 year period.

- **Costs to be recovered through base rates:** The Commission directed that costs of the project be recovered via a temporary surcharge, but that upon Con Edison's next tariff filing project costs would be recovered through base rates.
- **Return on investment will mirror overall rate of return:** The Commission directed that the return on investment in the BQDM project for Con Edison be similar to the utility's overall rate of return.
- **1 00 basis point return-on-equity adder conditioned upon outcomes:** The commission allowed a 1 percent return-on-equity adder for the project tied to the following outcomes:
  - 45 basis points will be tied to performance in achieving or exceeding the proposed 41 MW of non-wire alternative measures;
  - 25 basis points will be tied to performance in increasing the diversity of Distributed Energy Resource (DER) providers in the marketplace;
  - 30 basis points will be tied to the company's ability to assemble a portfolio of solutions that achieves a lower $/MW value than the traditional investment solution presented.

→ Private Capital Supplementing Energy Efficiency Program Funding

Building upon decades of successful ratepayer-funded efficiency program administration, efforts to bring private, public, and philanthropic capital to energy efficiency are trending throughout the region and beyond. Policymakers in several states are piloting large-scale financing programs with the goal of leveraging private capital with public funding. Some recent examples include:

- In New York, the 2013 bond issuance based on NYSERDA's $24.3 million On-bill Residential Loan portfolio.
- In Connecticut, the Connecticut Green Bank's 2014 sale of their $30 million Commercial PACE portfolio to specialty finance provider Clean Fund.
- In Pennsylvania, the June 2015 sale of the Warehouse for Energy Efficiency Loans (WHEEL)'s $12.58 million worth of residential energy efficiency loans originated through the Keystone Home Energy Efficiency Loan Program (HELP).
- Credit facility partnerships announced in support of the Connecticut Green Bank's C-PACE program and New York Green Bank's unsecured residential energy efficiency loan program, each intending to leverage $100 million of private capital.
- The Public Purpose Energy Service Company (PPESCO) Commons Energy recently received a $5 million Program Related Investment (PRI) from the MacArthur Foundation to be repaid with proceeds from bundled energy investments.

As noted by the recent SEE Action publication Making it Count: Understanding the Value of Energy Efficiency Financing Programs Funded by Utility Customers, these efforts are slowly moving the ball forward toward the creation of a secondary market for energy efficiency financing, much like the secondary market that provides capital liquidity for home mortgages.

At the federal level, key actors like the U.S. Department of Energy have bolstered support for these efforts, recently clarifying that Green Banks may qualify for Federal Loan Guarantees. At the same time, collaborative efforts such as the recently announced Green Bank Network and the Environmental Defense Fund's Investor Confidence Project are aiming to build investor understanding around the envisioned asset class, attempting to standardize instruments across states and stakeholders.

As states move toward a greater role for private capital markets within efficiency program administration, care must be taken to preserve present program structures until — and even beyond — a time when private financing demonstrates a proven ability to provide comparable societal benefits. In fact, the vast majority of the above-mentioned financing programs incorporate ratepayer funded efficiency program incentives, with many requiring use of available incentives as a pre-condition for enrollment.

There is no doubt that the success of the above-mentioned efforts would help pull private capital toward energy efficiency investments, but whether adequate demand exists to justify such liquidity remains to be seen. The trend in the region has been toward blended programs, where private capital may enhance, rather than replace current program funding structures, helping to both drive demand and maximize societal benefits.

Why is this the case?

The cost of capital isn't the only market impediment standing between the status quo and a scaled-up market that captures all cost-effective energy efficiency upgrades.

Imperfect access to information, split incentive issues, and constrained balance sheets are just a few examples of classic market failures that exist within the market for energy upgrades – market failures which ratepayer funded efficiency programs have a proven capability of surmounting. For example, ratepayer funded efficiency programs can help solve consumers' imperfect access to information by capitalizing on the usage information the utility possesses, in order to target and market incentives where they are most cost effective. Utility program administrators in particular have a monthly conduit for communications with customers through their billing statements, which they can use to solicit program enrollment and inform ratepayers of monthly incentives. Further, systems benefit charges offer a very low cost source of capital for investing in energy efficiency, lower than that which can be found even in advanced private capital markets.

While secondary markets and standardized instruments hold great potential to supplement utility energy efficiency programs, they are unlikely to replace the current functioning system in the near-term. In that time, it is important that forward thinking programs and projects continue to exercise prudence within the current system, while developing the tools necessary to supplement current programs.

→ Evolving Program Evaluation, Measurement, and Verification: EM&V 2.0

With ever-larger sums of ratepayer dollars being invested in energy efficiency, thorough evaluation, measurement and verification (EM&V) is essential in providing accurate assessments of program performance and credibility before regulators and system planners alike. EM&V demonstrates the value of energy efficiency as reliable resource in helping to meet energy needs.

Thanks to the evolving world of big data, information, controls and communication, the way EM&V can be conducted is changing as well. To begin to make sense of it all and provide guidance for policymakers and program administrators, NEEP's Regional EM&V Forum recently released **The Changing EM&V Paradigm** report, which researched the current and potential future impacts of information and communications technologies (ICT) on EM&V practices. The report focuses on where and how new data analytic tools and better data availability interface with current program impact evaluation core elements, and identifies opportunities for streamlining the "traditional" evaluation process.

The report issues findings and recommendations on three general areas:

1. Application of automated measurement and verification software for evaluation;
2. Opportunities and challenges to using automated M&V to reduce the time and costs to conduct evaluations;
3. Improved data collection tools and data availability to support evaluation.

The Changing Paradigm report found that the rapid evolution of automated EM&V tools are not necessarily aligned with many current state public utility commission energy efficiency program evaluation policies. It identifies key barriers that need to be addressed, and suggests collaborative efforts to support developing protocols for ICT-enabled EM&V. While the auto-M&V experience is already providing real-time program performance feedback that can inform mid-year program design/delivery, corrections can lead to potentially lower administrative costs and provide real-time performance feedback.

"Automation and data are changing the EM&V paradigm in ways not imagined just a few short years ago. Data analytic tools are increasingly helping program administrators improve their customer engagement and savings opportunity assessments, such as through virtual audits, and are providing real-term program performance feedback that helps inform mid-course program design/delivery corrections. More research and testing, however, is needed on how these tools can improve and streamline the EM&V process while providing rigorous savings. The Forum will continue working with states and program administrators, and in coordination with national efforts, to address opportunities, challenges and solutions to helping advance auto-M&V tools."

— Julie Michals, Director of NEEP's Regional EM&V Forum

Building Policies

Because buildings consume so much energy and generally endure for decades, if not centuries, getting it right on building energy policies and practices is key to locking in savings for both new and retrofitted structures. NEEP's Buildings Team is working on a number of fronts at the state and local levels to help shape the future of building energy, with an eye to Next Generation Energy Efficiency themes including deep energy savings, climate resiliency, public health, and integration of efficiency with other DSM resources, such as onsite renewable energy and energy storage. The following sections review innovations in data and information, performance standards, and even nomenclature — with the adoption of "zero energy buildings" — that NEEP is not only monitoring, but helping to shape.

→ Rhode Island, Massachusetts at Head of the Class in Green School Construction

Investment in the public school sector has long been known to produce great results in the way students learn. However, states face many obstacles when it comes to making improvements in their school facilities, most notably limited funding. Rhode Island recently overcame a major barrier by lifting the long-standing school construction moratorium. Upon this change, a new school construction funding mechanism was created.

The School Building Authority Capital Fund will provide upfront funding for school construction and renovation projects in Rhode Island. These construction projects will be prioritized by need on an annual basis. Additionally, the school construction regulations require all projects to meet the standards set by the Northeast Collaborative for High Performance Schools (NE-CHPS) design criteria, which seeks to give all students access to high quality, healthy learning environments. The path taken by Rhode Island to create a School Building Authority can serve as an important model for states around the region that find themselves in similar predicaments with school construction moratoriums. School construction has taken big step forward in Massachusetts as well. The Massachusetts School Building Authority (MSBA) recently conducted a review of its Sustainable Building Design Guidelines and concluded that NE-CHPS is a suitable performance criteria. This move signals MSBA's recognition of NE-CHPS for its ability to provide learning environments with greater indoor environmental quality in addition to the energy efficiency improvements. Schools that achieve 15 percent more energy savings above current building code will be eligible for an additional 2 percent reimbursement. States such as Rhode Island and Massachusetts are showing their commitment to providing children with the best available school facilities. These investments are likely to yield good results in the long term with superior educational outcomes for the greater public good.

In addition to their importance as both public sector investments and as learning environments, focusing on energy efficiency in schools and other public buildings offers additional benefits to states and communities. First, as the public sector has a responsibility to lead by example, it can take a role in delivering broad societal benefits that may not be as attractive to private sector investors focused more on near-term financial returns. Secondly, the public sector has a longer investment horizon, making it able to accept longer payback periods for the new, innovative technologies and practices that the private sector may not be willing to, making schools and other public buildings an ideal incubator for new technologies and alternative design and construction practices. This is particularly important as states progress toward a future where "zero energy buildings" become more of the norm (next page).

Monomoy Regional High School in Harwich, Mass. Completed in 2014, Monomoy was designed to meet MA-CHPS criteria.

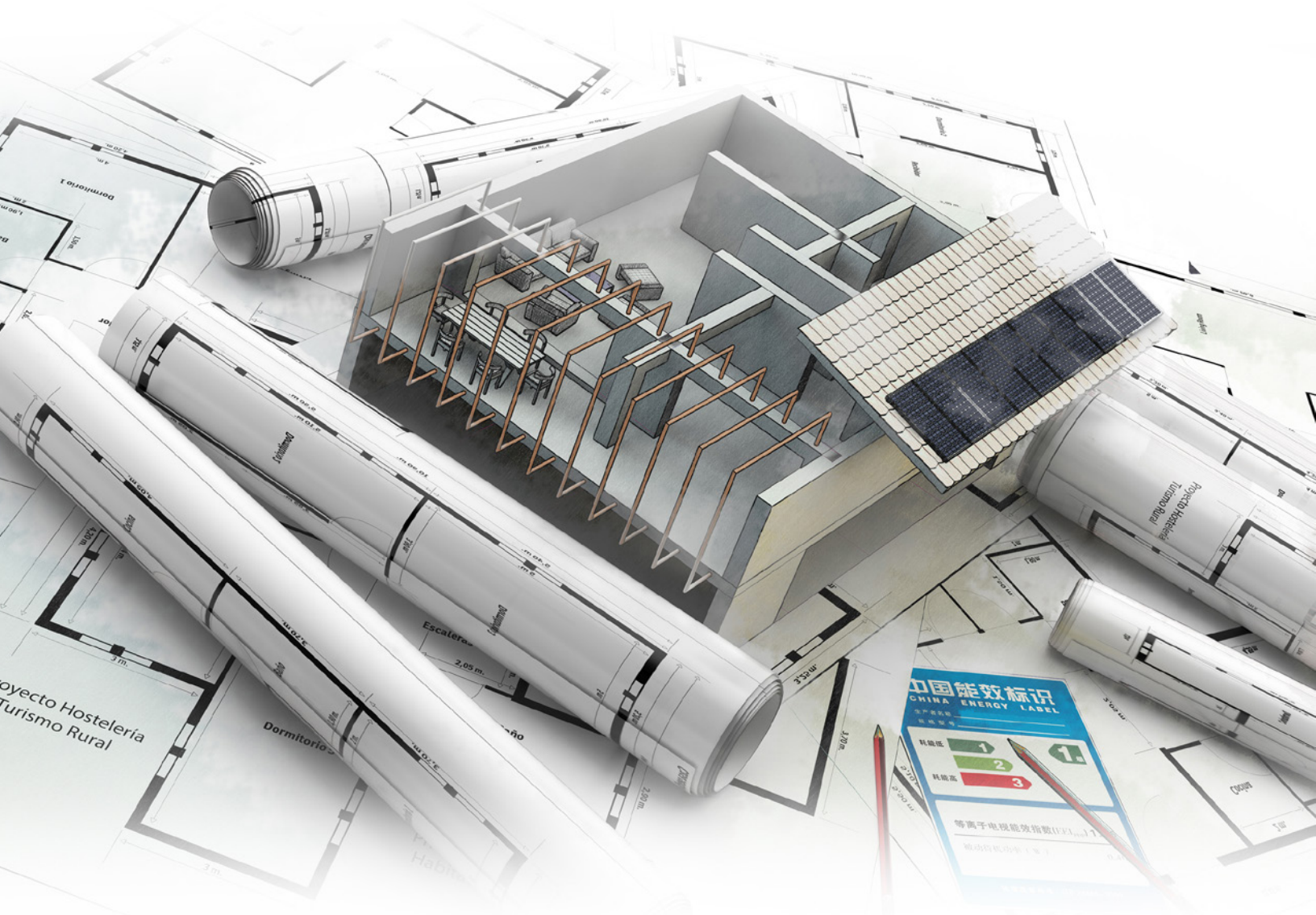
→ "Zero Energy" Buildings Defined and Gaining Momentum

The term "zero net energy" is well known in energy-efficient construction — the 'net' indicating the balance of a building's energy use coming out to zero over the course of a year. But outside of building science or policy realms, the term usually has to be explained and is not easily understood. To address this barrier, in September 2015, the U.S. Department of Energy promulgated a common definition of a "Zero Energy Building." After an extensive stakeholder process, this important publication will provide clarity across the many sectors of building research, design and construction. The definition also applies to communities, campuses and portfolios. A publication entitled, **A Common Definition for Zero Energy Buildings** also provides guidelines for measurement and implementation delving comprehensively into how to employ the definition for building projects. NEEP staff contributed technical assistance in the creation of the definitions.

→ States Moving Toward Zero Energy Buildings

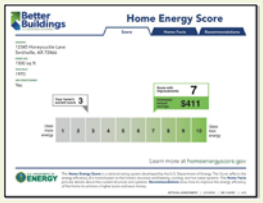
In 2012, NEEP published the **Roadmap to Zero Net Energy Buildings** that made recommendation for states to promote zero energy policies and buildings. In 2015, one-third of the NEEP region states have enacted 3-5 of the recommendations. A NEEP Zero Energy Roadmap Progress Report will be published in the first quarter of 2016.

Outstanding progress has been made on the municipal level, specifically in **Cambridge, MA** and **Montpelier, VT**, both of which are moving toward zero energy communities. In addition, the public school sector has become a leader in the region as well as nationally in zero energy and resilient design and construction.



"An energy-efficient building, where, on a source energy basis, the actual annual delivered energy is less than or equal to the on-site renewable exported energy." — *National Definition of Zero Energy Buildings*

→ Previewing the Home Energy Labeling Information eXchange (HELIX)

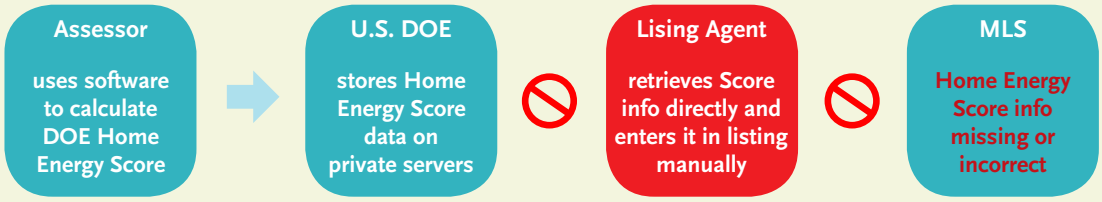


HELIX
Coming in 2018

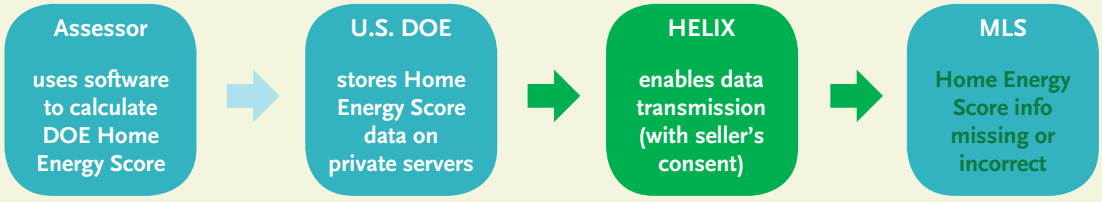
MLS MULTIPLE LISTING SERVICE®

Home buyers and renters are increasingly demanding information on the energy performance of their potential new homes. In particular, the growing millennial market expects the ability to filter and prioritize prospective homes based on anticipated cost of energy bills and thermal performance. Asset rating programs, like the U.S. Department of Energy's Home Energy Score, deliver readily-comparable information which, unlike energy bills, are independent of the home's tenants. These asset ratings provide cost-effective and well-supported mechanisms for driving energy retrofits and accelerate the adequate valuation of efficiency in real estate transaction transactions.

However, there is currently a data disconnect between when a home is assessed through a rating program like DOE's Home Energy Score and when it is posted for sale on a Multiple Listing Service (MLS): instead of auto-population (auto-pop), the listing agent typically receives this data indirectly and enters it manually, resulting in considerable entry of omitted or incorrect information in MLS listings.



Upon its kickoff in January 2016, the Home Energy Labeling Information eXchange (HELIX) project, a regional effort led by NEEP, promises to remove this barrier and make home energy efficiency information highly accessible yet secure by designing, developing, and implementing a database enabling direct and consistent transmission of such data across New England and New York.



By full implementation in 2018 — the year millennials are expected to become the majority demographic in the home buying market — HELIX will support NEEP's larger goal of creating statewide programs and policies throughout the region that support large scale energy efficiency improvements and the market valuation of efficiency in homes. Meantime, NEEP has developed resources to accelerate this process such as handy checklists for real estate professionals and renters.

The total annual avoided CO_2 from 2014 electric energy savings across the NEEP region is 2,784,429 tons. That is equivalent to taking 531,788 passenger vehicles off the road annually, or enough electricity to power 347,454 homes for a year.

NEEP provided overviews and insights to the best of our ability. Because states are never standing still, we encourage readers to visit our **state policy pages** *and the* **NEEP blog** *for updates and analysis throughout the year.*

LEADING STATES

Leadings states throughout the region maintain robust programs and stable funding in pursuit of all-cost effective energy efficiency. Their long term plans commit to harvesting energy efficiency as a key resource well into the future, and many are beginning the process of modernizing their electric distribution system for this future. Below is a description of the latest developments within our region's leading states, including Vermont, Rhode Island, Massachusetts, Connecticut, and New York.

Connecticut

Connecticut's Department of Energy and Environmental Protection in December 2015 gave its **approval with conditions** to the proposed **2016-18 Conservation and Load Management Plan**.

Connecticut's program administrators should be lauded for "next generation" thinking in terms of work towards building energy rating, an emphasis on electric air source heat pumps with a cold-climate rating, programs to serve the multifamily market, behavioral programs, and innovative commercial and industrial programs aimed at understanding and better serving the needs of various business classes. In particular, NEEP is encouraged to see the focus on things like Strategic Energy Management, Customized Solution Partnerships and Memorandums of Understanding. For more details on NEEP's feedback on the plans, see our **public comments**.

Also notable is an ongoing **proceeding** around demonstration projects for grid-side system enhancements to integrate distributed energy resources.

Connecticut has also pursued several progressive building policies, including an informative pilot project to incorporate the U.S. DOE Home Energy Score into the state's C&LM plans as part of the Home Energy Services program offering. The state has also begun to examine innovative strategies for gauging and improving compliance with the building energy code.

CONNECTICUT AT A GLANCE

Electric Program Expenditures	$176,458,651
Gas Program Expenditures	$41,418,232
Per Capita Expenditures	$60.67
Annual Electric Savings (MWh)	369,686
Annual Electric Savings as a Percent of Retail Sales	1.26%
Annual Gas Savings (Therms)	6,480,404
Annual Gas Savings as a Percent of Retail Sales	0.49%
Annual Avoided Electric Sector Carbon Emissions (tons)	131,492

*2014 program year data as reported to ISO-New England for its 2015 Energy Efficiency Forecast and to the NEEP EM&V Forum for the Regional Energy Efficiency Database (REED). Savings are expressed in net annual terms.

Massachusetts

The electric and gas efficiency program administrators saw their **2016-18 three-year statewide plans** and **term sheet** approved by the Energy Efficiency Advisory Council (EEAC) in October, with the final stamp by the Public Utilities Commission on January 28, 2016. The proposed plans will deliver nationally historic savings levels — 2.93 percent of forecasted electric sales and 1.24 percent of forecasted gas sales statewide — keeping the Commonwealth at the top of the pack and delivering $8 billion in lifetime benefits to residents and businesses.

Peak load management, including efficiency and **energy storage**, was a major focus of policymakers in Massachusetts through 2014, though the topic received less regulatory attention in 2015. Still, in August, **National Grid**, **Unitil**, and **Eversource** submitted their **Grid Modernization** proposals per Department of Public Utilities Order **12-76-B**.

Massachusetts has also initiated several innovative building policies, including a pilot to test simpler and more cost-effective means for performing commercial building asset ratings for energy performance, though its leading status has been somewhat tarnished by the unwillingness of state officials to adopt an updated and progressive stretch energy code.

"Better managing peaks through energy efficiency and load management is a priority of this administration."

— Judith Judson, Director of Energy Efficiency, Massachusetts Department of Energy Resources

In November, Massachusetts Attorney General Maura Healy release the **Regional Electric Reliability Options Study**, where it sought to answer the question of whether new natural gas pipelines are the most cost-effective and environmentally-compliant means of meeting consumer energy need. The study, conducted by the highly-regarded Analysis Group, concluded that, even under a stressed scenario, the more cost effective resources, including energy efficiency and demand response, can ensure that no additional pipeline gas capacity is needed through 2030.

"We do not need increased gas capacity to meet electric reliability needs. A much more cost-effective solution is to embrace energy efficiency and demand response programs that protect ratepayers and significantly reduce greenhouse gas emissions."

— Maura Healey Attorney General, Commonwealth of Massachusetts

MASSACHUSETTS AT A GLANCE

Electric Program Expenditures	$528,171,707
Gas Program Expenditures	$178,109,670
Per Capita Expenditures	$103.95
Annual Electric Savings (MWh)	1,351,105
Annual Electric Savings as a Percent of Retail Sales	2.48%
Annual Gas Savings (Therms)	28,628,133
Annual Gas Savings as a Percent of Retail Sales	1.03%
Annual Avoided Electric Sector Carbon Emissions (tons)	362,952

*2014 program year data as reported to ISO-New England for its 2015 Energy Efficiency Forecast and to the NEEP EM&V Forum for the Regional Energy Efficiency Database (REED). Savings are expressed in net annual terms.

New York

New York remains in the midst of its ambitious Reforming the Energy Vision regulatory proceeding, with recent gubernatorial leadership signaling enhanced support for forward-thinking energy policies. For example, the 2015 State Energy Plan cites a number of elements relating to energy efficiency, but also includes an emphasis on battery storage industries, the transportation sector, and community engagement/support. Ambitiously, it proposes reducing greenhouse gas emissions by 40 percent from 1990 levels, producing 50 percent of electric generation from renewable resources, and affecting a 600 trillion BTU increase in energy efficiency by the 2030.

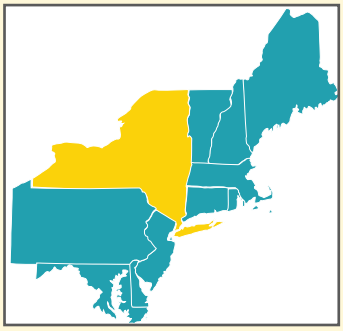
To achieve these goals, Governor Andrew Cuomo recently announced support for a North American Cap and Trade Program, linking Canadian providences, California, and the Regional Greenhouse Gas Initiative (RGGI). At the same time however, the state's 2015 budget also saw diversion of $41 million in RGGI proceeds toward programs unrelated to clean energy, and Governor Cuomo's proposed 2016 budget includes a similar provision. Reliance on cap and trade to fund clean energy programs in the future will require limitations on such funding diversion. Several states in the region, including New York, are actively considering a similar cap and trade system that captures emissions from the transportation sector.

During 2015, the Public Service Commission (PSC) issued its Order Adopting a Regulatory Policy Framework and Implementation Plan, Order Authorizing Utility-Administered Gas Efficiency Programs, and Order Adopting Dynamic Load Management Filings with Modification. The Department of Public Service (DPS) also issued its Benefit-Cost Analysis (BCA) Whitepaper and its Whitepaper on Ratemaking and Utility Business Models. The CBA Whitepaper proposes to avoid quantifying non-energy benefits of distributed energy resource, while the Whitepaper of Ratemaking and Utility Business Models proposes a system of earnings impact mechanisms (EIMs) to reward utilities for efficiency program implementation. In early 2016, the PSC issued a final Order on the BCA Framework, embracing the societal cost test and non-energy benefits on a project/locational-specific basis.

Outside of the PSC and DPS, the efficiency program administrators also filed a number of important plans in 2015. The state's Investor owned utilities filed their efficiency transition implementation plans (ETIPS) and utility demonstration projects, which can be found here. The New York State Energy Research and Development Authority (NYSERDA) also filed a Supplement to its Clean Energy Fund Proposal which reiterated their support for fuel-neutral investments in energy efficiency, with the PSC subsequently issuing an Order authorizing the fund in early 2016.

NEW YORK AT A GLANCE

Electric Program Expenditures	$372,496,583
Gas Program Expenditures	$125,501,474
Per Capita Expenditures	$25.22
Annual Electric Savings (MWh)	1,421,287
Annual Electric Savings as a Percent of Retail Sales	0.96%
Annual Gas Savings (Therms)	32,075,100
Annual Gas Savings as a Percent of Retail Sales	0.36%
Annual Avoided Electric Sector Carbon Emissions (tons)	517,229



*2014 program year data as reported to NEEP EM&V Forum for the Regional Energy Efficiency Database (REED). Savings are expressed in net annual terms.

Rhode Island

Collaboration between the legislature and Governor Gina Raimondo in **Rhode Island** enabled a number of bold new policies in 2015. The legislature **transformed** the state's Clean Water Finance Agency into the **Rhode Island Infrastructure Bank** (RIIB), and created an **Efficient Buildings Fund** within the RIIB to finance energy upgrades in public buildings. The fund will dovetail well with a December **Executive Order** from the Governor directing emissions reductions in government buildings through energy efficiency, renewable energy, and adoption of a building energy stretch code.

These efforts support the policy objectives outlined in the recent draft of the state's long term energy plan, **Energy 2035**, which recommends continued support and enhancement of least cost procurement policies, recommending their expansion to all fuels.

The Rhode Island Energy Efficiency Resource Management Council and Public Utility Commission (PUC) are continuing their commitment to energy efficiency with the **2016 Efficiency Program Plan**, which targets energy savings of 2.55 percent of retail sales from 2012 levels, and the **2016 System Reliability Plan**, which utilizes geo-targeting strategies to ensure least-cost system reliability. Rhode Island is also exploring the realm of grid modernization through their **Systems Integration Rhode Island** initiative, which aims to, among other things, map a path toward productive integration of advanced metering infrastructure, strategic electrification, and active load management.

RHODE ISLAND AT A GLANCE

Electric Program Expenditures	$85,348,093
Gas Program Expenditures	$21,549,375
Per Capita Expenditures	$101.20
Annual Electric Savings (MWh)	268,468
Annual Electric Savings as a Percent of Retail Sales	3.51%
Annual Gas Savings (Therms)	4,090,292
Annual Gas Savings as a Percent of Retail Sales	0.98%
Annual Avoided Electric Sector Carbon Emissions (tons)	31,471

*2014 program year data as reported to ISO-New England for its 2015 Energy Efficiency Forecast and to the NEEP EM&V Forum for the Regional Energy Efficiency Database (REED). Savings are expressed in net annual terms. Savings include CHP project at Torray Plastics which saved ~1 percent electric retail sales.

Vermont

Vermont continues to serve as a national leader on energy efficiency policies. With publication of the Draft 2015 Comprehensive Energy Plan in late September, the Vermont Department of Public Service (DPS) outlined an ambitious agenda for achieving energy and climate goals. While the plan emphasizes the continued success of the states' energy efficiency programs, it also outlines extensive backing for widespread rollout of new technologies such as heat pumps and electric vehicles.

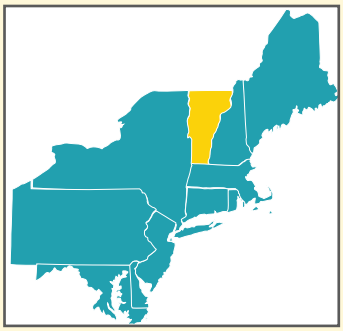
In support of the plan's policy objectives the legislature enacted Act 56, establishing energy transformation project requirements for the state's distribution utilities. Projects eligible to satisfy this requirement include heat pumps, electric vehicles, energy storage, and home weatherization. Annual portfolio requirements begin at two percent of retail sales in 2017 and escalate to 12 percent of retail sales by 2032.

Final rules around the legislation remain pending within the Vermont Public Service Board (PSB)'s Docket 8550. To help facilitate these and other projects, Efficiency Vermont is planning to leverage a $46 million loan from the U.S. Department of agriculture to offer 1.5 percent interest loans for energy upgrades in the state.

Vermont is also one of several states in the NEEP region tackling issues around energy data access, per Docket 8488. Examining standards for energy data aggregation, storage, access, and automated transfer, the proceeding aims to encourage energy labeling for commercial, multifamily, and multi-use buildings in Vermont. With advanced metering infrastructure already in place in much of the state, there is an opportunity for consumers, vendors, and efficiency programs to leverage energy data for a new frontier of energy savings.

VERMONT AT A GLANCE

Electric Program Expenditures	$45,794,592
Gas Program Expenditures	$2,250,853
Per Capita Expenditures	$76.74
Annual Electric Savings (MWh)	96,557
Annual Electric Savings as a Percent of Retail Sales	1.73%
Annual Gas Savings (Therms)	915,440
Annual Gas Savings as a Percent of Retail Sales	0.85%
Annual Avoided Electric Sector Carbon Emissions (tons)	38,357



*2014 program year data as reported to ISO-New England for its 2015 Energy Efficiency Forecast and to the NEEP EM&V Forum for the Regional Energy Efficiency Database (REED). Savings are expressed in net annual terms.

ADVANCING STATES

Advancing states throughout the region have recently demonstrated new commitments to energy efficiency policies. Below is a description of the latest developments within our region's advancing states, including Maryland, Delaware, New Hampshire, Maine, and the District of Columbia.

Delaware

The state's electric and gas utilities, the Sustainable Energy Utility, and the stakeholder Energy Efficiency Advisory Council, headed by the Division of Energy and Climate at the Department of Energy and Natural Resources Control, have been working through the issues surrounding creation of statewide energy efficiency programs per legislation passed in 2014. All parties have committed to submitting initial energy efficiency program plans in early 2016. It is expected that new programs will be rolled out in 2017.

Creating a framework for evaluation, measurement and verification, figuring out how to apply a cost-effectiveness test, and coordination among the various program providers[11] are all key to ensuring a smooth roll-out. Delaware officials have used the EEAC as both a sounding board and learning platform, welcoming information on best practices in the region to ensure that customers benefit and programs succeed. For more information, visit the Delaware Energy Efficiency Advisory Council's website here.

DELAWARE AT A GLANCE

Electric Program Expenditures	$2,068,572
Gas Program Expenditures	$166,512
Per Capita Expenditures	$2.36
Annual Electric Savings (MWh)	8,606
Annual Electric Savings as a Percent of Retail Sales	0.08%
Annual Gas Savings (Therms)	21,524
Annual Gas Savings as a Percent of Retail Sales	0.004%
Annual Avoided Electric Sector Carbon Emissions (tons)	5,188

*2014 program year data as reported to NEEP EM&V Forum for the Regional Energy Efficiency Database (REED). Savings are expressed in net annual terms.

[11] NEEP issued a memo on Guiding Principles for Shared Program Administration as information to assist Delaware as it establishes its program delivery framework. It can found here: http://www.neep.org/sites/default/files/resources/Guiding%20Principles%20for%20Shared%20Energy%20Efficiency%20Program%20Administration.pdf

District of Columbia

DC regulators re-opened **Docket FC 1119**, reconsidering their hotly debated **decision to deny** the merger of Exelon and PHI Holdings, which has already received approval in all other necessary jurisdictions, and which could have resulted in additional efficiency funds as part of the merger. (For an examination of utility mergers and where energy efficiency fits in, see NEEP's **blog** on the subject.) The District has also entered the grid modernization arena, with its **Investigation into Modernizing the Energy Delivery System for Increased Sustainability (Case No. 1130)**.

The District's Department of Energy and Environment has been a leading force for innovation in the buildings sector,[12] working closely with the DC Sustainable Energy Utility. Energy efficiency is a core part of the District's Sustainable DC Task Force Report. One innovative development has been the implementation of a new online application platform at the Department of Consumer Affairs and Regulation that expedites the building permit application, and related energy code inspection.

"Our climate projections for heat certainly indicate that deep energy efficiency will be critical to reducing demand. In addition, passive cooling strategies can save energy and make buildings more resilient to extreme heat and power outages associated with severe weather."

— Bill Updike, Chief of Green Building and Climate Branch, District of Columbia Department of Energy and Environment

DISTRICT OF COLUMBIA AT A GLANCE

Electric Program Expenditures	$13,500,000
Gas Program Expenditures	$4,600,000
Per Capita Expenditures	$26.97
Annual Electric Savings (MWh)	59,105
Annual Electric Savings as a Percent of Retail Sales	0.53%
Annual Gas Savings (Therms)	1,442,268
Annual Gas Savings as a Percent of Retail Sales	0.44%
Annual Avoided Electric Sector Carbon Emissions (tons)	34,593

*2014 program year data as reported to NEEP EM&V Forum for the Regional Energy Efficiency Database (REED). Savings are expressed in net annual terms.

[12] http://doee.dc.gov/service/green-buildings

Maine

Maine's efficiency programs have been successful despite lack of support from Governor Paul LePage and related partisan debate on their value. For example, 2015 saw a **legislative interpretation** by the Maine Public Utility Commission that drastically reduced Efficiency Maine's funding, a **legislative fix** to the funding cut, a veto of the legislative fix by Governor LePage, and a **unanimous vote** by the legislature to override the governor's veto and restore funding for energy efficiency.[13]

The **Efficiency Maine Trust's 2017-19 Triennial Plan**, the third such plan, was approved by the board of trustees at its November 2015 meeting before going to the Public Utility Commission for final approval. It proposes electric efficiency savings targets at more than 2 percent of retail sales.

Maine is climbing towards its aspirational goal of weatherizing all homes, and putting a priority on weatherization as well as high-efficiency electric heat pumps as a way to move more consumers off fossil fuel heating. Notably, Maine offers fuel-blind programs for low-income customers, helping people add insulation and air-sealing and upgrade to heat pumps, regardless of fuel source. Another positive development in 2015 was the expansion of natural gas programs to customers of all providers in the state.

Two areas where improvement is still needed are in matching efficiency investment levels to the "Maximum Achievable Cost-Effective" funding level as required by law, and reinstating a mandatory, uniform building energy code for the state. In recent years, the Public Utility Commission has kept Efficiency Maine funding to a Base Funding scenario, thus limiting the potential of the programs to reach customers. Early in 2016, the legislature will take up a **bill** limiting the amount of Regional Greenhouse Gas initiative proceeds that are invested in energy efficiency.

As for the building energy code, the legislature passed the state's first uniform statewide building energy code in 2008, but three years later in 2011, the legislature amended that law, so that the code now only applies only to the largest communities in the state. Moreover, Maine is now three code cycles behind in updating its building energy code, with no clear indication as to when that may change.[14]

MAINE AT A GLANCE

Electric Program Expenditures	$21,972,152
Gas Program Expenditures	$14,462,977
Per Capita Expenditures	$27.39
Annual Electric Savings (MWh)	161,571
Annual Electric Savings as a Percent of Retail Sales	1.36%
Annual Gas Savings (Therms)	1,616,460
Annual Gas Savings as a Percent of Retail Sales	0.46%
Annual Avoided Electric Sector Carbon Emissions (tons)	58,650

*2014 program year data taken from Efficiency Maine Trust's annual report, available at: http://www.efficiencymaine.com/docs/2014-Efficiency-Maine-Annual-Report.pdf. Data here are for SBC, RGGI, and ARRA funded electric efficiency programs. Savings are expressed in gross annual terms.

[13] A description of the partisan struggles over efficiency can be found in this Bangor Daily News article: http://bangordailynews.com/2015/05/25/politics/partisan-struggle-over-maine-energy-policy-persists/

[14] http://neep.org/initiatives/energy-efficient-buildings/codes-tracker

Maryland

Energy efficiency policies in Maryland are at a crossroads. A June Order by Maryland's Public Service Commission (PSC) positioned the state as a national leader by extending the EmPOWER Maryland program beyond its legislative targets, enabling comprehensive gas efficiency programs, adopting the societal cost test for cost-effectiveness screening, and setting ambitious electric efficiency savings targets of roughly two percent of retail sales annually.

Yet, significant staffing changes at the Maryland Energy Administration (MEA) and pronouncements by Governor Larry Hogan of his opposition to expanded investments in energy efficiency have clouded the issue and threatened Maryland's status as a regional leader in energy efficiency policy. The Governor's statements were confirmed by a MEA PSC filing withdrawing support for the investment necessary to achieve the targets set by the June order. Subsequently a December PSC Order approved most of the requested efficiency program funding increases, but in many cases only until the next round of semi-annual hearings in June.

Another proceeding of concern before the PSC is a request by Baltimore Gas and Electric (BG&E) to increase fixed service charges for residential customers by 60 percent, from $7.50 to $12. Such charges discourage efficiency measures by shifting charges away from the volumetrically determined proportion of a customer's bill and instead toward a fixed charge that consumers cannot reduce through efficiency measures. Proposals for fixed charge increases are becoming more common as utilities are face with declining sales due to successful efficiency and solar net metering programs begin to seek a more secure revenue base. For more information on the fixed charge debate, see our section on Rate Design.

MARYLAND AT A GLANCE

Electric Program Expenditures	$317,180,259
Gas Program Expenditures	$17,300,000
Per Capita Expenditures	$52.81
Annual Electric Savings (MWh)	817,906
Annual Electric Savings as a Percent of Retail Sales	1.33%
Annual Gas Savings (Therms)	2,074,860
Annual Gas Savings as a Percent of Retail Sales	0.22%
Annual Avoided Electric Sector Carbon Emissions (tons)	661,501

*2014 program year data as reported to NEEP EM&V Forum for the Regional Energy Efficiency Database (REED). Savings are expressed in net annual terms.

New Hampshire

Alone among New England states, New Hampshire does not require by law or regulation an energy efficiency resource standard, but develops programs based only on what an annual budget will support. Regulatory action in 2015 began to change that, however. In May, the Public Utilities Commission (PUC) initiated a proceeding to establish an EERS under **Docket 15-137**.

Throughout the summer and fall of 2015, PUC staff hosted a series of stakeholder sessions to gather input on topics including targets, funding, and rate design. The issue of funding constraints continues to limit achievable savings even within the state's EERS discussion, and an early 2016 **bill proposing** to limit use of Regional Greenhouse Gas Initiative proceeds that would fund the EERS is concerning. **PUC Staff**, **utilities**, and **efficiency advocates** filed their EERS proposals in December, with the proceeding continuing through the spring of 2016, when the PUC commissioners are expected to issue a final ruling.

Aside from the EERS proceeding, other significant policy developments in New Hampshire in 2015 included the move by Eversource to **divest its energy generation resources**, (with a potential settlement including additional funding for efficiency programs). In November, however, the PUC staff called for a five-year delay on divestiture, citing concerns over ratepayer impacts.

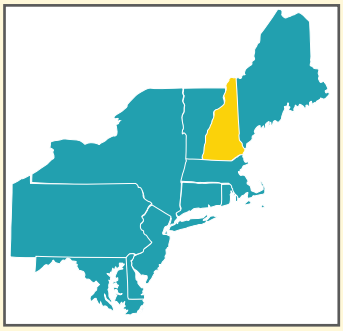
Lastly, New Hampshire became the latest state in the region to explore grid modernization, with the PUC's **Investigation into Grid Modernization (IR 15-296)**, as required by a legislative directive to implement goals of the state's 10-year energy strategy. In October, PUC staff informed the Commission that, based upon lessons gleaned from their counterparts in Massachusetts, and after reviewing the many comments received, they concluded they needed to hire an expert consultant and facilitator to guide their investigation, which has yet to begin.

"It's an important step to take because it shows the state is committed to energy efficiency in the long term. Energy efficiency is the least costly way of lowering rates and bills for residential customers."

— Susan Chamberlin, Former New Hampshire Consumer Advocate, on the Creation of an EERS

NEW HAMPSHIRE AT A GLANCE

Electric Program Expenditures	$25,825,828
Gas Program Expenditures	$7,044,928
Per Capita Expenditures	$24.70
Annual Electric Savings (MWh)	63,383
Annual Electric Savings as a Percent of Retail Sales	0.58%
Annual Gas Savings (Therms)	2,160,000
Annual Gas Savings as a Percent of Retail Sales	0.60%
Annual Avoided Electric Sector Carbon Emissions (tons)	25,009



*2014 program year data as reported to ISO-New England for its 2015 Energy Efficiency Forecast and to the NEEP EM&V Forum for the Regional Energy Efficiency Database (REED). Savings are expressed in net annual terms.

TRAILING STATES

Two states in our region have the potential to capture extensive energy savings but have failed to do so, largely due to funding constraints and lack of policy leadership. We're optimistic that new thought leaders at the executive and legislative level may catalyze opportunities for improvement within these states, lending greater support for energy efficiency's role as the least cost energy resource. Below we describe recent developments in energy efficiency policies in New Jersey and Pennsylvania.

New Jersey

New Jersey is in the midst of revising its Energy Master Plan, which was last updated in 2011. The plan will consider emerging issues such as the Energy Resilience Bank, emergency preparedness, microgrids, and distributed energy resources, yet makes no mention of the Regional Greenhouse Gas Initiative (RGGI), which the state officially withdrew from in 2015 after several years of non-participation.

The Office of Clean Energy in May issued a new Comprehensive Resource Analysis for the state's Clean Energy Program (CEP), which — due to resource uncertainty — identified funding for fiscal year 2016 according to a trend line based on previous years, rather than according to projected collections from the state's Systems Benefits Charge. In 2015, the state saw budget proposals divert between $150 and $190 million from the Clean Energy Fund, largely to pay for energy expenses at state facilities rather to support the energy efficiency programs and projects the funds were intended for.

For 2016, the CEP will see a change in program delivery methods, modeled upon new vendor AEG's proposal for program administration. As the Board of Public Utilities notes, "The new contract streamlines program management from an organizational structure which had three separate contractors, a program coordinator and two separate market managers, to a single program administrator responsible for operation of most phases of the CEP." AEG's proposal also focuses on program delivery methods that integrate private financing, the Clean Power Plan, and deferred distribution system investments as a potential source of funding outside the Systems Benefit Charge.

Despite prolonged setbacks in energy efficiency programs, the state did become one of the first in the region to update its building energy code to reference the 2015 International Energy Conservation Code (IECC), creating some hope that the state may return to a position of energy efficiency leadership in the not-too-distant future.

NEW JERSEY AT A GLANCE

Electric Program Expenditures	$201,500,000
Gas Program Expenditures	$89,800,000
Per Capita Expenditures	$32.59
Annual Electric Savings (MWh)	500,784
Annual Electric Savings as a Percent of Retail Sales	0.68%
Annual Gas Savings (Therms)	12,870,000
Annual Gas Savings as a Percent of Retail Sales	0.25%
Annual Avoided Electric Sector Carbon Emissions (tons)	277,434

*2014 program year data is taken from New Jersey Clean Energy Program reports, available at: http://www.njcleanenergy.com/main/public-reports-and-library/financial-reports/clean-energy-program-financial-reports At least some of the savings are expressed in gross annual terms.

Pennsylvania

Pennsylvania's Governor Tom Wolf and its Public Utility Commission are making strides on energy issues. Regulators and utilities delivered several important decisions and filings throughout 2015. The first was an Order extending Act 129 — the state's energy efficiency and conservation program — for another five years and reviving the state's dormant retail demand response program. However, the same order failed to expand program funding beyond the legislatively assigned two percent of 2006 utility revenues, limiting savings targets to about .8 percent of retail sales. The second Order revised the Commonwealth's cost-effectiveness screening processes to include savings associated with reduced water and fossil fuel consumption. Subsequently, Duquesne Light and Power, Metropolitan Edison, Penelec, PennPower, WestPenn Power, PECO, and PPL submitted their Act 129 Phase III plans, which are currently under consideration.

It is likely that revision of the Phase III Plans will be necessary to accommodate the U.S. EPA's Clean Power Plan Final Rule, which offers a Clean Energy Incentive Program for energy efficiency projects in low income communities beginning in 2020, the final year of Phase III. Pennsylvania in particular will benefit from this program because the Clean Power Plan will requires more emission reductions from the Commonwealth than every other jurisdiction in the Northeast and Mid-Atlantic combined.

Under the Governor Wolf, the Department of Environmental Protection (DEP) has shown renewed leadership on emission reduction. For example, a recently published draft update to the DEP's triennial Climate Change Action Plan identifies energy efficiency as a key strategy for emission reduction, and the DEP has recently taken a proactive role on issues like LED street lighting conversion. Demonstrating an optimism about the role of energy efficiency, DEP Secretary John Quigley notes that "There's a lot of juice left to be squeezed out of our Act 129."

Contrasting with executive branch leadership, some state legislators continue to double down on policies of the past. The body's continued failure to support a bill expanding Act 129 to the natural gas sector leaves Pennsylvania the *only* state in the region without comprehensive gas efficiency programs. Another area of concern has been SB 805, a bill that would allow the largest electric customers to "opt out" of Pennsylvania's highly successful efficiency programs. This would likely result in less efficiency happening over all, and undermine already constrained program budgets. The bill was removed from table in early December of 2015, and hopefully won't be revived.

PENNSYLVANIA AT A GLANCE

Electric Program Expenditures	$173,171,000
Per Capita Expenditures	$13.54
Annual Electric Savings (MWh)	1,019,155
Annual Electric Savings as a Percent of Retail Sales	0.70%
Annual Avoided Electric Sector Carbon Emissions (tons)	564,612

*2014 program year data taken from Pennsylvania Statewide Evaluation PY 5 Annual report, available at: http://www.puc.pa.gov/Electric/pdf/Act129/SWE_PY5-Final_Annual_Report.pdf Savings are expressed in gross annual terms.

CONCLUSION

If 2015 was a year of changing paradigms, 2016 promises to be a year of rapid evolution in the world of energy efficiency and other demand-side resources. Utilities, efficiency program administrators, delivery consultants and regulators are racing to keep up with changing information and control technologies that can help consumers and PAs alike understand and use energy more wisely. Greater efficiency as well as customer-owned renewable generation and even energy storage can mean less demand for expensive and greenhouse gas-emitting energy sources. But this new paradigm also challenges the status quo of existing utility models, particularly with relation to grid interconnectivity and revenue opportunities.

Likewise, policymakers are challenged to keep pace with the Next Generation Energy Efficiency trends as best they can. Regulators must balance the sometimes and seemingly-discordant charges of protecting and empowering customers, ensuring proper price signals for gas and electric utilities, and keeping broader societal goals such as system reliability, climate resiliency, environmental protection and economic prosperity in mind. Governors and legislators need to match clean energy and environmental goals with job creation and fiscal growth, while resisting calls from opponents of energy efficiency to focus only on costs, and not the myriad benefits.

Next Generation Energy Efficiency holds the potential to harmonize what may, on the surface, appear to be conflicting objectives and turn challenges into opportunities for residents, businesses, utilities and other program administrators, practitioners and other market actors, and society at large. There are many positive examples in our region of states that continue to lead the way, through both policy and program innovations. NEEP will continue to connect stakeholders and help them learn from each other as we collectively create new models that sustain our course toward a clean energy future.

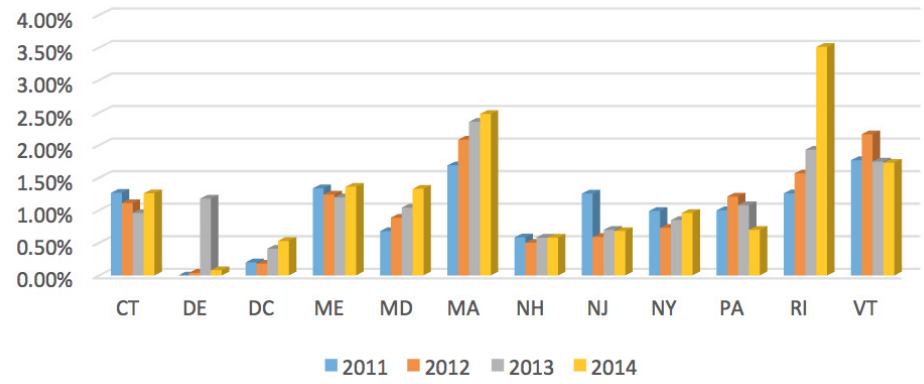
NEEP'S VIEW: Policy Strategies To Advance Next Generation Efficiency

1. Put consumers at the center of the energy/utility relationship, thoughtfully integrating new technologies and policies to so that price signals, information and behavior aligns to advance the efficient use of energy.
2. Via law or regulation, establish binding policy directives for utilities to capture all cost-effective energy efficiency, and provide a regulatory framework to allow for the integration of these programs with other demand side resources, including demand response, storage, on-site renewable generation, combined heat and power and electric vehicles.
3. Create utility rate structures aligned with broader public policy goals, including mitigating the need for new infrastructure, lowering peak and overall energy use, supporting carbon reduction goals, fostering climate resiliency, growing the clean energy economy, and helping consumers save energy and reduce costs.
4. Ensure adequate, stable, long-term funding for efficiency programs, with private financing to complement but not supplant ratepayer program funding.
5. Allow for robust stakeholder input and engagement — ideally through a standing advisory board with expert consultants — to help states plan, deliver and evaluate methods to achieve long term savings goals.
6. Advance policies and programs that promote comprehensive all-fuel strategies, including building energy and operational savings en route to "zero energy buildings."
7. Support complementary public policies such as building energy codes, building energy rating and disclosure, appliance efficiency standards, and state and local governments "leading by example" through progressive energy efficiency strategies in schools and other public buildings.
8. Integrate energy efficiency into long-range state energy and air quality planning, and ensure that energy efficiency and other demand resources are fully accounted for and considered equally through robust and comprehensive analyses whenever new infrastructure investments are contemplated.
9. Foster a flexible regulatory framework to address the opportunities and challenges of new information and communication technologies and continue supporting transparency and consistency in evaluation, measurement and verification of program savings.
10. Highlight and share regionally and nationally energy efficiency success stories and learn from best practices to ensure continued progress in capturing cost-effective efficiency and moving towards Next Generation Energy Efficiency policies and programs.

State Energy Efficiency Policies, Administration, and Savings Goals

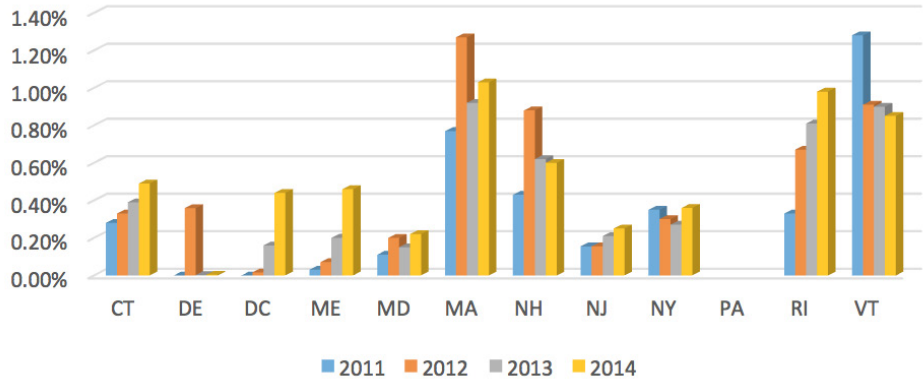
State	Policy Type	Program Administrator	Energy Savings Goals
Connecticut	All Cost-Effective Energy Efficiency	Electric & Gas Utilities 2016-18 Plan	Electric: 1.5% retail sales Gas: .6% retail sales (forecasted retail sales)
Maine	All Cost-Effective Energy Efficiency	Efficiency Maine Trust 2017-19 Plan Budgets and Metrics	Electric: ~2.3% retail sales Gas: pending (2014 retail sales
Massachusetts	All Cost-Effective Energy Efficiency	Electric & Gas Utilities + CLC 2016-18 Plan Term Sheet	Electric: 2.9% retail sales Gas: 1.1% retail sales (forecasted retail sales)
New Hampshire	*Program Funding Only*	Electric & Gas Utilities PUC Staff proposal Utilities Proposal Advocates proposal	Pending Proceeding
Rhode Island	All Cost-Effective Energy Efficiency	Electric & Gas Utilities 2015-17 Plan	Electric: 2.6% retail sales Gas: 1.1% retail sales (2012 retail sales)
Vermont	All Cost-Effective Energy Efficiency	Energy Efficiency Utility 2015-17 Plan Demand Resource Proc.	Electric: 2.1% retail sales Gas: Pending (forecasted retail sales)
Delaware	All Cost-Effective Energy Efficiency	Utilities+ Sustainable Energy Utility	Pending Proceeding
District of Columbia	Efficiency Utility Goals	Sustainable Energy Utility	N/A
Maryland	Energy Efficiency Resource Standard	Electric and Gas Utilities Order No. 87082	Electric: 2.0% retail sales Gas: Pending (2013 retail sales)
New Jersey	Efficiency Funding	Office of Clean Energy + Utilities Strategic Plan	No mandated savings goals
New York	Energy Efficiency Portfolio Standard	NYSERDA + Utilities 15-M-0252 Pending	Pending Proceeding
Pennsylvania	Energy Efficiency Resource Standard Funding Capped	Electric Utilities Act 129 Phase III	Electric: .8% retail sales Gas: none (2013 retail sales)

Electric Savings as Percent Retail Sales*



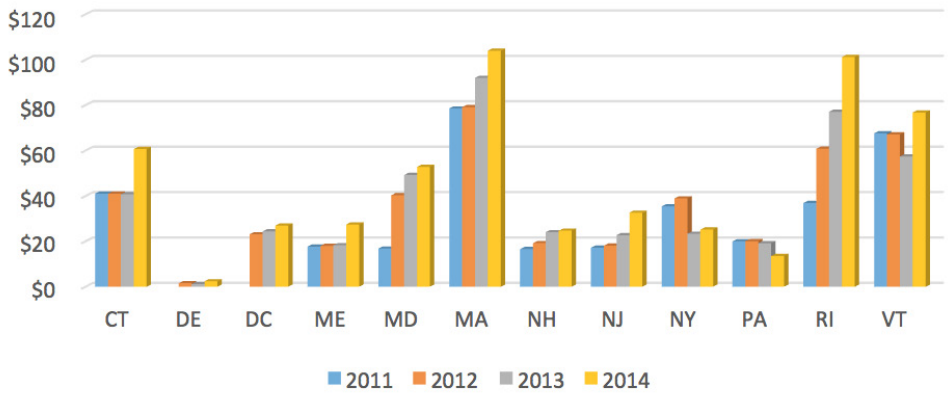
*Data compiled from state energy efficiency program expenditures from state annual energy efficiency reports from 20011-2014, data submitted to ISO-New England for its annual energy efficiency forecast, and to NEEP for its Regional Energy Efficiency Database (REED). Rhode Island's 2014 Savings includes a CHP project totaling ~1% of retail sales. Delaware's 2013 electric savings also include a large CHP project.

Gas Savings as Percent Retail Sales*



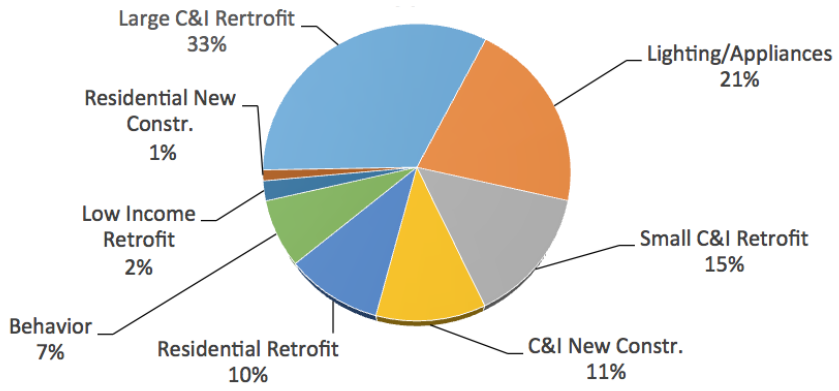
*Data compiled from state energy efficiency program expenditures from state annual energy efficiency reports from 20011-2014, data submitted to ISO-New England for its annual energy efficiency forecast, and to NEEP for its RegionalEnergy Efficiency Database (REED).

Combined Per Capita Expenditures Over Time*



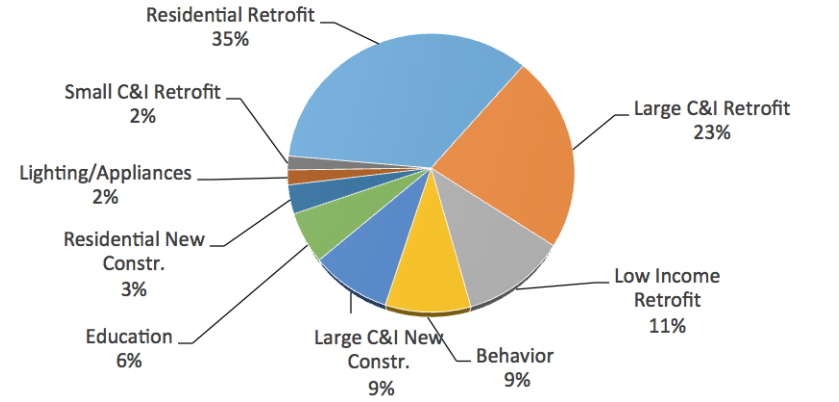
*Data compiled from state energy efficiency program expenditures from state annual energy efficiency reports from 20011-2014, data submitted to ISO-New England for its annual energy efficiency forecast, and to NEEP for its Regional Energy Efficiency Database (REED).

Percent of Region's 2014 Electric Savings by Program Type*



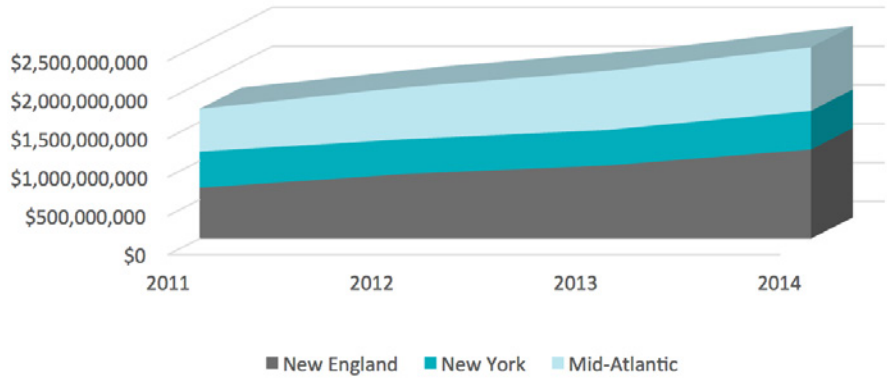
*Electric Savings by program derived from NEEP Regional Energy Efficiency (REED) Database's 2014 data, and includes Connecticut, Delaware, the District of Columbia, Maryland, Massachusetts, New Hampshire, New York, Rhode Island, and Vermont.

Percent of Region's 2014 Gas Savings by Program Type*



*Gas Savings by program derived from NEEP Regional Energy Efficiency (REED) Database's 2014 data, and includes Connecticut, Delaware, the District of Columbia, Maryland, Massachusetts, New Hampshire, New York, Rhode Island, and Vermont.

Region's Combined Energy Efficiency Investments 2011-2014*



*Data compiled from state energy efficiency program expenditures from state annual energy efficiency reports from 20011-2014, data submitted to ISO-New England for its annual energy efficiency forecast, and to NEEP for its Regional Energy Efficiency Database (REED).

APPENDIX B

NEEP 2015 Policy Blogs*

GOING DEEPER SERIES

Going Deeper: Next Generation Energy Efficiency

Going Deeper: Why PA's Should Care that Demand Response is Before the Supreme Court

Going Deeper: Can New York Fulfill its Promise to Reform the Energy Vision?

POLICY TRACKER SERIES

Energy Efficiency Policy Tracker: A Final Look for 2015

Energy Efficiency Policy Tracker: October 2015

Energy Efficiency Policy Tracker: August 2015

BLOGS

Vermont Embarks on Landmark Strategic Electrification Program

Learning from the Best: SEE Action Resources Help Tap Potential, Deliver Customer Value

Costs Down, Goals Up: Massachusetts Aims High with Next 3 Year Efficiency Plan

As Advanced Metering Grows, SEE Action Describes Potential for New Energy Savings

A Call for Compliance: Energy Efficiency's Role in the Clean Power Plan

New Hampshire Poised to Enact Energy Efficiency Resource Standard

Massachusetts Tackles "Holy Grail" of Energy Storage

What Con Edison's BQDM Project Reveals About Geo-Targeting and Utility Incentives

Utility Mergers: Where Does Energy Efficiency Fit In?

A Changing Landscape: Characterizing Energy Efficiency as a Resource, Not a Cost

Two States, Two Paths: A Regional Roundup Case Study

Comprehensive Analysis Needed Before the Region's Energy Infrastructure Expands

* *All of these blogs are online at* neep.org

Select NEEP 2015 Publications*

The Changing EM&V Paradigm

Northeast and Mid-Atlantic Residential Lighting Strategy: 2015 Update

Exploring the Nexus of E-Commerce and Energy Efficiency

Early Replacement Measures Study: Phase II Research Report

Northeast Collaborative for High Performance Schools (NE-CHPS) Version 3.1

Opportunities for Home Energy Management Systems (HEMS) in Advanced Residential Energy Efficiency Programs

The State of Our Sockets: A Regional Analysis of the Residential Lighting Market

Construction Codes in the Northeast: Myths and Realities of Energy Code Adoption and the Economic Effects

Incremental Cost Study Phase IV Report

Mid-Atlantic Technical Reference Manual Version 5.0

A Changing Landscape: The 2015 Regional Roundup of Energy Efficiency Policy

LED Street Lighting Assessment and Strategies for the Northeast and Mid-Atlantic

Ductless Heat Pump Meta Study

Geo-targeting Energy Efficiency as a Transmission and Distribution Resource

Cost Effectiveness Screening Principles and Guidelines

* *Visit neep.org/resources to access any of these reports*

APPENDIX D

NEEP 2015 Public Policy Technical Assistance

NEEP serves as a resource to state policymakers, sharing best practices and insights to further the efficient use of energy in homes, buildings and industry. Below are links to public comments, guidance memos and presentations prepared by the Policy Outreach and Analysis team in 2015. All of these resources, including the electronic version of this report, can be found at neep.org.

Date	Type	Assistance Subject Matter and Link	State
9/17/2015	Comments	Grid Modernization Scoping	New Hampshire
8/21/2015	Presentation	EERS Funding	New Hampshire
8/4/2015	Memo	EERS MW Target Considerations	New Hampshire
7/20/2015	Presentation	EERS Guiding Principles	New Hampshire
4/3/2015	Comments	EERS Straw Proposal	New Hampshire
1/14/2015	Presentation	House Committee Orientation- Energy Efficiency	New Hampshire
10/26/2015	Comments	Track II- Ratemaking & Utility Business Models	New York
9/28/2015	Comments	Utility ETIPs and LED Street Lighting	New York
8/21/2015	Comments	Staff Benefit Cost Analysis Whitepaper	New York
8/14/2015	Comments	NYSERDA Clean Energy Fund Info. Supp.	New York
4/10/2015	Joint Comments	REV Energy Efficiency Letter of Concern	New York
5/28/2015	Comments	EEAC Draft 2016-18 Plan Input	Massachusetts
1/20/2015	Comments	EEAC 2016-18 Plan Input	Massachusetts
9/10/2015	Memo	Overview of SEE Action Resources	Delaware
8/25/2015	Memo	Principles for Shared Program Admin.	Delaware
11/1/2015	Fact Sheet	Large Customer Opt-Outs and Pennsylvania	Pennsylvania
5/15/2015	Reply Comments	Act 129 Phase III Tent. Order	Pennsylvania
4/27/2015	Comments	Act 129 Phase III Tentative Order	Pennsylvania
12/9/15	Presentation	Overview of See Action Resources	Connecticut
11/3/2015	Comments	2016-18 C&LM Plans	Connecticut
2/11/2015	Comments	2014 Integrated Resource Plan	Connecticut
11/9/2015	Comments	2016 Comprehensive Energy Plan	Vermont
7/24/2015	Comments	Preliminary Comprehensive Energy Plan	Vermont
1/30/2015	Joint Comments	EmPOWER Goals and Cost-Effectiveness	Maryland
8/31/2015	Comments	Grid Modernization Scoping	D.C.
5/29/2015	Letter of Support	Sierra Club Comments, 2015 CRA	New Jersey
3/26/2015	Comments	New England Clean Energy RFP	CT/RI/MA

FURTHER INFORMATION

Northeast Energy Efficiency Partnerships (NEEP) maintains and updates an abundance of news materials and policy and program information resources on our website, www.neep.org. You will find information on building energy codes and high performance buildings, appliance efficiency standards, regional work on market strategies to advance efficient lighting and other products, and more. We encourage you to subscribe to our newsletters, and contact us if we can be of assistance in any way. Please check out the following:

- The NEEP blog – **featuring news and insights from staff and guest authors.**
- Highlights, **our bi-monthly policy news and analysis e-newsletter.**
- The Efficiency Policy Snapshot – **focuses on New England investment and savings data.**
- **The electronic version of the *2016 Regional Roundup*, which includes full hyperlinks in text and appendices.**
- The Regional Evaluation, Measurement and Verification Forum, **which supports the development and use of common and/or consistent protocols to evaluate, measure, verify, and report the savings, costs, and emission impacts of energy efficiency.**

Resource from the U.S. Department of Energy

While there are a great number of online resources, we call to readers' attention the State and Local Solution Center on Energy.gov as well as the State and Local Energy Efficiency Network (SEE Action) for their guidance materials, case studies and more.

ABOUT OUR DATA: The Regional Energy Efficiency Database

In order to provide for a more "apples to apples" comparison, the *Roundup* draws on the Regional Energy Efficiency Database (REED), a project of NEEP's Regional Evaluation, Measurement, and Verification (EM&V) Forum, to provide for greater transparency and consistency in state energy efficiency program data. REED is the only regional resource to provide for transparent and consistent reporting of electric and natural gas energy efficiency program energy and demand savings and associated costs, avoided emissions, and job impacts, with the purpose of supporting state and regional energy and environmental policies.

REED is based on the EM&V Forum's Common Statewide Energy Efficiency Reporting Guidelines, which were adopted by the Forum Steering Committee in 2010. The Guidelines provide state-level reporting templates and process recommendations for improving the consistency of energy efficiency reporting across the region. REED includes program year 2011-2014 energy efficiency data from the following ten states: Connecticut, Delaware, District of Columbia, Maine, Maryland, Massachusetts, New Hampshire, New York, Rhode Island and Vermont. For states in our region not providing data to REED, we used 2014 data from state and utility annual reports and research by partner organizations.

For more information, please contact the authors of this report:

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