



Northeast Energy Efficiency Partnerships

Energy Efficiency Snapshot

*NEEP's Look at
Energy Efficiency by the Numbers*

Northeast & Mid-Atlantic States

Spring 2016

About NEEP



Mission

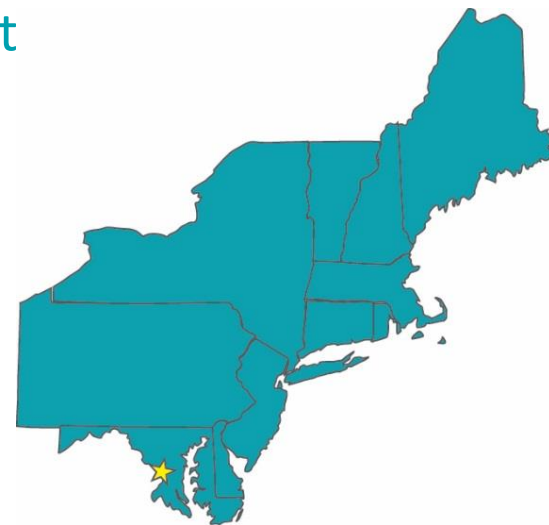
Accelerate energy efficiency as an essential part of demand-side solutions that enable a sustainable regional energy system

Approach

Overcome barriers and transform markets via *Collaboration, Education and Enterprise*

Vision

Region embraces **next generation energy efficiency** as a core strategy to meet energy needs in a carbon-constrained world



NEEP is one of six regional energy efficiency organizations (REEOs) funded by the U.S. Department of Energy (DOE) to provide states guidance on policies and programs.

NEEP's Seasonal Snapshot



An Overview

The Snapshot provides an overview of energy efficiency policy by the numbers in New England, New York, and the Mid-Atlantic regions. Updated twice annually, we include charts and tables on the following:

- Energy Efficiency as the Least Cost Energy Resource
- Energy Efficiency as an Economic Driver
- State Energy Efficiency Policies and Savings Goals
- Public Policies advancing Next Generation Energy Efficiency
- The Growing Focus on Peak Demand Reduction (Summer and Winter)
- Per Capita Energy Efficiency Expenditures
- Efficiency Savings as a Percent of Retail Sales (Gas and Electric)
- Cost of Saved Energy by State
- Energy Savings by Sector and Program Type
- Residential Lighting Assumptions
- Energy Efficiency and Avoided Emissions

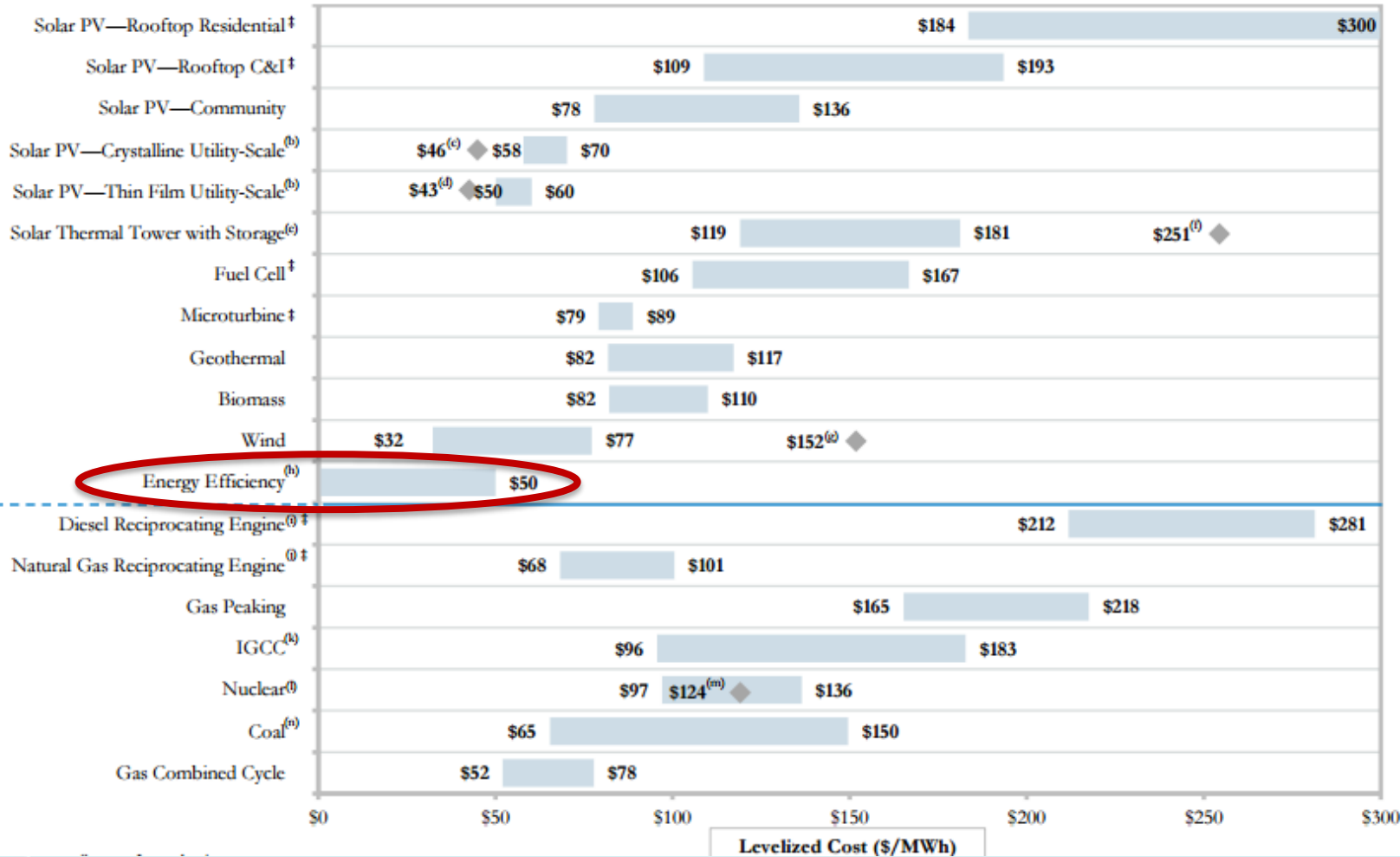
The figures in this presentation are compiled from the Regional Energy Efficiency Database (REED), program administrator plans, annual reports, U.S. EIA, and ACEEE.

Energy Efficiency: The Least-Cost Energy Resource



With a lifecycle cost of between \$0 and \$50/MWh, investments in energy efficiency are more cost-effective than investments in *any* conventional energy generation resource.

ALTERNATIVE ENERGY^(a)



CONVENTIONAL

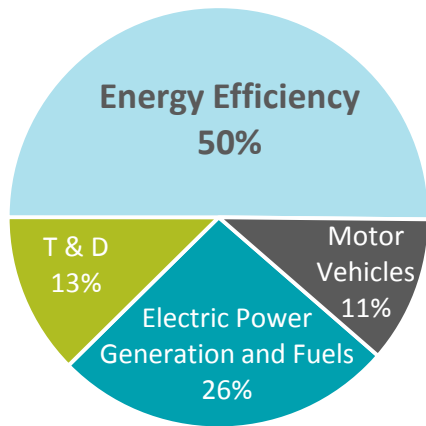
Energy Efficiency as an Economic Driver



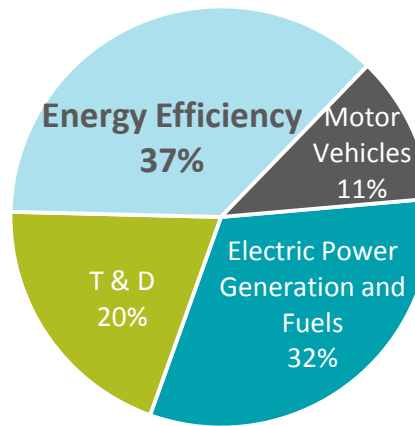
Job Creation and Economic Growth

In New England, **energy efficiency is responsible for 130,000 jobs, more than every other part of the energy industry combined.** In the Northeast and Mid-Atlantic as a whole, energy efficiency is responsible for more than 300,000 *direct* jobs.

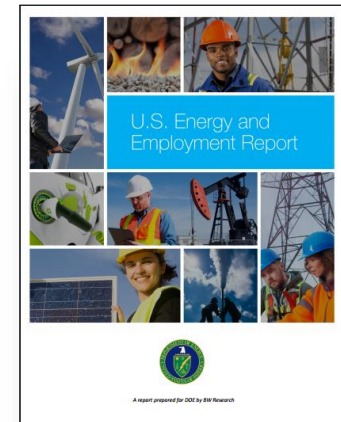
Source: U.S. Department of Energy
U.S. Energy and Employment Report
 (March 2016)



Energy Employment in New England



Energy Employment in the Mid-Atlantic



Region	Energy Efficiency	Electric Power Generation and Fuels	Electric Power and Fuels Transmission, Wholesale Trade and Distribution, and Storage (T&D)	Motor Vehicles
New England Jobs	129,977	67,971	32,146	29,123
Mid-Atlantic Jobs (Except Maryland, & D.C.)	163,319	141,221	88,266	50,388

Energy Efficiency Policies and Goals: New England States



STATE	POLICY TYPE	PROGRAM ADMINISTRATOR	ENERGY SAVINGS GOALS
Connecticut	<u>All Cost-Effective Energy Efficiency</u>	Electric & Gas Utilities <u>2016-18 Plan</u>	Electric: 1.5% retail sales Gas: 0.6% retail sales (forecasted retail sales)
Maine	<u>All Cost-Effective Energy Efficiency</u>	Efficiency Maine Trust <u>2017-19 Plan (proposed)</u> <u>Budgets and Metrics</u>	<u>Proceeding Pending</u>
Massachusetts	<u>All Cost-Effective Energy Efficiency</u>	Electric & Gas Utilities + CLC <u>2016-18 Plan</u> <u>Term Sheet</u>	Electric: 2.93% retail sales Gas: 1.24% retail sales (forecasted retail sales)
New Hampshire	<u>Program Funding Only</u>	Electric & Gas Utilities <u>PUC Staff proposal</u> <u>Utilities Proposal</u> <u>Advocates proposal</u>	<u>Proceeding pending</u>
Rhode Island	<u>All Cost-Effective Energy Efficiency</u>	Electric & Gas Utilities <u>2015-17 Plan</u>	Electric: 2.6% retail sales Gas: 1.1% retail sales (2012 retail sales)
Vermont	<u>All Cost-Effective Energy Efficiency</u>	Efficiency Vermont, BED, VGS <u>2015-17 Plan</u> <u>Demand Resource Proc.</u>	Electric: 2.1% retail sales Gas: 0.9% retail sales (forecasted retail sales)

Energy Efficiency Policies and Goals:

The Mid-Atlantic Region

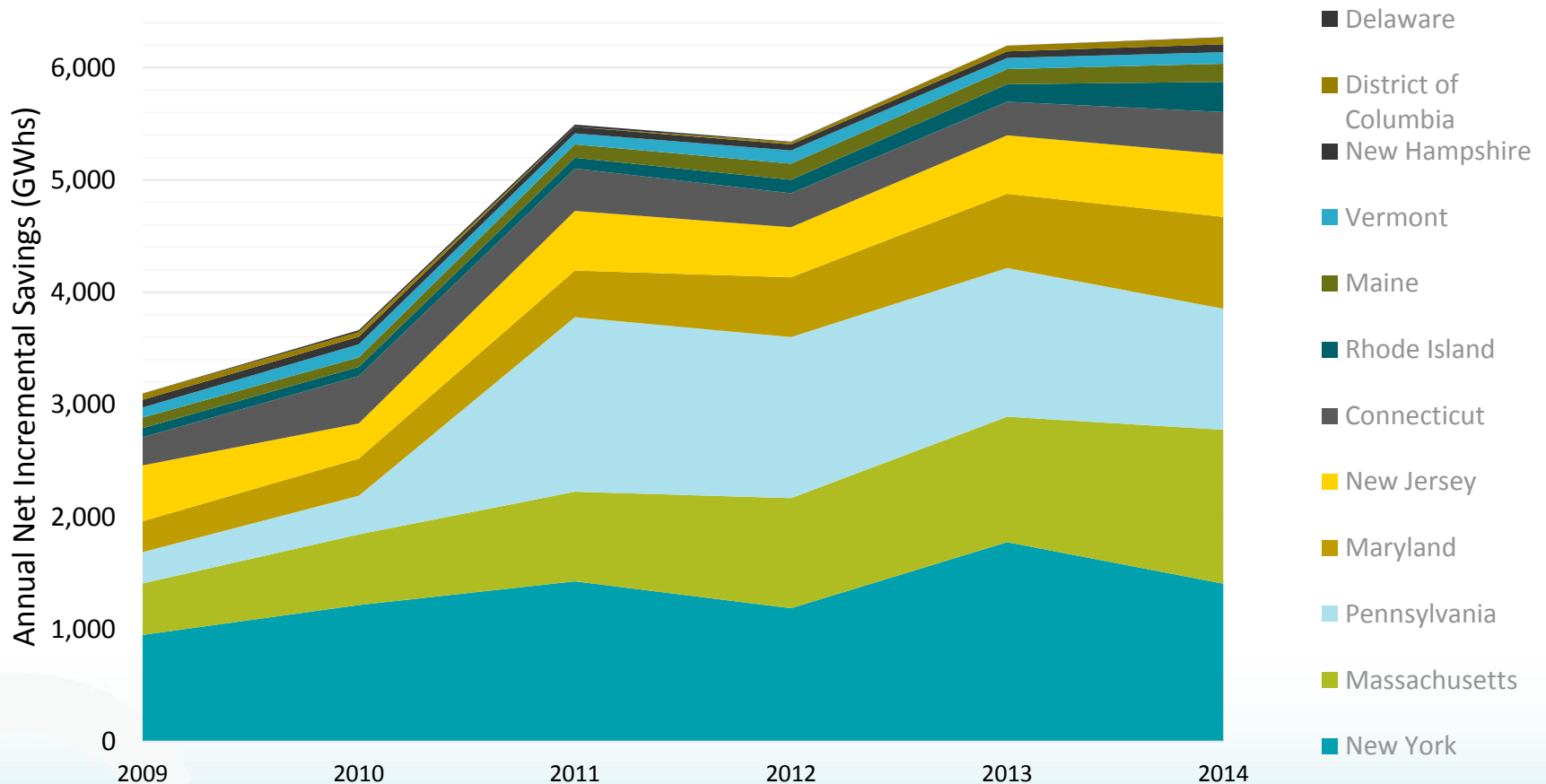


STATE	POLICY TYPE	PROGRAM ADMINISTRATOR	ENERGY SAVINGS GOALS
Delaware	<u>All Cost-Effective Energy Efficiency</u>	Utilities+ Sustainable Energy Utility	<u>Proposals Pending</u>
District of Columbia	<u>Efficiency Utility Goals</u>	Sustainable Energy Utility	Electric: 0.53% retail sales Gas: 0.44% retail sales (2014 retail sales)
Maryland	<u>Energy Efficiency Resource Standard</u>	Electric and Gas Utilities Order No. 87082 <u>Gas Working Group Targets</u>	Electric: 2.0% retail sales (<u>2020</u>) Gas: <u>Pending Proceeding</u> (2014 retail sales)
New Jersey	<u>Efficiency Funding</u>	NJCEP OCE+ Utilities Strategic Plan	<i>No mandated savings goals</i>
New York	<u>Energy Efficiency Portfolio Standard</u>	NYSERDA + Utilities <u>NYSERDA Clean Energy Fund</u> <u>Utility ETIPs</u>	Electric: 1.09% retail sales Plus PSEG-LI/NYPA: 1.51% total Gas: 0.35% retail sales (2014 retail sales)
Pennsylvania	<u>Energy Efficiency Resource Standard</u> <i>Funding Capped</i>	Electric Utilities <u>Act 129 Phase III</u>	Electric: 0.8% retail sales Gas: none (2013 retail sales)

Policies Provide Extensive Savings



Annual verified electric savings have more than doubled in recent years, moving from ~3,100 GWh in 2009 to ~6,300 GWh in 2014. This is a direct result of regulatory policies and executive leadership in states supporting energy efficiency as a first order resource.



Sources: 2013-14 data is drawn from EIA form 861. 2011-12 data is drawn from NEEP's [REED Database](#) and ACEEE Scorecard/program administrator reports (D.C. Del., NJ. Pa.). 2009-10 data is drawn from ACEEE scorecards.

Advancements in Public Policy:

Next Generation Energy Efficiency



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.	States exploring use as customer engagement tool
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

See [NEEP's 2016 Regional Roundup](#) for more information.

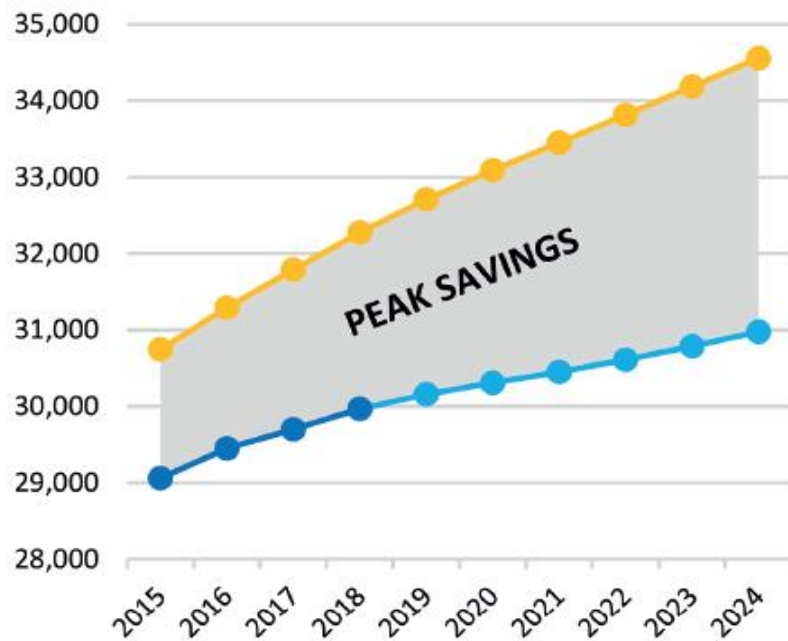
The Growing Focus on Peak Demand:

A Look at ISO-NE

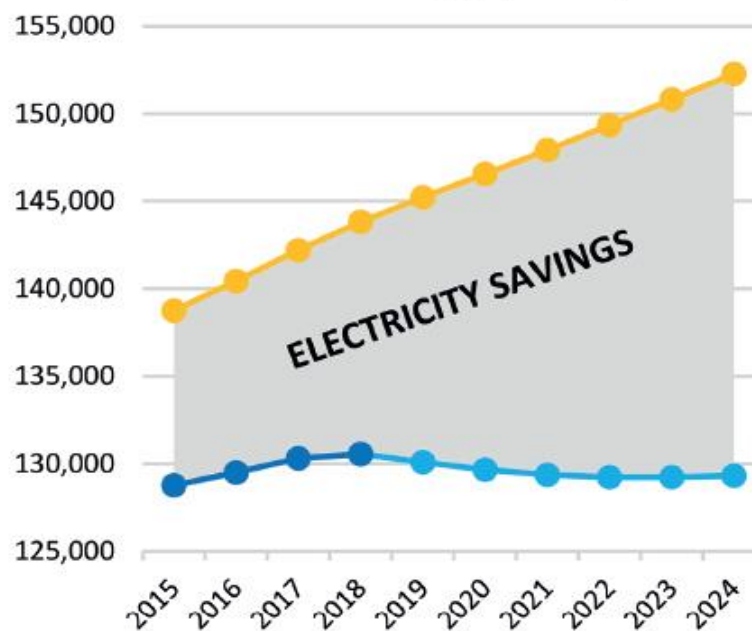


In ISO-NE, investment in energy efficiency will decrease overall load growth, but peak demand continues to grow spreading MW costs over fewer MWhs.

Summer Peak (MW)



Annual Energy (GWh)



The gross forecast of peak demand and energy use

The forecast minus the impact of EE participating in the Forward Capacity Market (FCM) to date

The forecast minus anticipated EE growth beyond FCM years

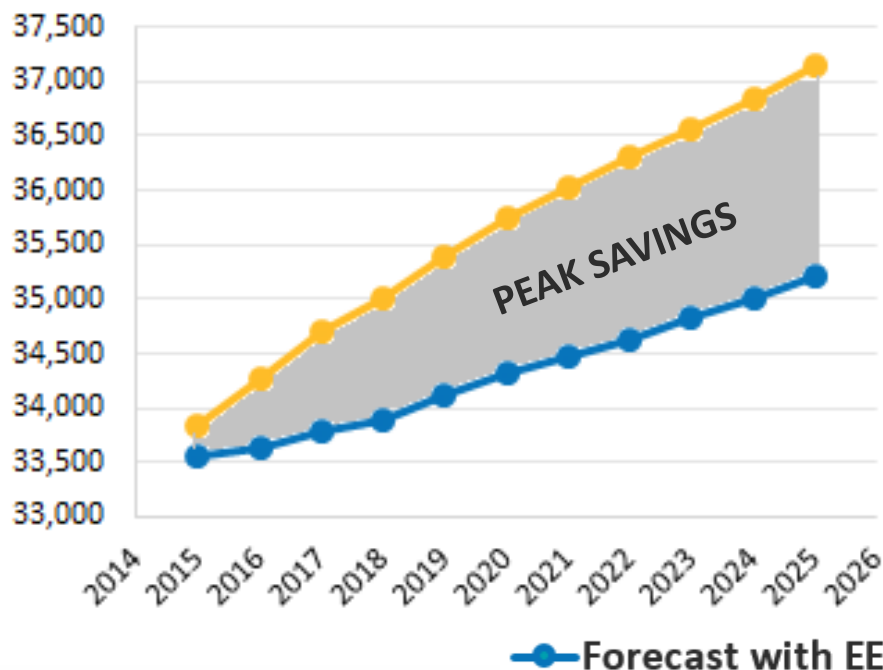
Forward looking program administrators are targeting system peaks on a temporal and locational basis through focus on peak coincident energy efficiency measures, demand response, and geo-targeting.

The Growing Focus on Peak Demand: A Look at NY-ISO

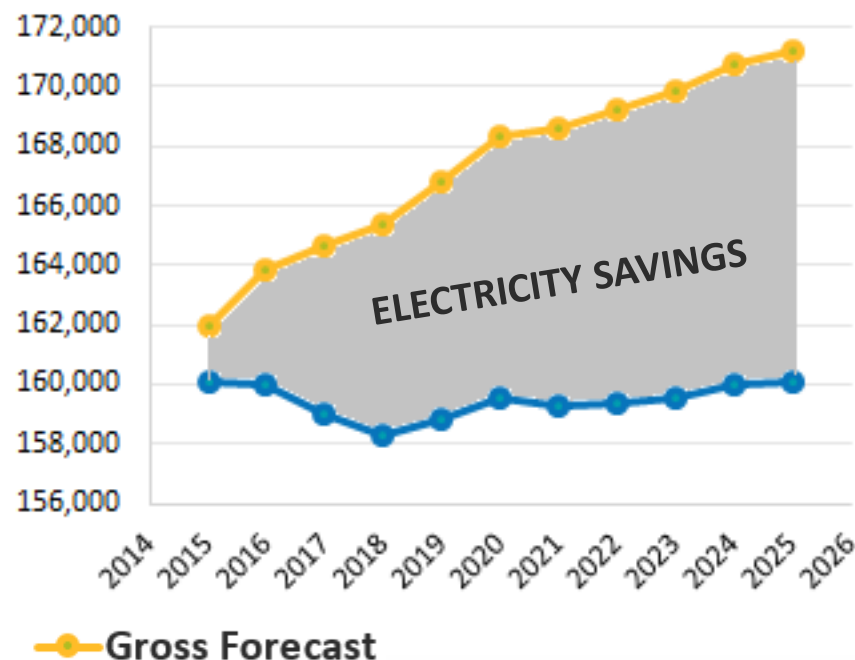


The same is true for NY-ISO, where investment in energy efficiency will decrease overall load growth, yet peak demand continues to grow.

Summer Peak (MW)



Annual Energy (GWh)



A key focus of the New York Public Service Commission’s “Reforming the Energy Vision” proceeding is peak MW reductions, playing a pivotal part in discussions on dynamic load management and utility business models.

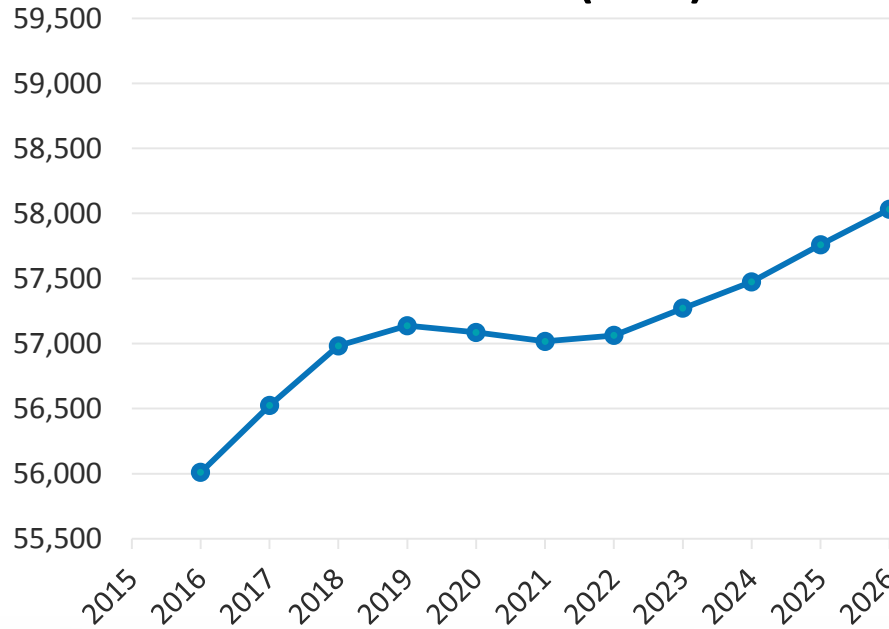
The Growing Focus on Peak Demand:

A Look at PJM (Mid-Atlantic)

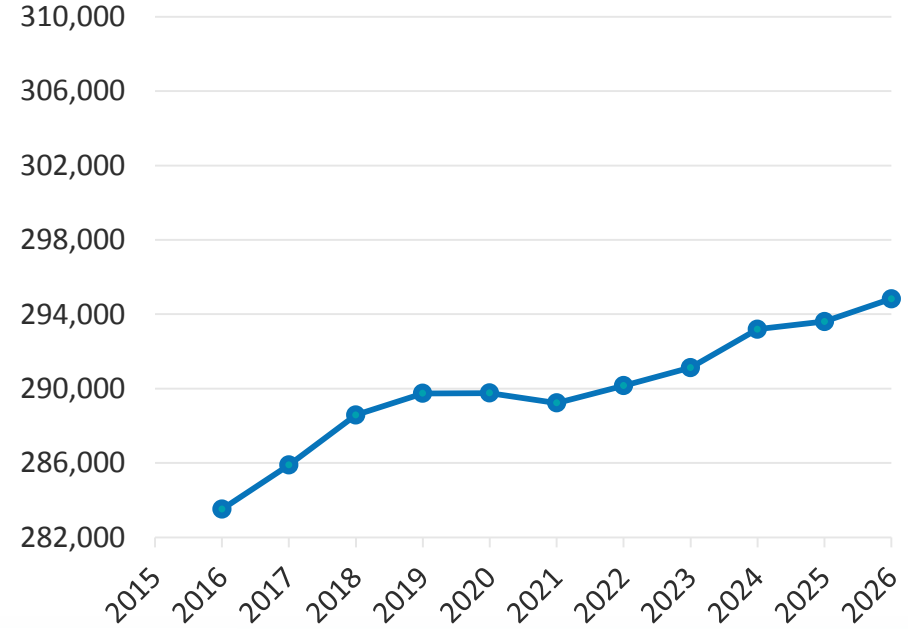


PJM began accounting for state level investments in energy efficiency in their long-term plan for the first time in January 2016. However, their plan does not include estimates of system needs before accounting for energy efficiency.

Summer Peak (MW)



Annual Energy (GWh)



—●— Forecast with EE

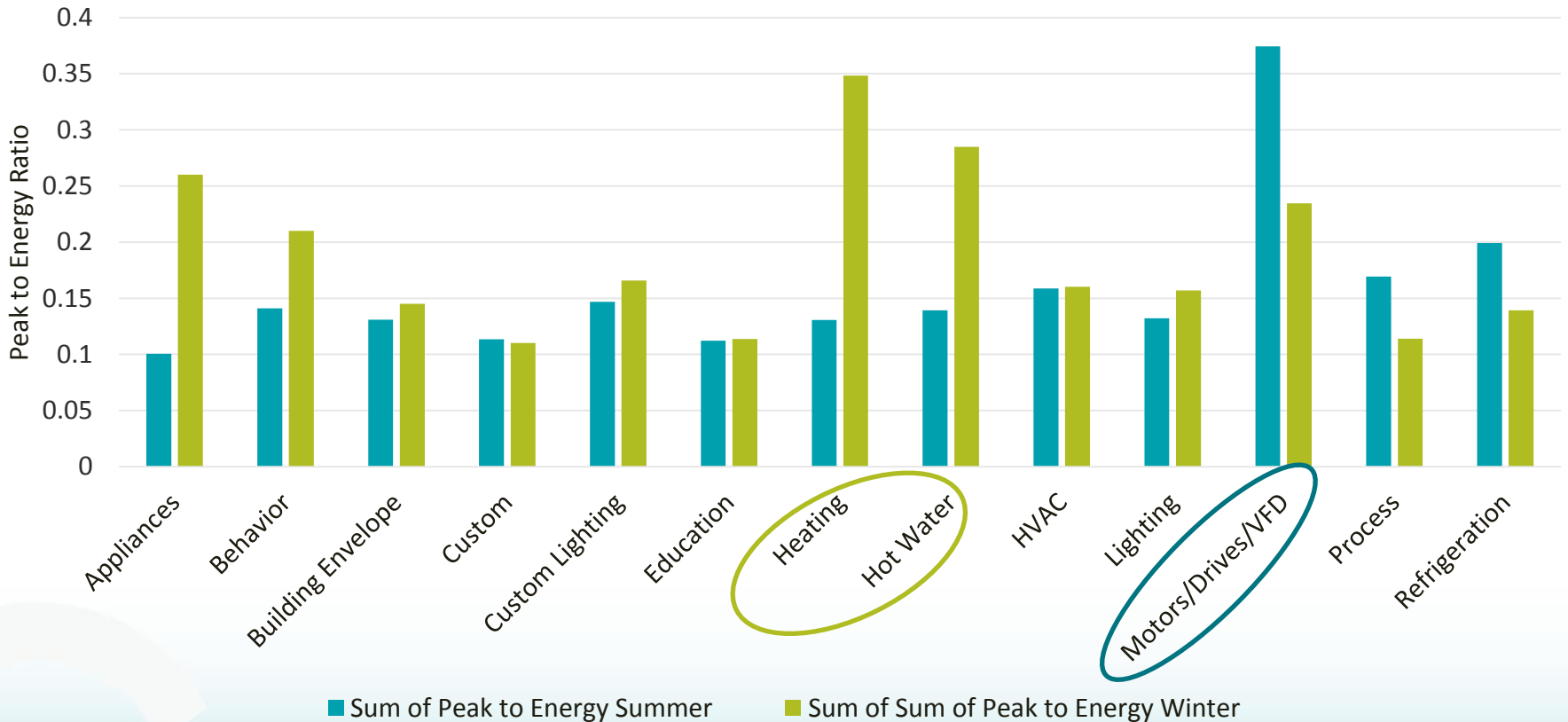
Relative to the ISO-NE and NY-ISO, the level of investment on a per capita basis in the Mid-Atlantic states is insufficient to flatten load growth.

Peak to Energy Ratio, by Measure



ISO-NE Summer and Winter Peak

Among the energy efficiency measures currently accounted for in ISO-NE's Energy Efficiency Forecast, heating, hot water, and appliances have the greatest coincidence with winter peak. Motors/Drives/VFDs have the greatest coincidence with summer peak.



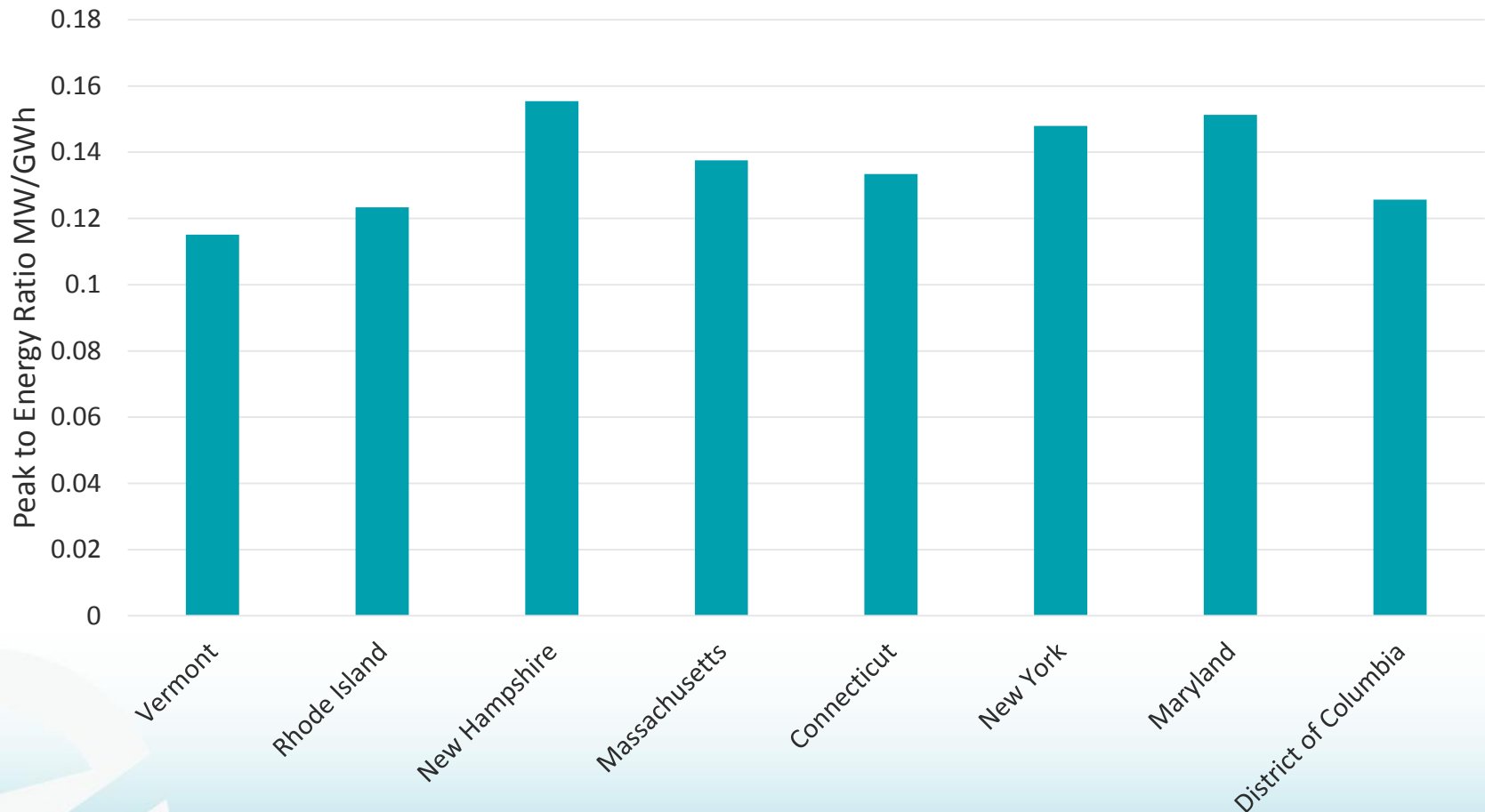
Source: NEEP [REED Database](#), ISO-NE [Energy Efficiency Forecast](#)

Peak to Energy Ratio by State



A Look at the Leading States

While the region as a whole has enjoyed success at reducing peak demand, there are a few distinct leaders: New Hampshire, Maryland, and New York. These states have achieved a peak to energy ratio higher than .14 MW/GWh.

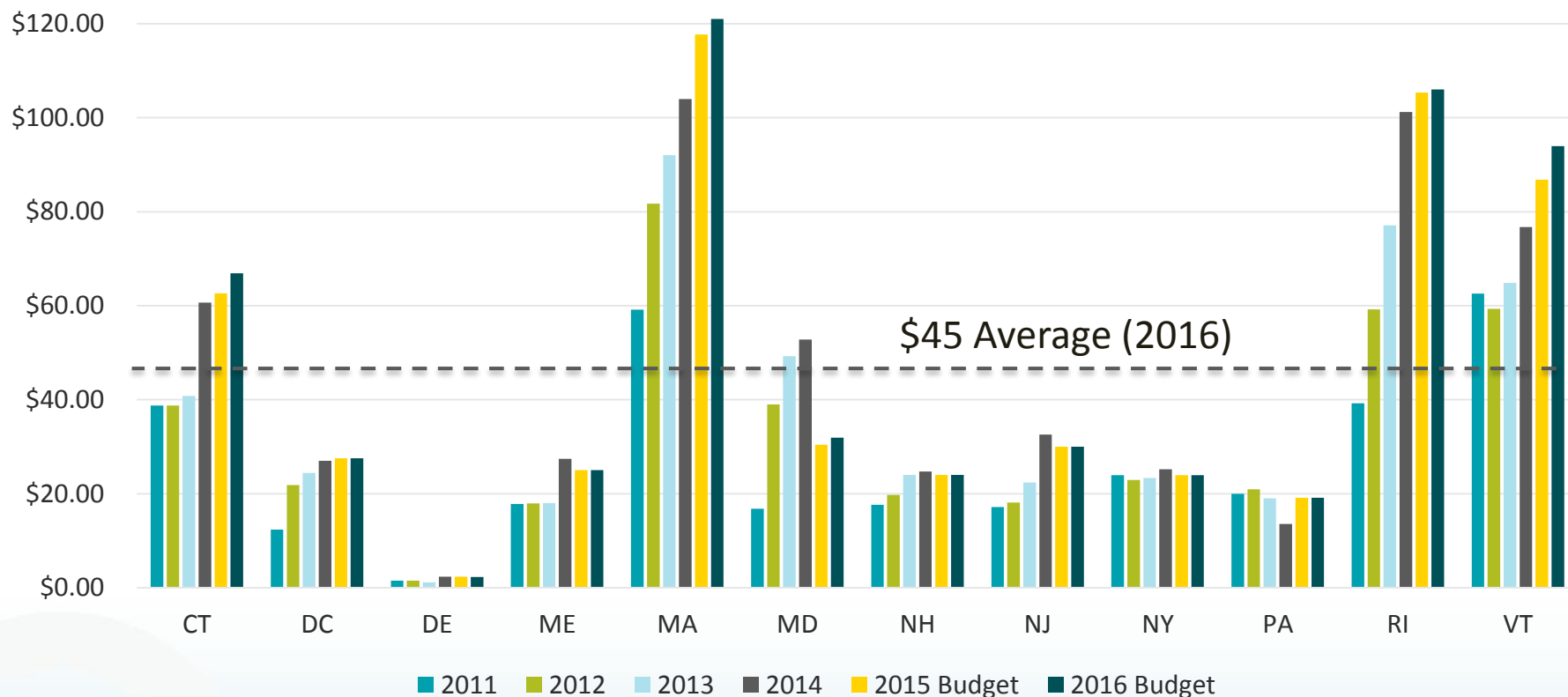


Per Capita Energy Efficiency Investments

Electric and Natural Gas Programs Combined



Efficiency investments are increasing across New England and the Mid-Atlantic. In 2016, combined efficiency program investments will average approximately \$45 per capita.



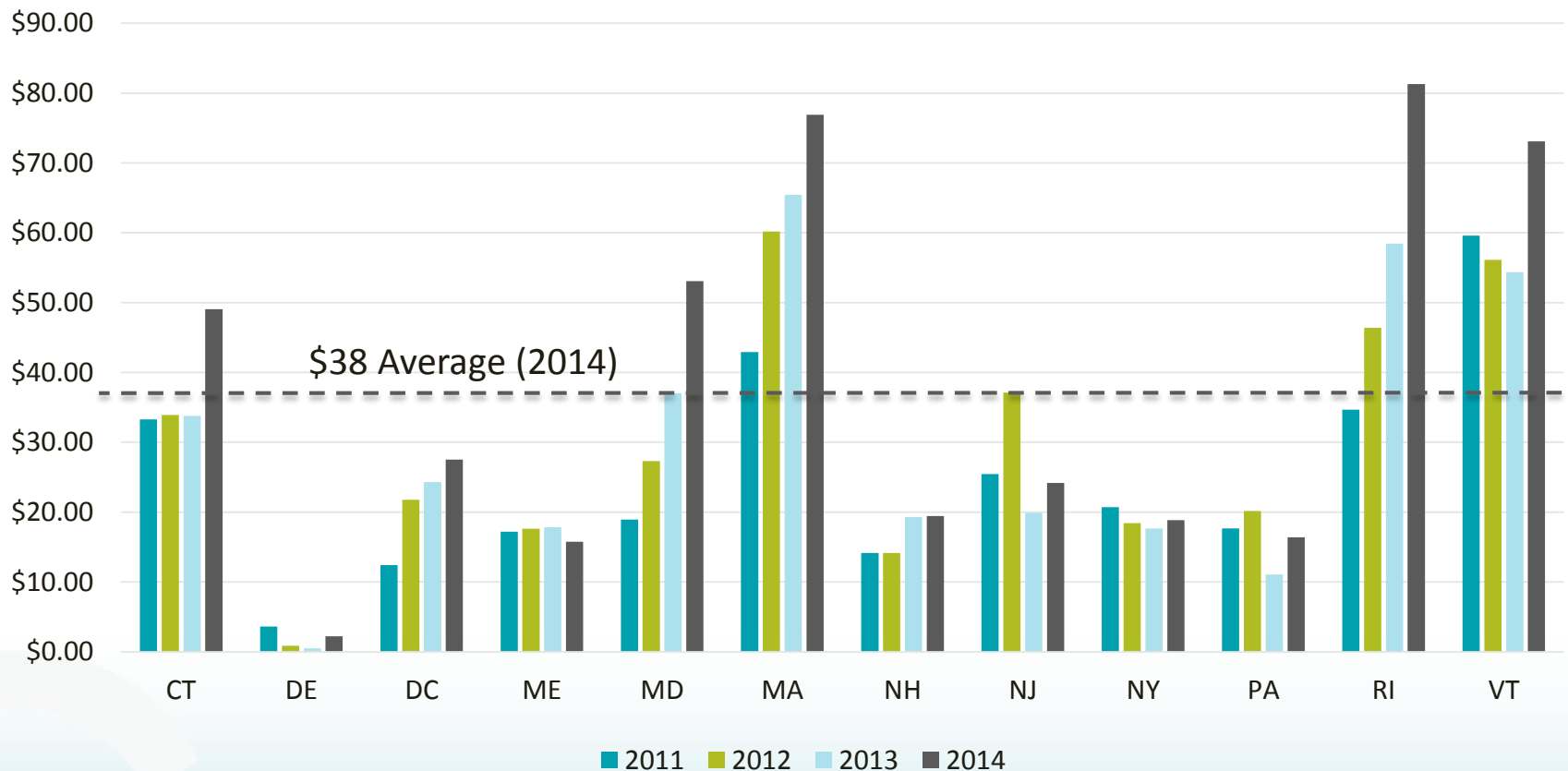
Source: 2011-14 data is drawn from NEEP's [REED Database](#) with the exception of DC, DE, NJ, and PA, which are drawn from ACEEE Scorecard. 2015-16 data is drawn from energy efficiency program plans in each state. For further information on which program administrators are included in REED, please see the [REED Footnotes](#) website.

Per Capita Investment

Electric Programs, 2011-14



The overwhelming majority of per capita energy efficiency investments in our region are directed toward electric programs, largely because avoided costs for electricity are higher than they are for natural gas.



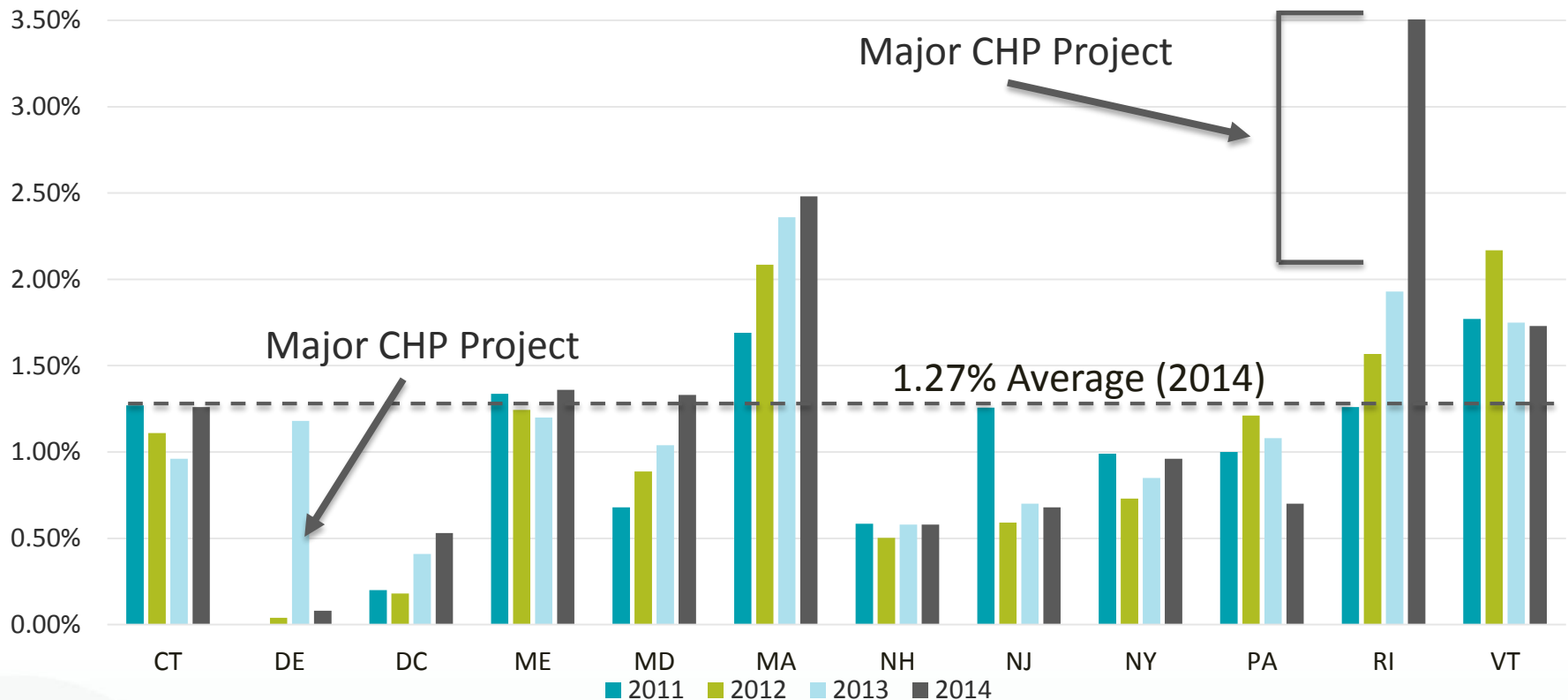
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Savings as Percent of Retail Sales



Electric Programs, 2011-14

Thanks to policy leadership, efficiency serves a growing portion of electricity demand, with leading states achieving savings of **more than two percent of annual electric sales**.



Many states, including Rhode Island and Delaware, are embracing Combined Heat and Power (CHP) as a cost-effective means of delivering savings and encouraging large customer participation in programs.

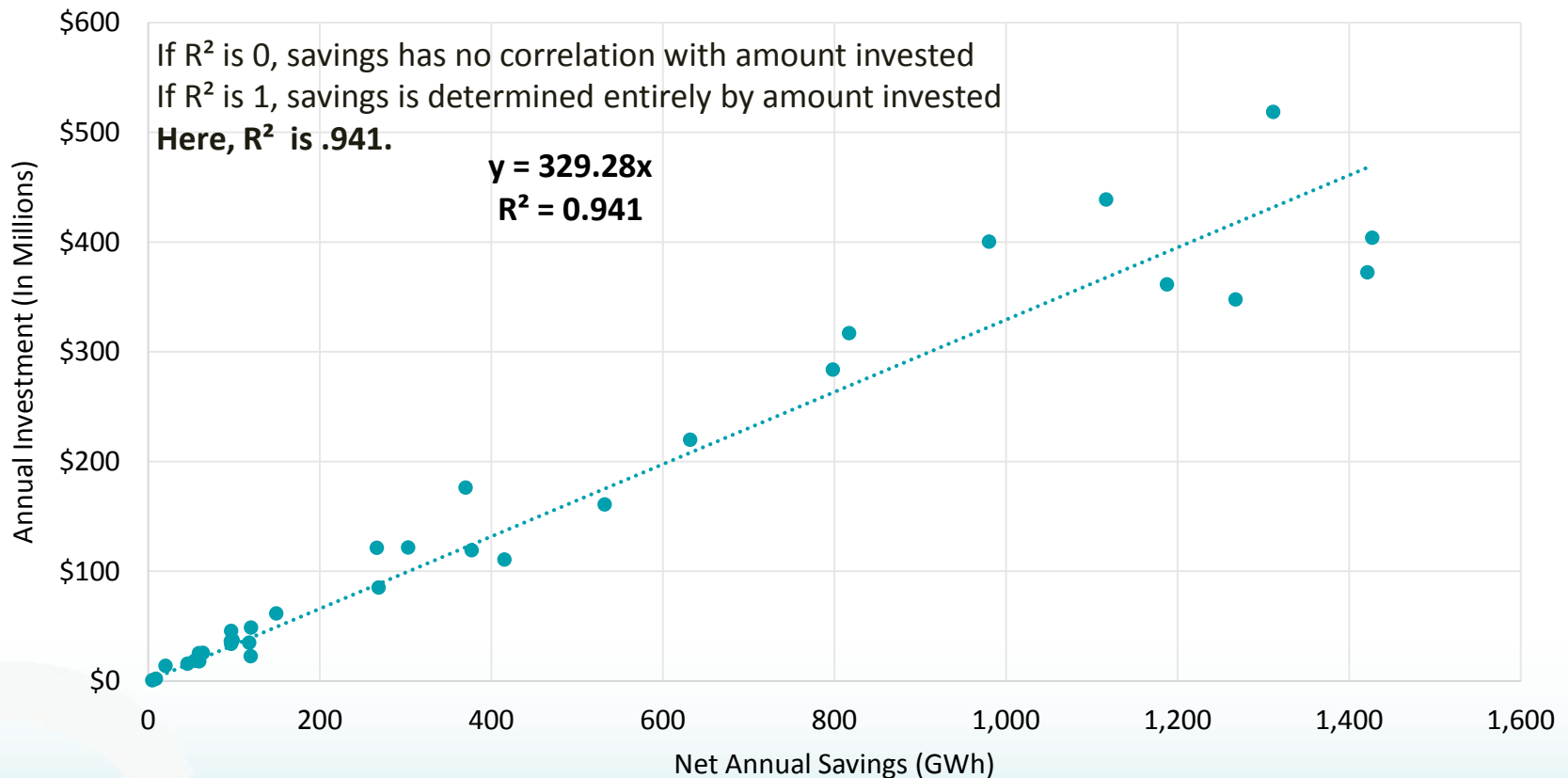
Source: 2011-14 data is drawn from NEEP's [REED Database](#) with the exception of DC, DE, NJ, and PA, which are drawn from ACEEE 's Scorecard. For further information on which program administrators are included in REED, please see the [REED Footnotes](#) website.

Investments Drive Savings



A Look at Electric Programs, 2011-14

The graph below uses savings and investment figures from states within the REED database to examine the relationship between electric efficiency program investment and annual program savings. ***The more a state invests, the more it saves.***

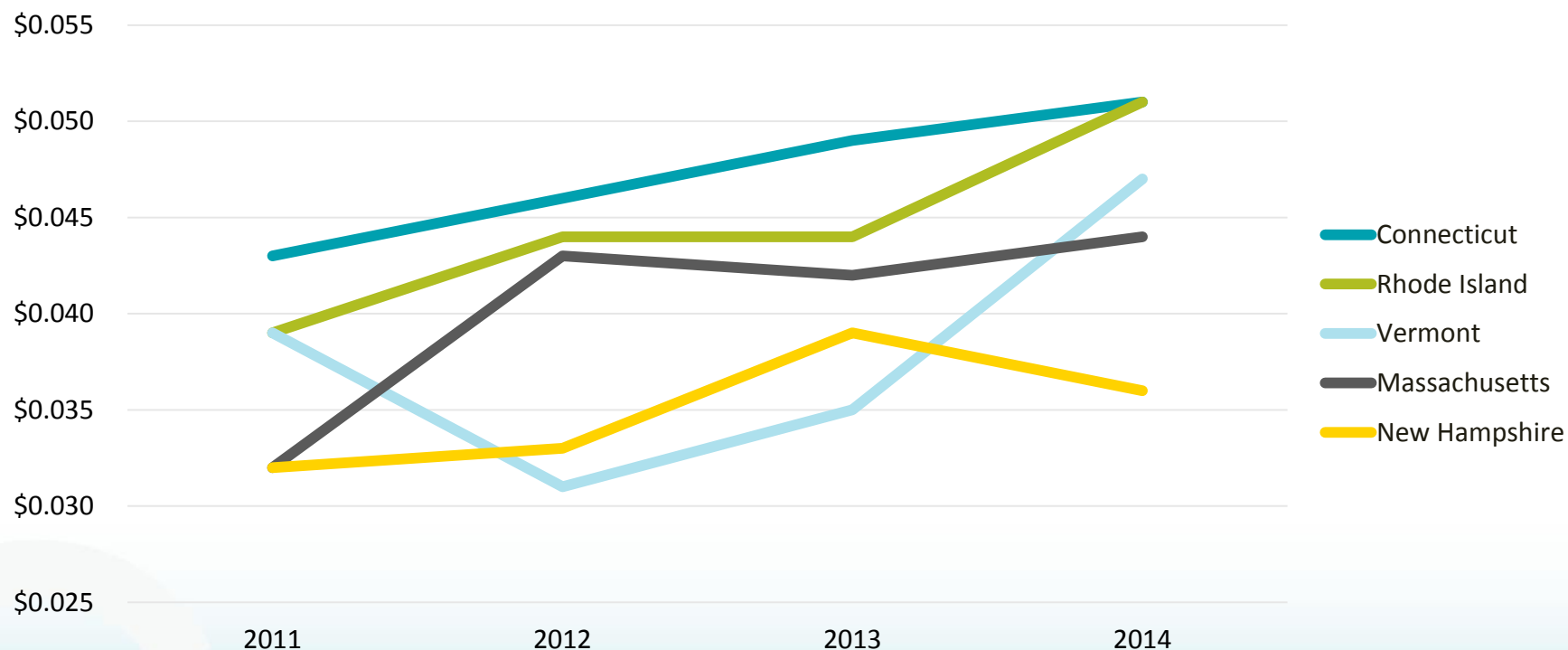


Source: NEEP [REED Database](#). For further information, see the NEEP REED [footnotes](#) page.
Graph includes savings and spending data from CT, MD, MA, NH, NY, RI, and VT.

Levelized Cost of Saved Electricity: *LCOE per kwh, New England States*



While the costs of saved energy may vary according to state-specific factors such as program scale, maturity, and depth, one thing remains constant: **the cost of saved energy is a fraction of cost of retail electricity, which is more than \$0.14**. The LCOE figures in this graph are based on a consistent discount rate across states, derived from the long-term U.S. treasury bond.



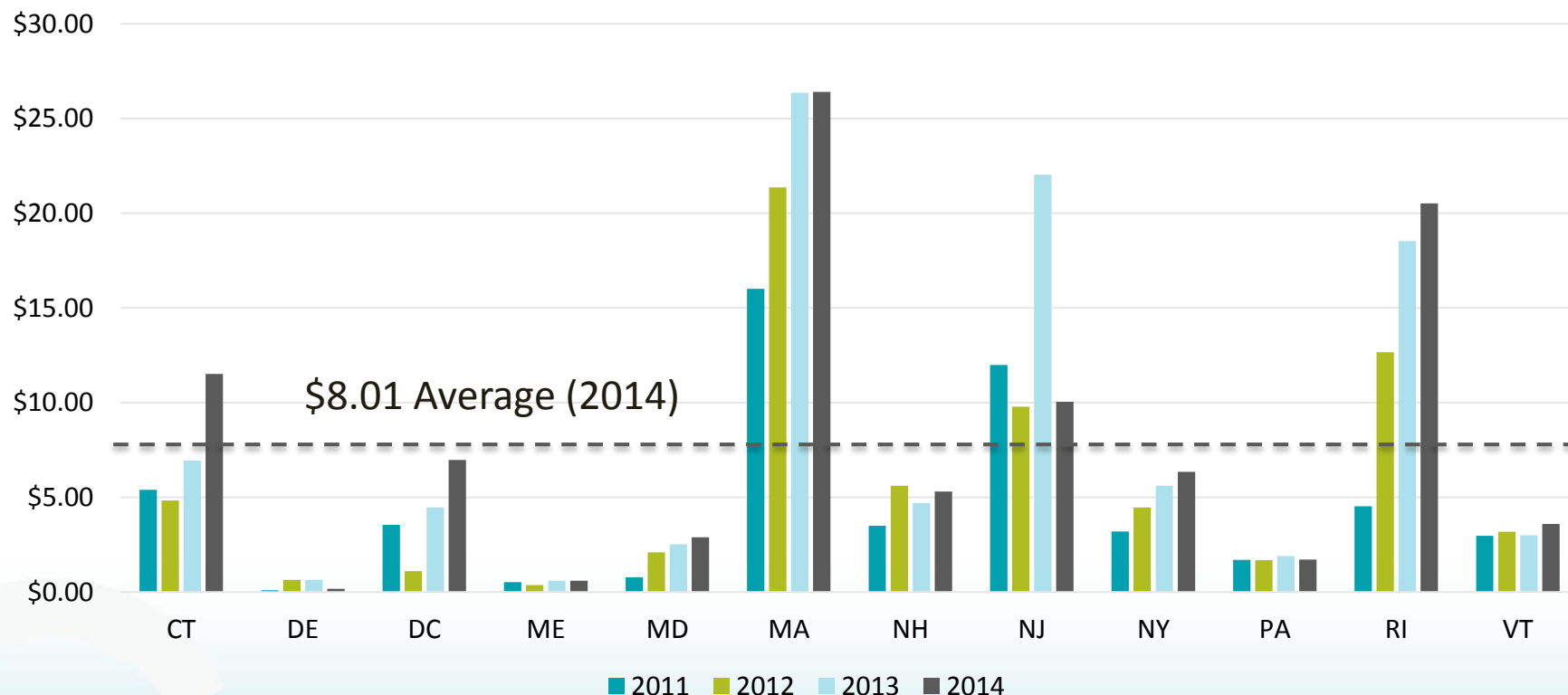
Source: NEEP [REED Database](#). For further information, see the NEEP REED [footnotes](#) page.

Per Capita Investment

Natural Gas Programs, 2011-14



On a simple per capita basis, investments in gas efficiency programs in the region are generally less extensive than investments in electric efficiency, but this may have to do with several states in our region that lack a statewide gas distribution level infrastructure.



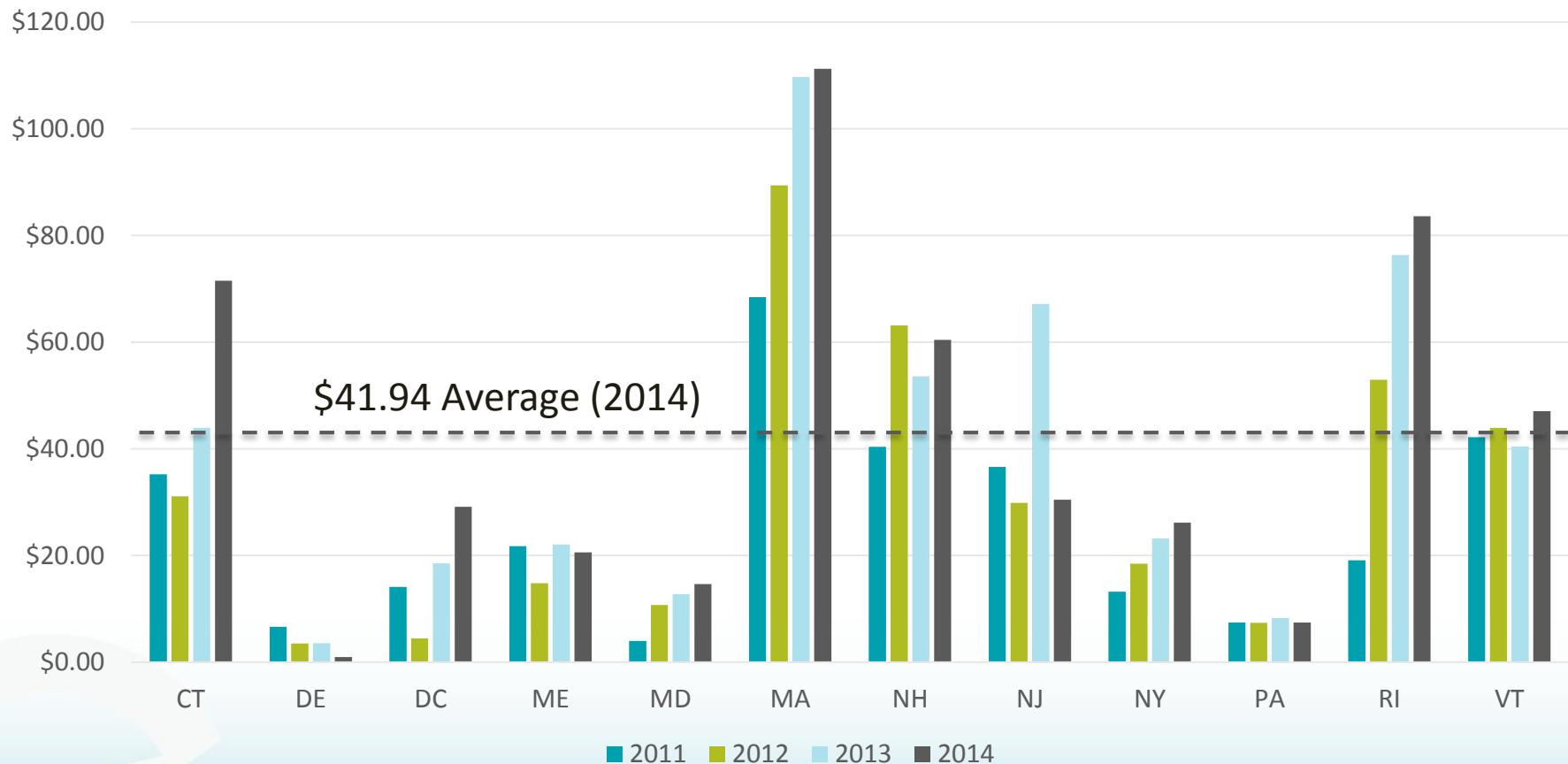
Source: 2011-14 data is drawn from NEEP's [REED Database](#) with the exception of DC, DE, NJ, and PA, which are drawn from ACEEE's Scorecard. For further information on which program administrators are included in REED, please see the [REED Footnotes](#) website.

Per Capita Natural Gas Investments



Dollars per Residential and Commercial Customer

Looking at investments per residential and commercial customer, rather than population, provides a more accurate comparison of gas savings and investment for rural states like Vermont, New Hampshire and Connecticut, which lack statewide delivery infrastructure.



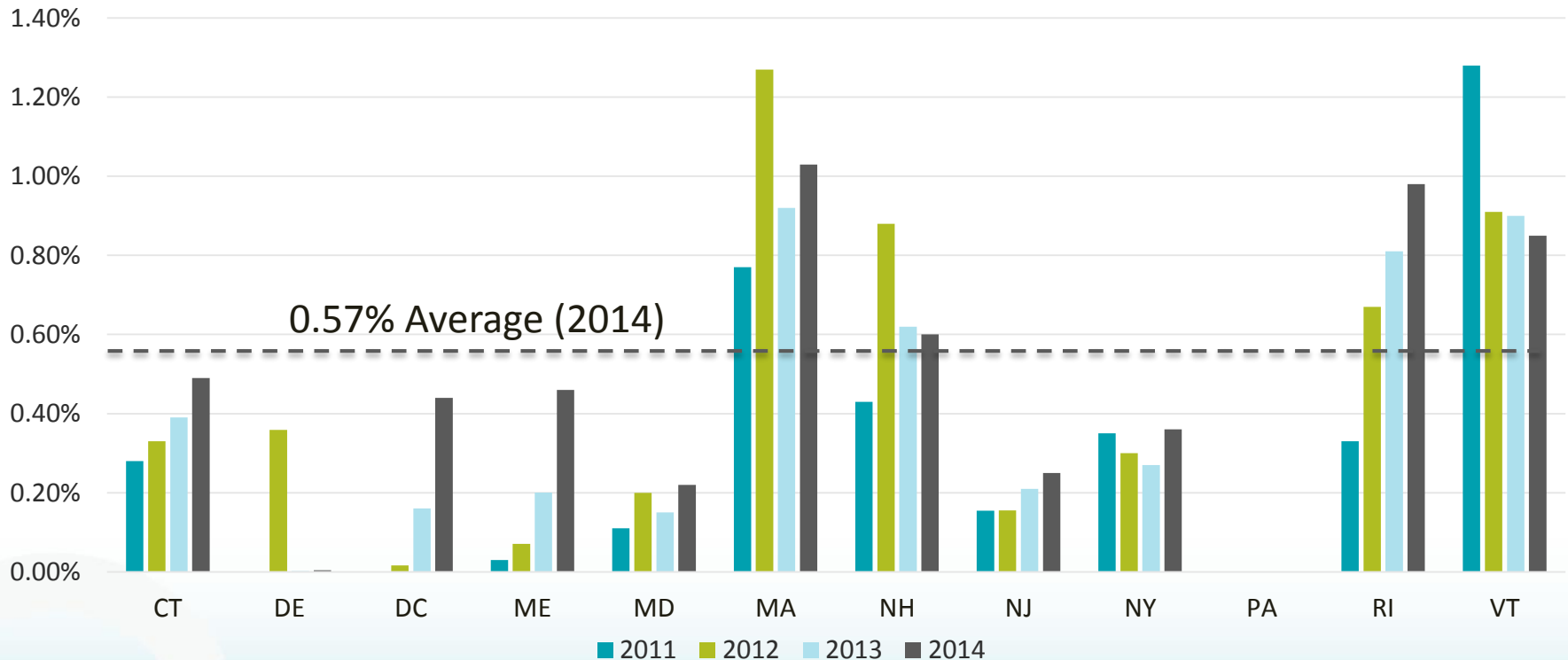
Source: 2011-14 data is drawn from NEEP's [REED Database](#) with the exception of DC, DE, NJ, and PA, which are drawn from ACEEE's Scorecard. For further information on which program administrators are included in REED, please see the [REED Footnotes](#) website.

Savings as a Percent of Retail Sales



Natural Gas Programs, 2011-14

While natural gas programs are more modest than their electric counterparts, leading states aim to achieve savings of about one percent of retail sales, with the region saving on average ~0.65 percent of retail sales. Pennsylvania remains the *only* state in the region state doesn't claim savings from comprehensive gas efficiency programs.



Source: 2011-14 data is drawn from NEEP's REED Database with the exception of DC, DE, NJ, and PA, which are drawn from ACEEE's Scorecard. For further information on which program administrators are included in REED, please see the REED Footnotes website.

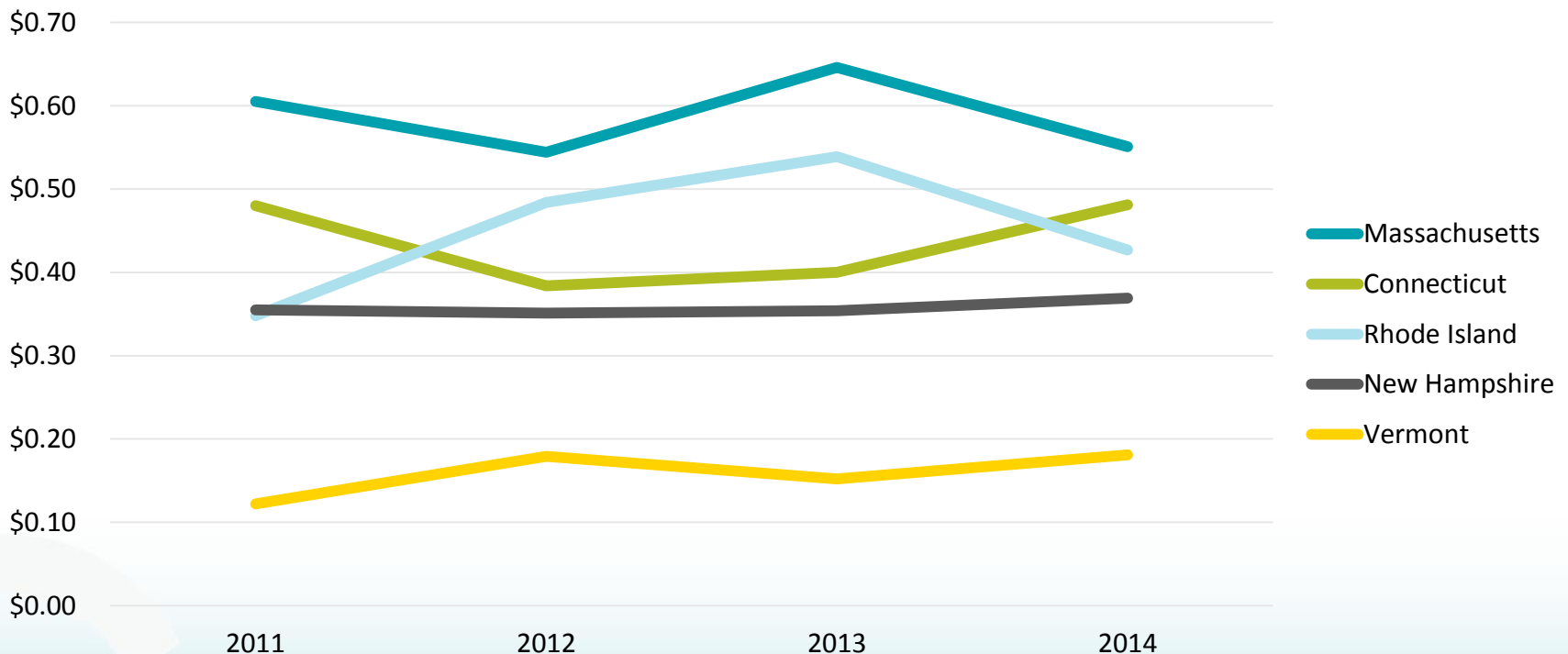
*While Pennsylvania doesn't claim savings for programs run by any regulated program administrator, the Department of Environmental Protection does in fact fund gas efficiency incentives for consumers.

Levelized Cost of Saved Natural Gas

LCOE Per Therm, New England States



While conventional wisdom holds that the cost of saved energy should be rising as programs mature, program administrators in Massachusetts and Rhode Island have been able to push the levelized cost of energy per therm downward. The downward trend from 2013 to 2014 may correlate with a recent expansion in program scale. In all cases, **the cost of energy savings is far less than the cost of retail natural gas, which is more than \$1/therm.**



Source: NEEP [REED Database](#). For further information, see the NEEP REED [footnotes](#) page.

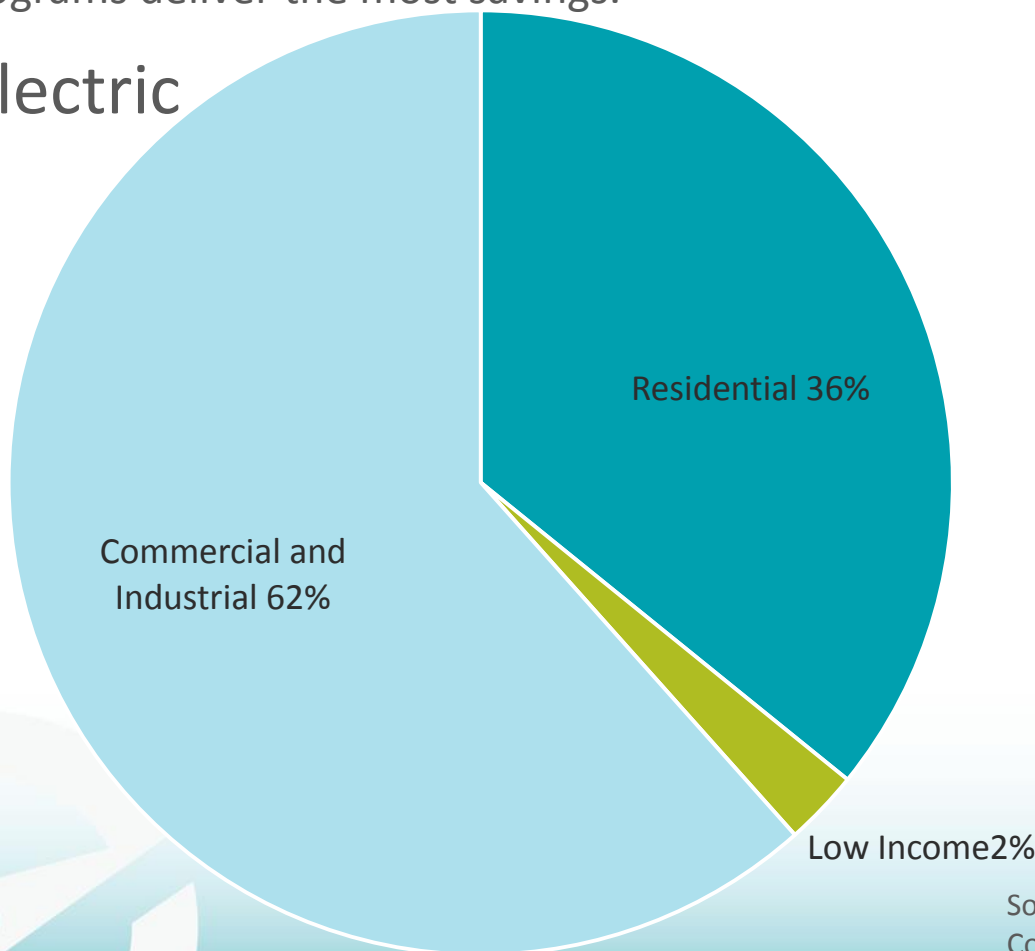
Energy Savings by Sector



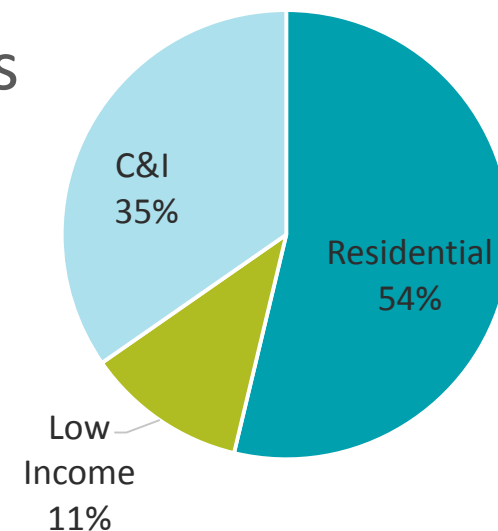
Natural Gas and Electric, 2014

In the states reporting to REED, electric programs budgets are about four times as big as for natural gas, with more mature programs doing more with gas. Electric programs derive the majority of their savings from the commercial sector, while for gas programs, residential programs deliver the most savings.

Electric



Gas



REED States 2014 Expenditures

Electric	\$1.5 Billion
Gas	\$376 Million

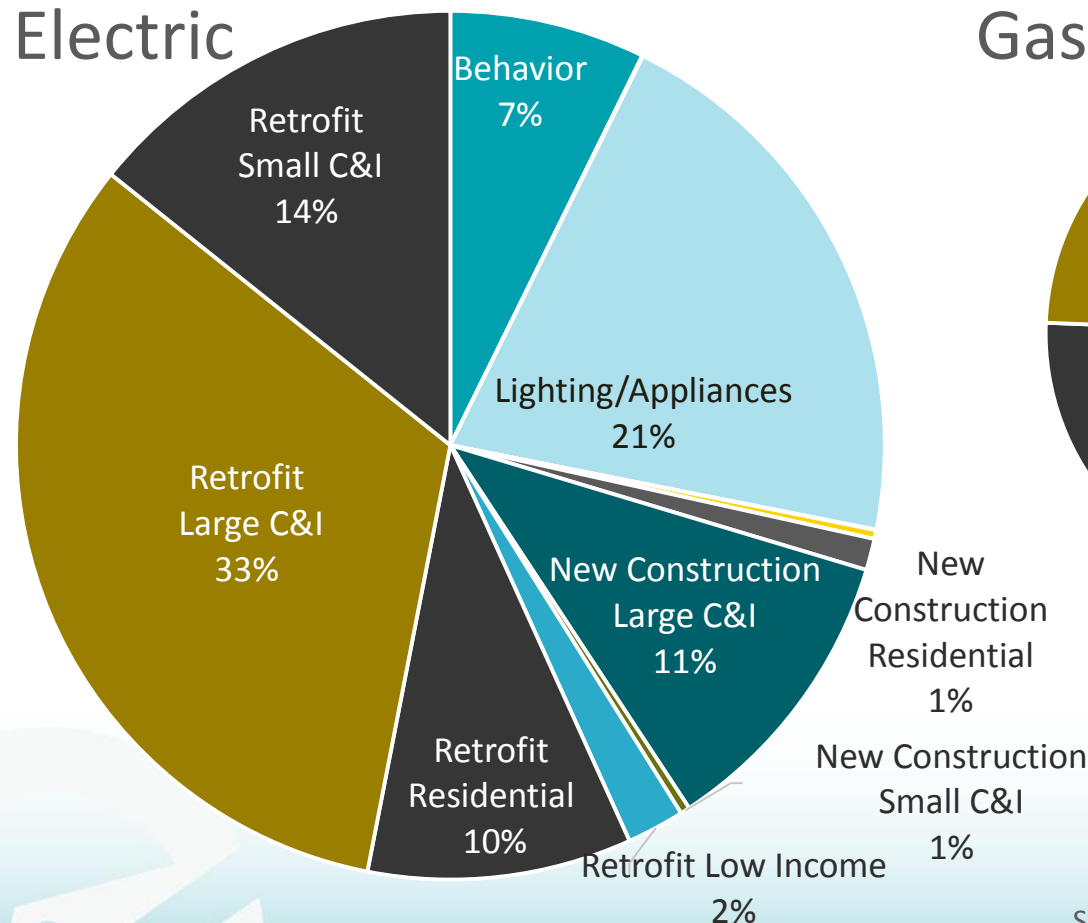
Savings by Program Type



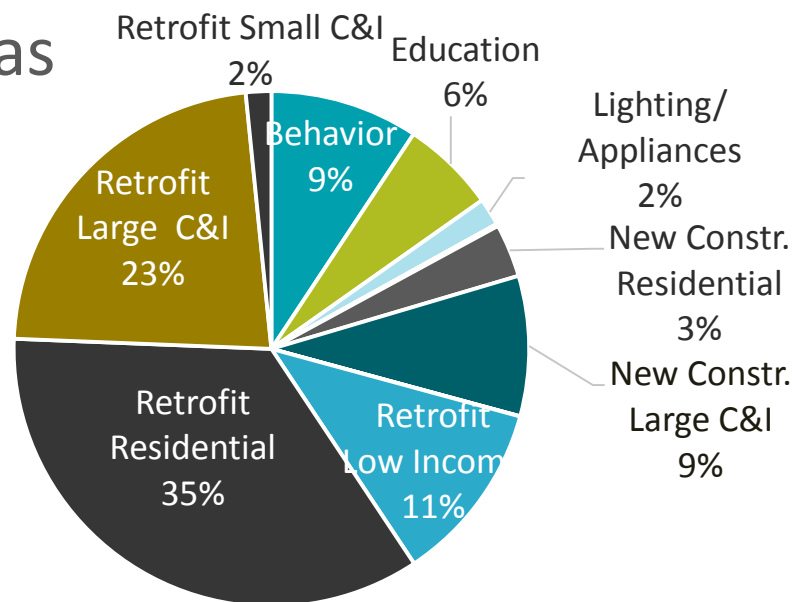
Natural Gas and Electric, 2014

Electric programs mine the majority of their savings from lighting, appliances, and large commercial and industrial retrofits, while natural gas programs focus greater attention on low income and residential retrofit programs.

Electric



Gas



Residential Lighting Programs



Insights from NEEP's Residential Lighting Deep Dive

Lighting is the single largest source of savings for residential electric energy efficiency programs. Seeking to better inform program design, NEEP published The State of Our Sockets, analyzing the residential lighting market, followed up by a Residential Lighting Deep Dive, detailing program assumptions to better understand differences in cost of saved energy for residential lighting.

A major takeaway: program savings assumption inputs vary widely, as seen below in the case of assumed measure lives. This significantly effects how cost-effectiveness is calculated, and therefore impacts program design.

Table 9: Measure Life Values by State for Retail Residential Lighting Programs

	CT	DC	MA	MD	NH	NY	RI	VT
Standard CFL Bulb	4	EUL reduced each year until 2020	EUL reduced each year until 2020	EUL reduced each year until 2020	5	Coupon - 5 Markdown - 7	4	EUL reduced each year until 2020
Standard LED Bulb	10	< 15W = 15 >=15W = 15	10	20	20	TRM does not specify an EUL for LEDs	8	< 10W = 15 >=10W = 15
Decorative LED Bulb	10	<15W = 15 15<=W<25 = 10.5 >=25W = 10.5	19 (EISA exempt)	16.7	20	TRM does not specify an EUL for LEDs	17	<15W = 15 15<=W<25 = 12.5 >=25W = 12.5
Directional LED Bulb	10	<20W = 15 >=20W = 15	19 (EISA exempt)	20	20	TRM does not specify an EUL for LEDs	17	<20W = 15 >=20W = 15

Identifying Trends in Regional Data

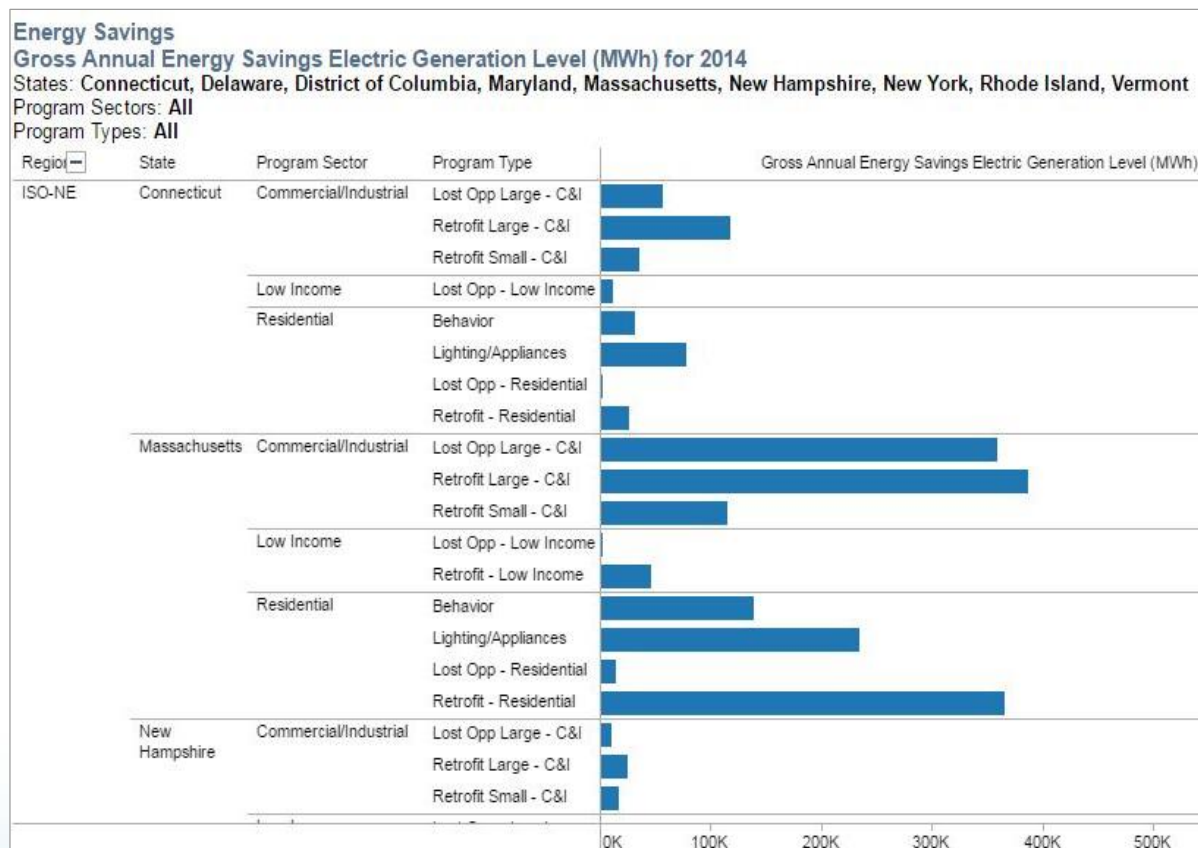


The Regional Energy Efficiency Database (REED)

Data collected by NEEP includes program years 2011 through 2014 for these participating jurisdictions: Conn., D.C., Del., Mass., Md., N.H., N.Y., R.I. and Vt.

REED features:

- Annual & Lifetime Savings
- Peak Demand Savings
- Avoided Air Emissions
- Program Expenditures
- Job Creation Impacts
- Cost of Saved Energy
- Program Funding Sources
- Supporting Information



Learn more at reed.neep.org

Energy Efficiency and Avoided Emissions

Insights for Clean Power Plan and NAAQS Compliance



In 2014, energy efficiency programs significantly reduced emissions of CO₂, NO_x, and SO₂, aiding states in compliance with the air quality goals, including recently promulgated changes to National Ambient Air Quality Standards (NAAQS).

The CO₂ emissions reductions are equivalent to the annual emissions from:



More than 530,000 passenger vehicles.



More than 347,000 homes.

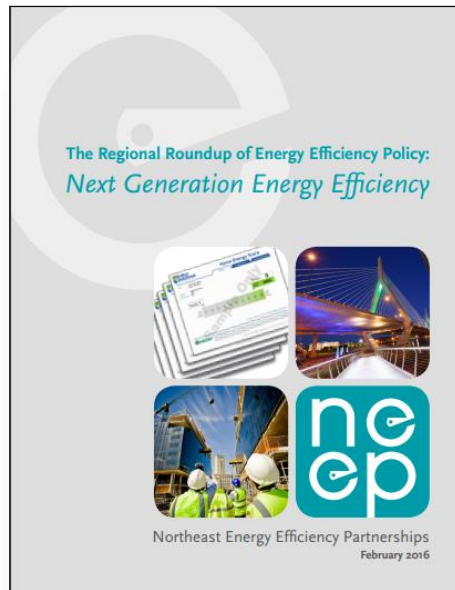
	Avoided CO ₂ (tons)	Avoided NO _x (tons)	Avoided SO ₂ (tons)
Connecticut	131,492	69	40
Delaware	5,188	4	10
District of Columbia	34,593	28	69
Maine	58,650	31	35,546
Maryland	660,908	537	1,324
Massachusetts	603,947	316	183
New Hampshire	25,009	13	8
New York	517,229	612	728
New Jersey	277,434	185	555
Pennsylvania	564,612	459	1,131
Rhode Island	119,981	63	36
Vermont	38,357	20	12
Total	3,037,400	2,337	39,643

More from NEEP

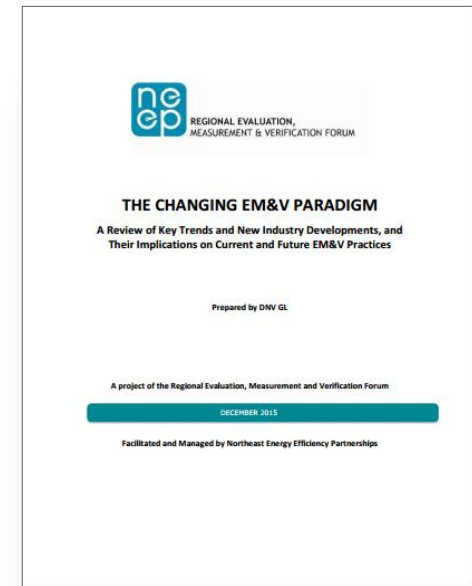
A Sample of reports at NEEP.org/Resources



2016 Regional Roundup of Energy Efficiency Policy



The Changing EM&V Paradigm



Opportunities for HEMS to Advance Residential Energy Efficiency Programs

Please visit [NEEP's blog](http://NEEP.org/blog) for the latest news and insights.

Questions?



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