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Year-to-Date Performance – Q2 2018

2018 marks the third year of the three-year Plan. In the second quarter of 2018, electric PAs are at 33% of lifetime savings for 2018, 42% of annual savings, and 36% of total benefits, and have spent 33% of the budget. Gas PAs are at 36% of lifetime savings for 2018, 42% of annual savings, and 40% of total benefits, and have spent 43% of the budget.

On a three-year basis, electric PAs have already achieved 81% of lifetime savings. Similarly, gas PAs have achieved 79% of lifetime savings from 2016 through Q2 2018.

Figure 1. Electric YTD Lifetime Savings

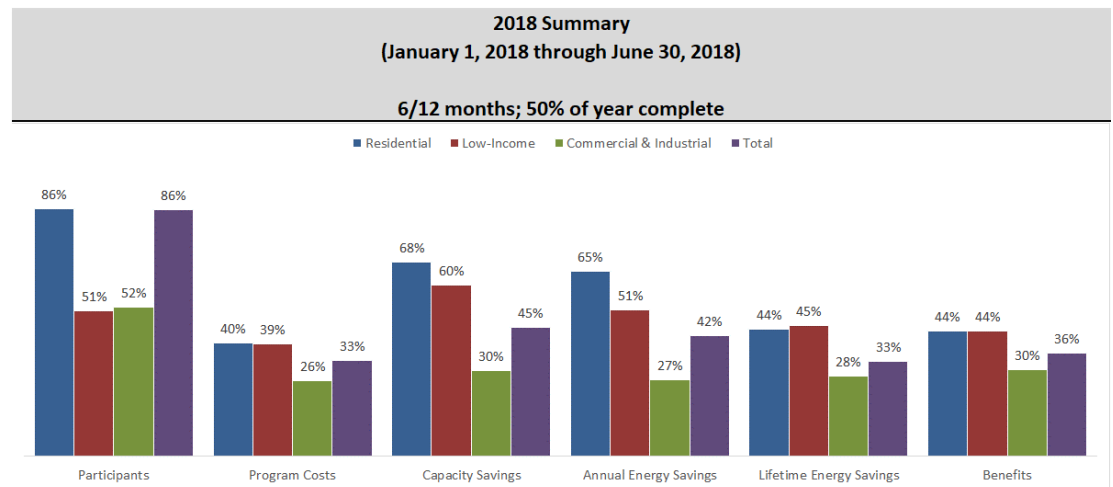
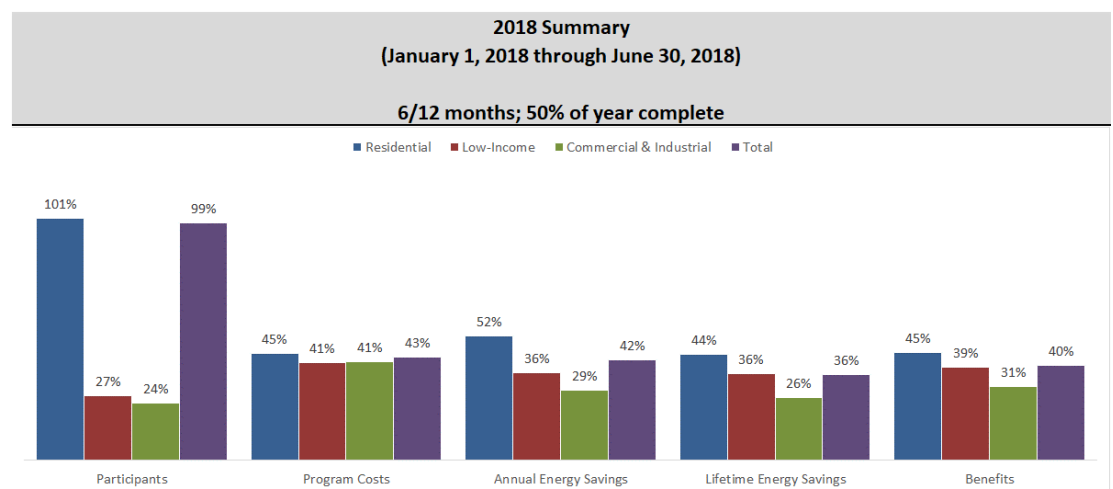


Figure 2. Gas YTD Lifetime Savings





Energy Efficiency Quarterly Report of the Program Administrators

Second Quarter 2018
August 24, 2018

Important Links:

[2016-2018 Plan](#)

[Oct. 26, 2015 Council
Resolution](#)

[Mass Save Data](#)

[Mass Save](#)

2018 Council Priorities

Priority 1: Continue to aggressively pursue 2016-2018 Plan goals—along with new initiatives and strategies—through the last year of the Plan.

The PAs strive to meet or exceed their savings and benefits goals while remaining cost-effective and sensitive to customer bill impacts. PAs are on track to meet savings goals for the 2016-2018 term. In this quarter, PAs conducted special promotional activities, analyzed results from the renovations and additions demonstration, updated C&I Upstream Offerings, and added new measures and technologies. Please see the graphs above for lifetime electric and gas savings results, and program sections for information on program delivery strategies.

Priority 2: Integrate the Council’s recommendations for the 2019-2021 Plan into the Plan to the Council’s satisfaction.

The PAs share many overall goals with the Council and sought to integrate many of the Council’s recommendations into the 2019-2021 Plan. The PAs submitted their [Three-Year Plan on April 30th](#), which addresses many priority topics of the Council. The PAs also formally addressed the Council’s recommendations in a detailed [narrative response](#) and cross-reference roadmap to the recommendations, the PA response, and the Plan.

Priority 3: Deliver requests for mid-term modifications (MTMs) to the 2016-2018 Plan to the Council with adequate time for review.

Several PAs submitted MTM requests during the second quarter of the year. These requests were provided five weeks in advance of the Council meeting in accordance with the Council’s request.

Priority 4: Provide the Council with a roadmap by May 16, 2018 which will describe their strategy and timeline for addressing the transformation of the lighting market.

The Residential Management Committee performed significant research and review into the transformation of the lighting market. The Program Administrators submitted a [lighting roadmap](#) to the Council on May 15, 2018 that describes the PAs’ strategy for addressing the transformation of the lighting market.

Priority 5: Identify opportunities to advance an integrated approach to demand-side management which includes active demand management and integration of distributed resources.

The PAs have done extensive research and preparation to design demand reduction programs for 2019-2021. The PAs presented a statewide program in the April Plan, and have continued to refine the program and will add additional details to the program descriptions going forward. The PAs also continue to implement and review current demand demonstration offerings.

Gas & Electric Program Highlights

Residential & Low-Income Sectors

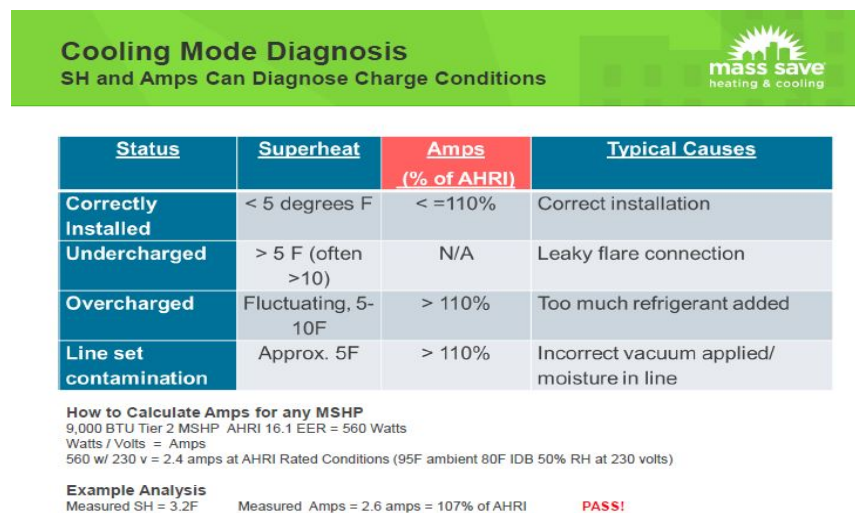
◆ Topic: Mini-Split Check Training

Summary: More than 400 contractors have participated in the Program Administrator’s (“PAs”) new Mini-Split (“MS”) Check training.

Context: Monitoring of installations have shown significant under- or overcharging in mini-split systems, especially those with multiple indoor heads. The PAs’ Airflow and Charge (“AC”) Check measure has been successful in improving central air conditioning and central heat pump systems, and many of the AC Check-trained contractors have been able to transfer those techniques for mini-splits, as shown by the fact that installations by AC Check-trained contractors had fewer charging issues. However, until now the PAs have not offered training specific to mini-splits.

Decision: The PAs have worked with CLEAResult to develop a MS Check measure, along with the applicable training. In the first three months that the training was offered, more than 400 contractors have participated in MS Check training. While much of the training focuses on the MS Check measure that the PAs will be claiming savings for, it also offers the opportunity to discuss common installation issues, cold-climate mini-splits, and customer education.

Figure 3. Cooling Mode Diagnosis Chart



Next Steps: The PAs will monitor MS Check measure submissions over the summer, as well as contractor feedback, to continue to enhance and improve the offer as needed.

◆ Topic: Refrigerator/Freezer Recycling Promotion

Summary: The PAs' limited-time refrigerator and freezer recycling promotion has been very successful.

Context: As the PAs have seen with other promotions, such as Black Friday, customers respond well to additional incentives that are available for a limited time. Last year, the PAs also held a refrigerator and freezer recycling promotion during the summer months, which is historically a slower period for this measure, and saw a significant increase, with volumes more than 600% of the slowest months in some cases.

Decision: The PAs offered an additional \$50 incentive from May 14 to July 31, bringing the total incentive to \$100 per refrigerator or freezer. This promotion was advertised on social media, through email newsletters, and on MassSave.com. A sweepstakes was even held, in partnership with a refrigerator manufacturer, to draw attention to the promotion. The response from customers was so significant that the recycling vendor had to add additional trucks to its routes and offer additional pick-up times.

Next Steps: The PAs will continue to monitor opportunities to increase participation with limited-time promotions.

Figure 4. Refrigerator/Freezer Recycling Promotional Material



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◆ Topic: Residential New Construction Renovations & Additions Demonstration Results

Summary: The PAs have been testing a new offer to take advantage of energy efficiency opportunities made possible during home renovations and additions. Results from the first 17 test projects have been positive, and the PAs expect to expand the demonstration into a full program offer in the 2019-2021 Plan.

Context: In 2017, the PAs began a renovations and additions demonstration under the Residential New Construction initiative. The demonstration was inspired by customer demand and built on concepts originally tested in 2010-2013. The goal of the demonstration was to incentivize customers to go beyond building code and/or the Massachusetts User Defined Reference Home (UDRH) during home renovations and additions. The PAs estimated the market potential for resulting energy efficiency opportunities to be substantial based on a 2016 National Association of Home Builders survey that found that the renovations and additions industry was trending up and that more than a third of Massachusetts homeowners were planning some kind of renovation in the coming year. The demonstration was designed to leverage the existing infrastructure of the Residential New Construction Initiative, including its recently redesigned incentive structure (a pay for savings model that rewards customers for every unit of energy savings modeled into their design), existing builder, contractor, and third-party verifier (rater) relationships, as well as the initiative's modeling tools and lead vendor expertise.

Decision: Results from the first 17 projects were positive and resulted in lessons learned, responding to questions such as:

- What are the most cost-effective energy efficiency opportunities typically available during renovations and additions;
- What does the renovations and additions market look like in Massachusetts, including confirmation of the average size and type of renovations and additions typically undertaken;
- What is the best time in a project to incorporate energy efficient design;
- How to best communicate and upsell energy efficiency to all project stakeholders;
- When to inspect the installation of proposed energy savings;
- How to integrate retrofit measure installation on parts of the home that are not undergoing the renovation/addition; and
- What are the typical financing needs for customers undertaking a renovation and/or addition?



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Table 1. Residential New Construction Renovations & Additions Demonstration Results

Town	Project Type	Reno sq/ft	Add sq/ft	Total Home Sq/ft	Incentive	kWh	Therms
Arlington	Reno Add		917	1628	\$1,110.25	25	169
Billerica	Reno, Addition	1872	2341	4213	\$2,913.35	221	596
Chelmsford	Reno, Addition	998	1356	2356	\$2,020.70	62	370
Concord	Reno (house)	4545		4545	\$2,038.00	3765	43
Hyannis	Reno, Addition	974	364	1348	\$2,948.03	5216	70
Medway	Addition		1032	1032	\$1,284.78	1523	40
Melrose	Reno	500		2000	\$706.10	76	117
North Andover	Reno	320		2000	\$545.30	8	95
Orleans	Reno	544		544	\$1,970.34	2531	30
Provincetown	Reno	366	0	366	\$1,590.56	360	0
Provincetown	Reno	370	0	370	\$1,754.71	3518	0
S. Dennis	Addition	1830	520	2350	\$560.44	198	70
Sandwich	Reno	1636	0	1636	\$2,166.95	71	440
Swansea	Reno Add		700	1578	\$652.00	10	91
Waltham	Reno	750		1500	\$1,081.10	86	146
Wellfleet	Addition		752		\$1,053.40	1532	0
Weymouth	Reno, Addition	1408	748	2256	\$2,471.25	875	370
Averages					\$1,580.43	1,181	155.7

Next Steps: There are currently 17 additional projects enrolled in the offer to build upon the lessons learned from the first 17 projects completed. The PAs have decided to formally integrate the renovations & additions offer into the 2019-2021 Three-Year Plan. The Residential New Construction lead vendor is making changes to the initiative's modeling tool to better show renovation and additions customers the impact of their energy efficiency decisions with the hope of increasing savings and, therefore, the incentives they receive. The lead vendor is also designing new marketing materials for the offer, a mobile app for quality assurance staff to use in the field, and training new staff to serve customers with the offer. Active solicitation for additional projects are planned for Q3/Q4 of 2018, in order ensure the offer is ready for a full roll out in early 2019.

◆ Topic: Income-Eligible Bid for Weatherization Pricing

Summary: In January 2018, the Massachusetts Income Eligible Lead Agencies who administer the federal Department of Energy’s Weatherization Assistance Program (“WAP”) issued an RFP for the purposes of establishing prices for standard weatherization measures. Pricing is maintained for a two-year period at which time another RFP process commences.

Context: The twelve Lead Agencies, along with representatives of the Department of Housing and Community Development (“DHCD”) met to establish protocols and a comprehensive list of measures to be included within the RFP. Each standard weatherization measure is listed with the existing price and unit of measurement, the corresponding Standard Work Specification (SWS) reference, and a brief description of the installation standards. The protocols and list are then forwarded to all existing contractors working for the WAP and Mass Save Income Eligible Programs and to contractors who respond to legal advertisements. The process imitates the state model for RFPs as mandated by the DHCD.

Upon receipt by the Lead Agencies, all bids are submitted to the LEAN network consultant for review. The consultant compiles the bids per measure, and establishes the mean and the percentage increase/decrease per measure. Upon completion of review, the Lead Agencies make pricing recommendations per measure and submit to the contractors, DHCD and to the PAs for review and approval and to ensure that the updated pricing is deemed cost-effective.

Decision: The PAs reviewed and approved the proposed 2018-2020 pricing as submitted on March 26th, 2018.

Next Steps: The PAs have adopted the pricing recommendations into the Income Eligible programs from April 1st, 2018 through March 31st, 2020.

◆ Topic: New Measures

Combo furnace/water heater measure added in Q2.

Commercial & Industrial Sector

◆Topic: C&I Training & Outreach

Table 2. 2018 Second Quarter C&I Trainings and Outreach Events.

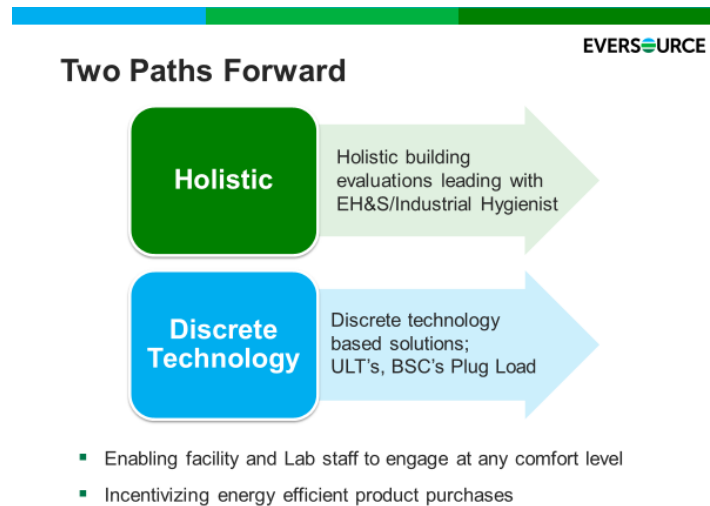
DATE	TOPICS OF INTEREST
4/3/18	Business Partner Open House Central (DCU Center, Worcester, MA)
4/5/18	Energy Conservation in Wastewater Treatment Plants (MAEEP, Norwood, MA)
4/9/18	Lunch & Learn: Regal Beloit – ECM Motors (Eversource, Westwood, MA)
4/10/18	New Product and Energy Show (ASHRAE, Randolph, MA)
4/19/18	Virtual Energy Audits- AEE New England, Waltham, MA
4/20/18	Webinar: Advanced Lighting Program Updates: Integrating Incentives into Design (National Grid, Waltham, MA)
4/26/18	Lunch & Learn: BMR Thermal (Eversource Energy, Westwood, MA)
5/3/18	Lunch & Learn: ECM Holding Group (Eversource Energy, Westwood, MA)
5/10/18	Lunch & Learn: Save Energy Systems (Eversource Energy, Westwood, MA)
5/24/18	An Introduction to Smart Labs™ High Performance Ventilation Systems – How to Maximize Lab Safety and Energy Efficiency (MAEEP, Norwood, MA)
5/30/18	Webinar: Effective Multifamily Ventilation for Optimal Energy Performance and Occupant Comfort and Health (National Grid, Waltham, MA)
6/20-21	Networked Lighting Controls for Designers (MAEEP, Norwood, MA)
6/15/18	Water & Wastewater Energy Efficiency Opportunity Project Planning (National Grid, Waltham, MA)
6/27/18	Lunch & Learn: Apex Lighting Solutions (Eversource Energy, Westwood, MA)
6/28/18	Energy Efficiency for Cannabis Grow Facilities (Cannabis Community Care and Research Network, Worcester, MA)
6/28/18	Webinar: High Performance Water Heating for Multifamily Properties (National Grid, Waltham, MA)

◆ Topic: High Performance Laboratory Symposium

Summary: Eversource, with the Cambridge Compact and the Boston Green Ribbon Commission, sponsored a High-Performance Laboratory Symposium to highlight the challenges and opportunities in creating energy efficiency and sustainability solutions for today's laboratories.

Context: Eversource's service territory hosts a high density of research and teaching labs. The energy usage in these labs is an order of magnitude higher than other building types in the area. The unique operating characteristics of labs make addressing energy issues challenging. Eversource has created a program that enables lab managers, facility managers and PI's to begin to address energy efficiency both at the lab level and at the building level.

Figure 5. Paths for Addressing Energy Efficiency



The Lab Symposium brought together nationally recognized speakers on discrete technology opportunities as well as panel discussions on the real-world issues on managing today's labs. Attendees from across all market segments (Hospital, University, Pharma) were represented and engaged. A lunch reception and vendor exhibit furthered the networking and development of efficiency opportunities.

Decision: The Lab Symposium brought together PA representatives and end user decision makers. Further dialogue will lead to project development to address large scale projects such as ductless fume hood and air change opportunities. Additionally, labs can now participate at the equipment level through efficient ultra-low temperature freezers and other plug load equipment purchases or control.

Next Steps: Eversource and the other PAs continue to explore opportunities and technology advancement in the laboratory arena. Equipment advancements and air flow strategies, led with safety and health first, will enable further development of this market.

◆ Topic: C&I Upstream Offerings Update

Summary: The Program Administrators updated the Upstream Commercial HVAC and Gas Water Heating (“GWH”) program structure in order to offer end-use customers an instant discount off the purchase price of equipment. The Upstream Food Service Equipment program is also reaching more and more customers.

Context: The PAs felt that the Upstream HVAC and Gas Water Heating program, as it was originally structured with no mandatory end-user direct incentive, had reached its full potential and was causing end-user confusion. After months of gathering opinions from the participating distributors and information from other utilities around the nation with similar programs, the PAs decided to make a mandatory customer facing instant discount amount be applied to the point of sale equipment cost at participating distributors, rather than leaving the full incentive amount to be used at the participating distributor’s discretion.

Though the potential new additional savings cannot be quantified, this change in program design will allow the PAs to market to end-use customers and installation contractors, which has never been done in the Upstream HVAC/GWH program historically. This change will also allow internal Commercial Sales Representatives/Account Executives to actively promote the program to their Commercial customers where appropriate.

For Food Service, National Grid and Eversource began piloting an upstream point-of-sale program in late 2016 for two select high-efficiency gas cooking products. In late December 2017, Berkshire Gas, Liberty Utilities, Unitil and Cape Light Compact also joined the effort to expand reach across Massachusetts, which took a few months to get fully up and running. Additional products were also added to the program, both gas and electric.

Decision: The PAs announced the HVAC/GWH program change would be effective as of June 1, 2018. At the same time, the PAs made the ECM circulator pump incentive the same amount as the Residential incentive in order to reduce distributor confusion, which often existed due to two different program structures for the same type of equipment.

For food service, the PAs discussed cost and results that were achieved during the 2017 testing period with National Grid and Eversource. This discussion led to Berkshire Gas, Liberty Utilities, Unitil, and Cape Light Compact deciding to participate, which allowed the PAs to expand natural gas equipment offerings as well as start offering electric products. As a result of the additional products and PAs, the program has grown successfully as referenced in the charts below:

Figure 6. Food Service Program Savings Comparison (January – June 2017 vs January – June 2018)

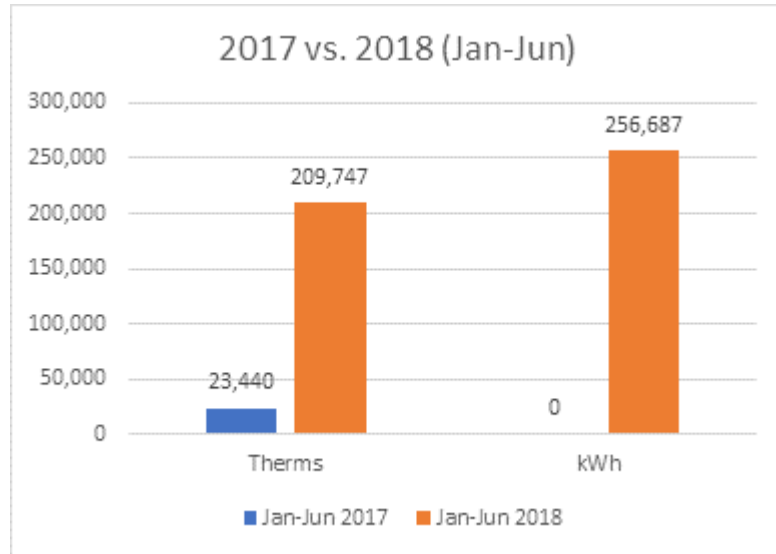
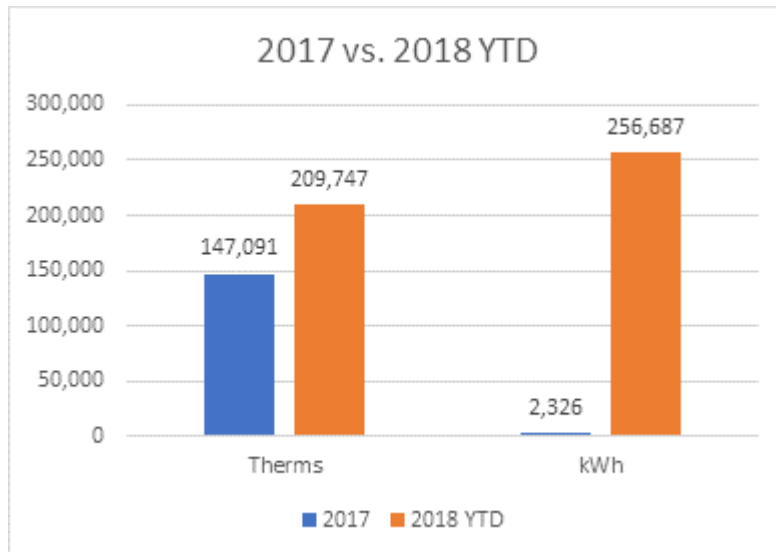


Figure 7. Food Service Program Savings (All of 2017 vs January – June 2018)



Next Steps: The Mass Save website will be updated to reflect the newly transparent HVAC/GWH equipment incentive levels. The PAs are developing marketing materials and investigating direct mail and other marketing tactics to drive sales further to the program. The PAs are also actively locating trade show opportunities for their implementation vendor, in order to be present at and speak to the contractor base more about this program. This will also help open doors for the PAs to put on equipment installation training sessions partnering with distributors and manufacturers to promote proper installation of high efficiency equipment. Columbia Gas is considering joining the Food Service effort.

◆ Topic: Eversource & National Grid Host Joint Energy Efficiency Engineering Meeting

Summary: Engineering groups from Eversource and National Grid held a joint meeting on May 21, 2018 in Worcester, MA to discuss opportunities to standardize engineering procedures, policies and guidelines to ensure consistent messaging and delivery of programs to our customers.

Context: The goal of this collaboration exercise was to utilize core competencies within the engineering groups to serve customers effectively. This meeting was a part of joint effort between Eversource and National Grid to ensure consistency and uniformity among strategy, sales and implementation groups. This effort will open up channels of communications resulting in better peer-peer exchange and enhanced customer management. Engineering and technical support was identified as a focus area since it is a key support function that interfaces with customers, vendors and internal groups. This collaboration will benefit customers, program administrators and all stakeholders including but not limited to vendors, distributors and implementers.

Decision: The meeting was very successful. Leveraging experience of Eversource and National Grid engineers to develop uniform program guidelines and engineering requirements will also help all Program Administrators implement programs efficiently. Joint decisions were made on finalizing customer engagement protocols, engineering study co-pays, standardizing report templates, project documentation requirements and engineering review procedures. These will immediately benefit customers, engineering vendors and result in streamlining of product delivery to all stakeholders.

Next Steps: Both companies have agreed to continue collaboration efforts. This has resulted in better information exchange and initiation of joint engineering PA conference calls. There will be a joint meeting with preferred engineering vendors to discuss key performance indicators related to quality and turnaround time in Fall 2018. Eversource and National Grid have communicated the success of this meeting to the other PAs as well and hope to have similar collaborative meetings across the state.

Innovation

Massachusetts Technical Assessment Committee:

The Massachusetts Technical Assessment Committee (“MTAC”) provides a statewide coordinated process for the PAs to assess the energy saving merits of new technologies, both residential and commercial. Eligible technologies are referred from MTAC to the Innovation and Technology Subcommittee for individual consideration and may be included in Massachusetts energy efficiency programs, as appropriate.

For each technology that MTAC recommends, a “Technology Scorecard” is developed and made available on www.MassSave.com/MTAC. These scorecards provide a description and photo of the technology, an overview of the energy savings opportunities associated with the

technology, a summary of its strengths and weaknesses, and market development issues, as well as a list of known suppliers.

In the second quarter of 2018, MTAC received one technology for review. MTAC continued to work on the technologies that it received in previous quarters for review. During the quarter MTAC approved three technologies.

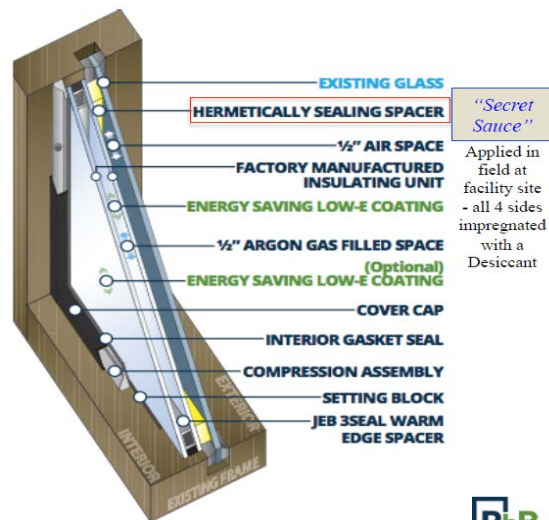
Table 3. Updated list of eligible technology reviewed by MTAC in 2018

Technology Name	Status
Permanent Window Retrofit System	Eligible as custom measure
Zoning Control	Eligible as custom measure
Vacuum Steam Heating System	Eligible as custom measure

Spotlight on Technology:

MTAC has referred a new Permanent Window Retrofit System for Commercial and Industrial buildings. This retrofit system is installed directly next to the building’s existing window and significantly reduces the heat flow between the conditioned space and outdoor environment. To support a robust installation, these highly insulating interior window attachment panels are hermetically sealed to existing glass with a bond that prevents invasion of oxygen, moisture, humidity or other contaminants. Window insulation improvement in U and R values result in both winter heating and summer cooling load reductions.

Figure 8. Schematic of a Permanent Window Retrofit System



Strategy Research:

In June 2018, MTAC conducted its monthly meeting at National Grid's [Innovation Hub](#) in Worcester, Massachusetts. This venue provided an innovative space for the committee meeting and included a facility tour conducted by student ambassadors. This unique facility demonstrates some of the latest technologies in energy efficiency and renewable energy including smart appliances, heat pumps and a solar awning with semi-transparent photovoltaic modules. The Innovation Hub has been serving the greater Worcester community since 2013 and is open to the public as an educational facility to learn about how new technology can help to achieve energy savings and build a more sustainable future.

Figure 9. Solar Awning



Figure 10. EV Charging Station



EM&V Highlights

Overview

For an overview of the evaluation activities currently being undertaken by the Evaluation Management Committee (“EMC”), please refer to the list of studies and corresponding Gantt chart on the EEAC website’s [Studies](#) section. Details on each study, including the study name, research area, study type, overall evaluation goal (project summary/purpose), expected outcomes and the current stage of the evaluation are available on the website. The list of evaluation studies is organized according to the current stage of study (planning, implementation, ready to file, etc.). A Gantt chart that illustrates each study’s schedule from the start of the study to its expected completion date is also available on the EEAC Website.

Planning Activities Conducted in Q2

The PAs continue to work on developing work plans for inclusion in the 2019-2021 Strategic Evaluation Plan.

Studies Completed in Q2 and their Application

Statewide Marketing – Post Marketing Survey

The goals of this study were to:

1. Conduct an ongoing assessment of customer awareness of the Mass Save brand;
2. Gather feedback on the new MassSave.com website; and
3. Assess whether customers mentally link Mass Save to its funding PAs.

Findings across most survey metrics indicate a continued upward trend of Mass Save awareness, familiarity, and participation in programs. Outreach to Spanish-speaking (studied here as Latinos) and low-income groups appear to be working well, with higher-year-over-year increases in website awareness than the overall MA population.

A sizable number of customers reported visiting the website in the six months between website redesign and our survey fielding. While not a majority of customers, the fact that about 40% visited an energy efficiency website in six months suggests a high degree of engagement with Mass Save. While customers gave similar usefulness ratings, whether they visited the website prior to or after the redesign, a survey designed for phone and web modes—without use of many visuals to help with recall—may not be the ideal method to assess receptiveness to the redesign.

While half of surveyed customers perceive PAs sponsor Mass Save, the interplay between Mass Save brand familiarity, program participation, and program sponsorship is complex. While we observed a logical connection for C&I customers—customers who have participated in programs are more likely to perceive PAs sponsor Mass Save, residential customers

showed a different pattern. Specifically, residential customers who reported they are familiar with Mass Save were less likely to assign Mass Save sponsorship to PAs. To tease apart these nuances, we suggest conducting in-home and in-business ethnographic research to identify the nuances of these associations of sponsorship of Mass Save, affiliation of Mass Save as a provider of energy efficiency programs, visits to the masssave.com website, and participation in Mass Save and PA programs.

C&I Small Business Impact Evaluation – Phase I (Lighting)

The primary objective of this study was to quantify the electric energy savings and demand reductions from lighting fixtures/lamps and controls as part of the C&I Small Business initiative. Overall realization rates produced were as follows and were recommended for retrospective application:

Savings Parameter	Retrospective Recommended Value	Relative Precision at Specified Confidence Interval
Gross Energy (kWh) Retrospective RR	95.1%	±4.7% (90% confidence)
Gross Summer Peak Demand Retrospective RR	90.6%	±2.5% (80% confidence)
Gross Winter Peak Demand Retrospective RR	102.8%	±11.8% (80% confidence)

Other recommendations include:

- Continued use of previous evaluation impact factors for Lighting Controls as there were few projects present in the sample.
- Program administrators should work with vendors to standardize how savings associated with replacement of fluorescent lamps with TLEDs are tracked / claimed. TLEDs were relatively new during the sample period, and consequently there was a lack in consistency in wattage estimates for TLED replacement projects.
- Continued refinement of lifetime savings estimates per dual baseline guidance provided by the LED Market Monitor study.
- Future examination of non-lighting measures offered in the Small Business initiative.

C&I LED Market Monitor Study: Lighting Market Model Summary Memo

The primary objectives of this study were:

- Developing a detailed first year inventory of the installed stock of lighting equipment in Massachusetts C&I facilities, including the number of lamps installed by building type, lighting application, and equipment technology.
- Develop algorithms for forecasting annual changes in the installed stock through 2026 that can support future planning efforts, including research into future industry standard practice for C&I lighting.
- Estimating annual energy use for the actual or forecasted installed inventory by building type, lighting application group, and equipment technology for the 2015-2026 period.

The resulting model produces forecasts of installed stock, market share, consumption, and savings over time. This effort has largely been accepted as the first step in establishing market adoption forecasts for C&I lighting, and the intention is to update forecasts models on a regular basis and based on new information available for the factors identified above. Full model details are available at the following link:

http://ma-eeac.org/wordpress/wp-content/uploads/P75-LED-Market-Model_Revised-Memo-051418_CLEAN.pdf

2016 C&I Customer Profile Study

This study was a continuation of the process to produce annual customer profile studies in C&I. The intents of this study were to integrate the Massachusetts PAs' billing and tracking data in a single C&I evaluation database and generate a comprehensive graphical report with cross-PA views of the data at a granular level without compromising data confidentiality.

Key report findings include:

- Participation and savings levels in 2016 declined for the first time since the studies have been performed.
- Across PAs, there are notable differences in the mix of measures installed, representing possible opportunities for statewide energy efficiency gains through more robust segmentation analyses.
- Upstream programs have resulted in increased participation of small customers, likely due to the accessible nature of the measures offered.
- The upstream hot water program experienced a successful first year for the gas market, delivering 1.4M gross therm savings, primarily from small and first-time gas participants.
- Upstream lighting continues to provide substantial savings and participation for the electric market, though the measure mix has fluctuated over time.
- Custom projects continue to provide substantial savings for gas and electric PAs.
- Both gas and electric HVAC projects continue to decline, even with the inclusion of electric upstream HVAC offerings.
- Controls measures provided substantial savings for lighting and HVAC.
- Aerators and spray valves remain a key driver of gas participation and savings despite the continued statewide decline in these numbers.

C&I 2011-2016 Mid-Size Customer Assessment

This study expands on the Mid-Size customer needs assessment completed in 2013, which analyzed mid-size electric accounts in the 2011 C&I evaluation database and concluded that accounts presented opportunities for PAs to increase savings. In the wake of this study, PAs indicated that they had taken steps to address some of the inefficiencies in program delivery. This study is meant to examine the effectiveness of these changes, more specifically:

- Provide an evaluation of the impact of steps PAs have taken to improve service to mid-size accounts from 2011-2016.
- Examine changes in performance indicators over that time.

- Determine whether there is a relationship between changes in PA practices and changes in performance indicators.

Upon completion of these analyses, high-level conclusions include:

- PAs have changed their criteria for classifying accounts by size.
- National Grid, Eversource, and CLC have developed specific customer engagement practices based on industry segments, many of which include a considerable number of mid-sized accounts. Other PAs have begun targeting specific industry segments, and have expressed interest in or intent to target additional industry segments.
- While PA and vendor communication has improved in many ways, some vendors remain confused about PAs' segmentation approaches and vendor roles.
- Some vendors could benefit from additional PA support and/or communication in the areas of engineering, training, and customer engagement.
- Upstream programs have had a substantial impact on participation of mid-sized customers.
- The 2013 study recommended that PAs encourage more customer and comprehensive energy efficiency projects to increase depth of savings, though the findings in this study suggest more work is needed here.

C&I Prescriptive Loadshapes of Savings

This study pooled known sources of 8,760 savings loadshapes to be used in measure-level savings calculations and in the PA benefit cost model. Evaluation vendors contributed a combined total of 676 different energy savings loadshapes to make up the savings tool. More specifically, loadshapes were provided for the following:

- Chillers
- Unitary A/C Equipment
- Compressed Air
- Refrigeration
- Exterior Lighting
- Interior Lighting
- Lighting Controls
- Variable Frequency Drives

Commercial Energy Code Compliance & Baseline for IECC 2012

This study is a continuation of the process to examine commercial customers' compliance behavior as it relates to each iteration of the energy code. Objectives for the study included:

- Revisit a sample of IECC 2009 sites to examine control/operation strategies.
- Revise previous lighting power density guidance as presented under the previous study on IECC 2009 code.
- Verify energy code compliance for commercial, new construction site permitted under IECC 2012.

Project engineers reviewed construction documents for sites in the sample to observe and document compliance with individual energy code provisions, and also conducted site visits

for nine sites to supplement document review. Historically, compliance was determined in accordance with the DOE/PNNL, though in this study the evaluation vendor made improvements to this approach which allowed for partial compliance credit and measure trade-offs within the building envelope. This approach generally aligns with COMcheck, a tool developed by DOE that is the most commonly used approach to demonstrate compliance by building designers.

Study conclusions include:

- The compliance of nonresidential new construction buildings is consistent over time, even as the energy code gets more stringent.
- The findings of the study are a clear call to action to consider the status of standard practice across Massachusetts and its relation to code requirements.
- The energy code requirement for interior lighting power is not reflective of current standard practice in Massachusetts.
- The energy code does not reflect standard practices for many mechanical provisions.
- Opportunities for improving compliance remain for targeted measures.
- Energy code determinations continue to be made at the design stage for new construction.

Deep Dive Report – Exploration of HVAC Trends

The study was scoped to take a deeper dive of some of the data produced by the 2016 Customer Profile study. More specifically, the objectives are:

- Delve more deeply into the details of HVAC, which has been steadily decreasing in gross kWh and therms both in absolute terms and in relative terms
- Understand the composition of HVAC energy savings in terms of measures, customers, and savings year over year

The study did not involve new primary data collection, rather it solely involved further analysis of data produced for the customer profile. Key findings include:

- HVAC trends in historic participation, savings, and incentives are driven primarily by results from the largest PAs in the electric and gas markets.
- Across the electric and gas PAs, the Healthcare, Social Assistance, Educational Services, and Manufacturing sectors play important roles each year. These sectors have also seen heavy participation and savings over the past 6 years, likely because they contain some of the largest electric and gas accounts, and have historically been targeted as a deep savings pool.
- For the electric PAs, it appears that HVAC savings are becoming costlier to achieve. This trend is less apparent for the gas PAs, although 2016 could point towards a similar pattern emerging. There may be opportunity for increased cross-fuel efforts to ensure that customers engaging in future HVAC programs are aware of both electric and gas opportunities relevant to their particular circumstances.
- While the gas analysis was able to identify where decreases in HVAC participation and savings are occurring across the PAs, industry sectors, and end-uses, it did not yield answers as to why this trend is occurring.
- The geographic analysis allows for the specific targeting of towns where historic participation rates and/or population savings achieved have been low or not identified. Building on the geographic trends, the PAs may want to consider leveraging tax and

geographic data fields to develop a decision tree for geotargeting HVAC installation candidates. This decision tree could be leveraged to help target a wider spread of customer sizes.

Studies Started in Q2

Appliance Recycling Impact Update (RLPNC 18-1)

The goals of the research are as follows:

- Identify the current characteristics of refrigerators and freezers being recycled through the program and compare them to those identified in the 2011 study and the 17-5 General Products NTG literature review.
- Refine estimates of partial use (i.e., how often recycled units were plugged in and turned on), free-ridership, and possibly replacement.
- Calculate unit energy consumption (UEC), per-unit savings, and verified 2017 program savings.

Gather Residential HVAC Efficient Market Share Estimates

This study is to obtain estimates of 2016 MA unit sales data for selected residential HVAC equipment to update the efficient equipment market share estimates from 2012 HEHE study.

C&I Lighting Hours of Use Study

The primary objective of this project is to develop building level annual hours of use estimates for application to fixture/lamp savings in the upstream lighting program offering. This study will leverage site level hours of use from all of the C&I lighting impact evaluations conducted in Massachusetts since 2010, and will provide average hours of use results for each building type where data is available.

Process Assessment for the Cross-Cutting Code Compliance Support Initiative (TXC 54)

At the end of 2017, Performance Systems Development (PSD) took over Code Compliance Support Initiative (CCSI) implementation from CLEAResult. PSD has conducted several webinars on code compliance and two classroom trainings to date. PSD has also responded to over eighty questions fielded through the Mass Save Technical Support Initiative. This evaluation will assess classroom trainings, webinars, and assistance provided through the Mass Save Technical Support line, with a focus on comparing support provided by PSD versus CLEAResult.

Products NTG Consensus (RLPNC 18-4)

The study will use a consensus-building process to develop prospective NTGRs for 2019 to 2021 for the following LEDs:

- Standard (medium screw base meant to reflect A-line bulbs)
- Reflector
- Specialty (focused on globe and candelabra bulbs)

HES LED NTG Assessment (RLPNC 18-5)

The study will describe an approach to estimating retrospective net-to-gross ratios (NTGRs) for LEDs installed as part of the Home Energy Services (HES) initiative. This study will draw on the longitudinal data provided by the extensive series of residential lighting saturation studies conducted in Massachusetts, the hours-of-use (HOU) estimates from the Northeast Residential Lighting HOU Study, and program tracking data from the HES initiative.

This project consists of three main tasks:

- Task 1: Calculate Retrospective NTGR Estimates,
- Task 2: Forecast Potential Prospective NTGR Estimates, and
- Task 3: Consensus Approach for Prospective NTGR Estimates.

Residential Baseline Study Phase 3: Panel Study (Res 1)

The primary objective of Phase 3 of the baseline study is to realize the benefits from establishing panels of survey and onsite residential customers by continuing to utilize the existing data collection instruments and already-installed end use metering equipment. Continuing the study offers a number of significant opportunities, including the opportunity to collect peak day load shapes during hotter weather than experienced in summer 2017, the opportunity to track the adoption of new non-incandescent technologies, and the opportunity to establish and track market baselines before, during, and after program interventions in the market.

Load Shape Model Update

The goal of this study is to update the current Demand Impacts Model using primary data collected from the RES 1 Baseline Load Shape Study (RES 1), which will increase the value and accuracy of the model.

Regulatory Updates

In Q2, the PAs prepared and submitted on April 30th the first draft of the Massachusetts Joint Statewide Electric and Gas Three-Year Energy Efficiency Plan for 2019-2021 to the Council. This comprehensive plan included program descriptions, savings, budgets, and benefits, information regarding fulfillment of Green Communities Act requirements, cost-recovery descriptions, and related data tables, models, and other appendices. While preparing the Plan, the PAs took into account the Council's recommendations, as well as comments made by councilors and stakeholders at meetings, workshops, and public comment sessions. The PAs also submitted BCR models to the Council's consultants. PAs expect to prepare a revised draft in September.



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On June 8, 2018, PAs filed their 2017 Plan-Year Reports. These reports are individual, PA-specific filings that are filed with the Department of Public Utilities (“Department”) for informational purposes only. PAs submitted data tables, explanations of significant variances, BCR screening tools, a Technical Reference Manual, evaluations studies and summaries, and performance incentive models. The PAs also prepared a rolled up, statewide version of the tables for the Council, and uploaded 2017 data to www.MassSaveData.com.

Several PAs submitted and received approval from the EEAC on mid-term modifications (“MTMs”) during Q2.



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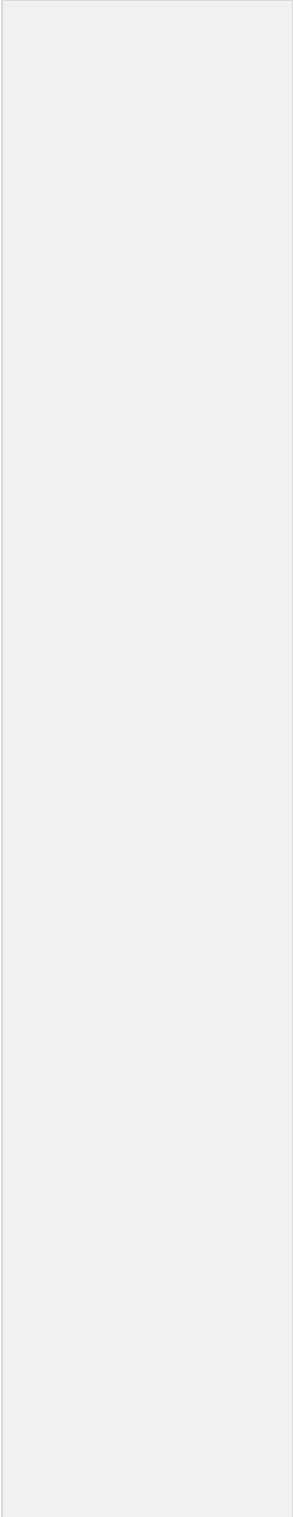
Case Studies



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Data Tables



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