MA ENERGY EFFICIENCY ADVISORY COUNCIL

2016-2018 Three-Year Electric & Gas Energy Efficiency Plans Planning Workshops

Briefing Documents for

C&I Workshop #3

March 3, 2015

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SECTION 1 – DEMAND REDUCTION

NOTES: Because this is a cross-cutting issue, this briefing section is focused on exploring the issues and raising key questions rather than efficiency opportunities and recommendations. Additionally, due to the complexities of this topic, this briefing document should be considered as a discussion piece and is not a definitive resource on this topic.

DEFINITION

Demand reduction refers to the lessening of the instantaneous maximum amount of energy used – referred to as peak demand. This concept of peak demand is used when designing a system or building so that electrical distribution equipment is properly sized. Peak demand varies from season to season with winter and summer months in New England experiencing much larger peaks, relative to spring and fall, because of the increased use of air conditioning in the summer and lighting and heating in the winter. In addition to the typical energy charges that electric customers pay based on the number of kWh they use, large C&I customers also pay a fee based on their peak demand often referred to as a demand charge.

In contrast, demand response involves reducing usage during peak or shifting usage from peak to off peak periods in response to economic incentives. Typical areas for demand reductions through demand response include adjusting HVAC set points, using only partial lighting, shutting down non-critical HVAC, and slowing down variable speed motors.

Both demand reduction and demand response can be used to lower the periods of peak demand in summer and in winter. In Massachusetts, peak demand occurs in the summer driven primarily by residential and commercial demand for air conditioning which spikes in the afternoon when temperatures are at their highest. There is also a peak, though of lesser magnitude, that occurs in winter during the early evening hours when most residential customers arrive home and turn on lights and appliances.

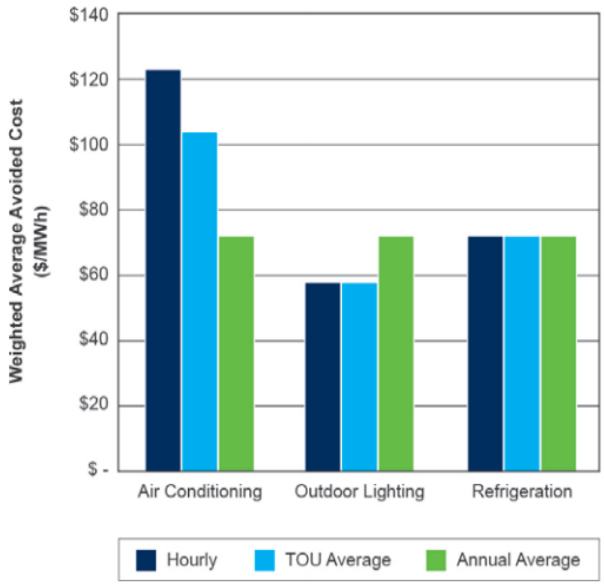
BACKGROUND

Energy efficiency, via demand reductions, has slowed growth in peak demand and flattened overall electric usage growth. Through 2013, energy efficiency efforts in New England have contributed roughly 1,400 megawatts of load reduction from energy efficiency measures and their contribution to the forward capacity market (FCM).

The magnitude of summer peak demand can have significant impacts on the wholesale cost of electricity and demand-response programs have been fostered to mitigate these impacts. The region has available roughly 700 megawatts of active demand-response resources in which companies have agreed in advance, in exchange for an incentive, to turn down lighting or reduce air conditioning load when called upon to do so by ISO New England (ISO-NE). In New England, demand response is primarily managed through third-party vendors in which the third-party works with commercial customers to aggregate enough load reduction to justify the cost of program participation. Other methods of engaging customers in demand response efforts, primarily outside of New England, include offering price-responsive demand prompting demand reductions/shifting through time-of-use pricing, critical peak pricing, variable peak pricing, real time pricing, and/or critical peak rebates. It also includes direct load control programs which provide the ability for power companies (or others) to cycle equipment like air conditioners and water heaters on and off during periods of peak demand in exchange for a financial incentive and lower electric bills.

It should be noted that in most cases the grid infrastructure required for demand response action by customers – meters capable of tracking and signaling time of use and price – is only available to a very small number of customers. Only the largest power users currently have time of use meters and the DPU is investigating broader advanced meter infrastructure (AMI) functionality through the Grid Modernization proceeding and a related time varying use proceeding. The utilities will be filing 10 year Grid Modernization plan with the DPU this summer.

Figure 1: Consideration of Time-Differentiation in Energy Savings Significantly Affects Estimates of the Value Savings



Source: (U.S. Environmental Protection Agency and U.S. Department of Energy 2006)

The value of summer and winter demand savings (kW) is included in the PAs calculation of energy efficiency program benefits (however the avoided cost of winter demand savings is zero). In addition, for each year of the life of a measure, a value is assigned for the summer peak, summer off-peak, winter peak and winter off-peak avoided costs of electricity usage (kWh). While this methodology does begin to account for the value of electric peak demand reductions, it does not fully represent the additional benefits of measures that reduce peak demand, as can be seen in the figure below.

This figure illustrates the weighted average avoided cost (i.e., the avoided cost benefits) for three measure types (air conditioning, outdoor lighting and refrigeration) using three different time-differentiated energy values: hourly, time-of-use average, and annual average.[1] As can be seen, an efficiency measure like air conditioning would accrue additional avoided cost benefits if an hourly weighted average avoided cost measurement were used. Documentation of several methodologies for peak demand and time-differentiated energy savings is available from NREL and aims to create uniform methods for determining energy efficiency savings for specific measures.[1]

In contrast to summer peak demand in which price spikes occur due to demand for electricity, winter electricity price impacts in Massachusetts are primarily determined by the price of fuel for electric generation, i.e., natural gas. This price, however, is reflected in the customer price of electricity because some electricity generators purchase natural gas off of the much more volatile spot market than the gas utilities, who purchase natural gas through long-term contracts. This occurred in Massachusetts during the winter of 2013-2014 when severe cold weather combined with a constrained natural gas market, resulting in significant electricity price increases for customers.

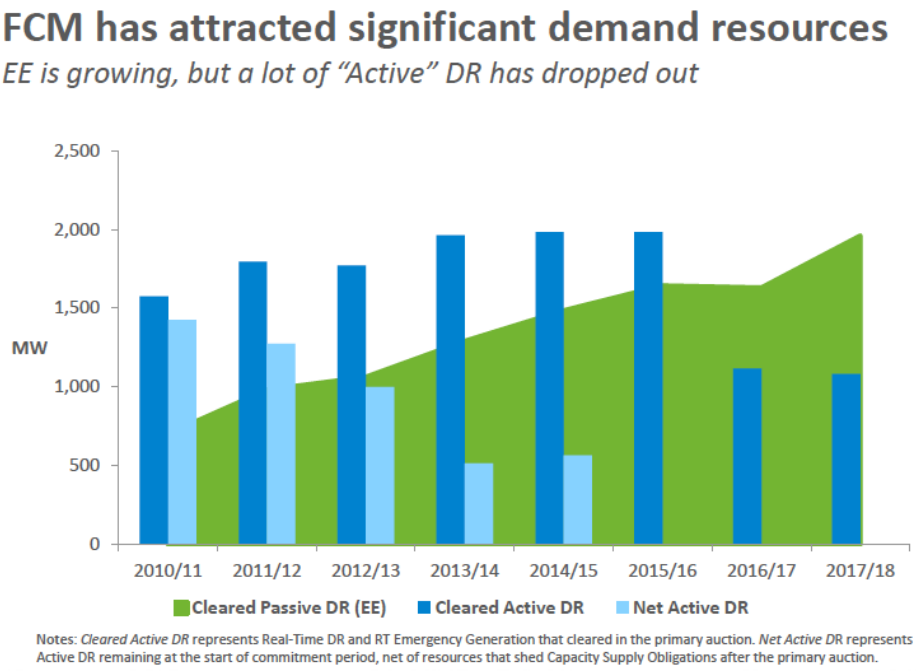
[1] NREL: http://energy.gov/sites/prod/files/2013/11/f5/53827-10.pdf

Demand Reduction
March 3, 2015 C&I Workshop #3 – Policy

A number of related efforts have been or are being utilized both in Massachusetts and other New England states to promote demand reductions. In Massachusetts, National Grid has recently developed highly targeted promotional campaigns focused on summer peak demand reductions in select areas of its service territory. These campaigns, aimed at residential customers, focused on promoting high efficiency pool pumps and pool heaters. Similarly, National Grid is in the process of developing targeted campaigns, called a non-wires alternative, on Nantucket where growing summer peak demand is leading to the need for incremental transmission capacity to the island (details of this effort are not available as it is still in preliminary design phase).

In Vermont, the Department of Public Service worked with Efficiency Vermont to set goals to reduce demand in specific regions of the state. Some regions had a winter peak constraint, some had a summer peak constraint, and some had both summer and winter. As a result of these efforts, for which incremental funding was provided, demand in the targeted areas was reduced between 3% and 6% in the first 2-1/2 years of implementation. Summer demand reduction proved easier to implement than winter reductions, but this may be a function of the limited territory for winter peak reductions, which was mostly rural and residential with two ski areas as the largest C&I customers. It was also found to be easier to realize demand savings overall from large C&I customers.

Currently both formal demand response and demand reductions from the New England's energy efficiency programs can be bid into the forward capacity market (FCM). However, whereas formal demand response has been declining in recent years, demand reductions from energy efficiency programs have been growing and are now greater than formal demand response programs in FCM. See ISO New England slide below (presented 2/25 at Acadia Center workshop at Federal Reserve, Boston.).



ENERGY EFFICIENCY ADVANCEMENT OPPORTUNITIES

One approach to achieving demand reductions is targeted marketing emphasizing the importance and value of demand reductions associated with those end uses that contribute most to peak demand. These marketing efforts could, for example, be launched in the fall to promote the value of LED lighting prior to the winter peak season or promote adoption of high efficiency air conditioning in the spring prior to the summer peak season. It must be noted, however, that winter and summer peak demand is driven primarily by residential rather than commercial & industrial demand. .

Incremental improvements in demand reductions may be achievable through geo-targeted approaches, in relatively infrastructure constrained areas, aimed at raising awareness and promoting demand reductions via energy efficiency as well as demand response. Geo-targeting may be very cost effective, and is modular in nature – as opposed to large transmission and distribution infrastructure investments, geo-targeted energy efficiency can be ramped up over time.

Coordinating energy efficiency and demand response could provide customers with better tools to understand, manage, and reduce their electricity use especially during peak hours. Such coordination could occur by either: a) combining offerings to encompass both demand response and energy efficiency based demand reduction opportunities under the same program umbrella to be delivered by the PAs; or b) coordinating program marketing and education to simultaneously promote demand reduction via energy efficiency and demand response in a closely coordinated or unified way. Because energy efficiency and demand response can be complicated topics, requiring sophisticated customer effort and action, program administrators could offer education that addresses both topics on an integrated basis.

NEXT STEPS FOR CONSIDERATION FOR DRAFT PLANS

- → Investigate what impact there would be on efficiency savings if the Council were to place greater emphasis on demand savings or peak demand savings.
- → Investigate where there may be current or anticipated capacity constraints in the system.
- → Explore the added potential benefits of, and impacts upon, the efficiency programs of the planned advanced metering functionality and time varying rates changes by the electric utilities.

KEY QUESTIONS

Some key questions for the Council to explore during the workshop include:

1. What would the impacts be on efficiency savings and the PAs' performance incentives if the Council were to place greater emphasis on demand savings or peak demand savings?

2. What would be the most effective way to capture demand savings with minimal impact on other efficiency plan goals (focusing on measures w/coincident peak savings, geo-targeting, direct load control, or linking with demand response programs)?

3. How can the Council and PAs prepare for advanced metering functionality and time varying rates and their impacts on the efficiency programs?

4. Do you support the potential next steps outlined above? What if anything would you like to add?

SECTION 2 – MARKET SEGMENTATION AND CUSTOMER SEGMENT SPECIFIC APPROACHES

DEFINITION

Segmentation is the process of dividing target markets into similar groups based on defined criteria in order to effectively market and deliver products and services to customers. Examples of vertical market segments include manufacturing, hospitals, universities, and office buildings. The purpose of segmentation is to identify groups with common business practices, attitudes, barriers and opportunities so that an approach can be designed to resonate with each group in order to best serve them. Other methods of segmentation include by geographic area, by size (meaning quantity of energy use or demand), or function such as chains stores or commercial real estate.[2]

The level of segmentation should reflect the organizational capacity to serve them as well as the mix of customers. For example, because of its large proportion of industrial customers, National Grid divides manufacturing into process, fabrication, food and heavy industry in order to better differentiate between and provide service to each of these sub-segments[3]. Similarly, Cape Light Compact has a territory with a large proportion of lodging customers and thus differentiates between hotels, motels, inns, bed & breakfasts, etc. Segmentation is a continuous process, and should be evaluated for effectiveness regularly. Size-based segmentation can be a useful first step in the process but often needs to be augmented with other attributes to be effective.

BACKGROUND

The Commercial & Industrial customer base served by the PAs in Massachusetts is comprised of roughly 350,000 unique electric customer accounts with annual usage of 25 billion kWh as well as 154,000 gas customer accounts with annual usage of approximately 1.2 billion therms. These customers span the entire spectrum of businesses from local barbershops and grocery stores to major manufacturing, health care, and educational organizations. The mix of customers varies significantly between PA territories both in terms of the industries represented as well as the size ranges of customers.

Serving this incredibly diverse and large population of business customers effectively has required an understanding of their unique attributes. Based on that understanding, the PAs have designed and implemented a number of strategies specifically targeted to various sub-segments of C&I customers.

An example of this kind of targeted strategy includes the development of a common approach to serving municipal customers who, as with all customer segments, have a unique mix of energy end uses, decision making and financial criteria, etc. that need to be considered. Working collaboratively with the DOER's Green Communities division, the PAs developed a tailored approach that includes a single point of contact within each PA, funding for engineering assessments of opportunities, financial assistance that can be tailored to the needs of individual municipalities, and a group of installation contractors experienced in navigating state law regarding municipal procurement. In addition, the PAs have engaged in targeted education and outreach efforts to town administrators, planners, and other key decision makers to build awareness and drive participation.

The PAs have also worked collaboratively with DOER and the Advanced Manufacturing Collaborative (AMC) to more effectively package and communicate available offerings and approaches relevant to small and medium-

[2] http://ma-eeac.org/wordpress/wp-content/uploads/EEAC_CT_MarketSegmentationStrategyPresentation_051314.pdf

[3] http://ma-eeac.org/wordpress/wp-content/uploads/PA-Presentation-on-Achieving-Yr-2014-CI-Goals-Three-Yr-2013-2015-CI-Goals-Compatibility-Mode.pdf - See slides 11-14 for more on Eversource and National Grid segments

sized manufacturing customers. Through this effort, targeted marketing materials were created and provided to relevant channel partners, the PAs participated in speaking engagements at relevant industry events and gatherings, and direct outreach was conducted to a carefully selected list of these customers. In tandem with this effort, National Grid has also launched an Industrial Initiative with a dedicated 3rd party program manager to serve these customers and is also offering incentives for project management for industrial energy efficiency projects.

Another excellent example of a segment-specific strategy is the PAs long-standing approach to serving small business customers. The PAs have successfully provided energy efficiency services to thousands of Small Business customers in some form for at least 20 years using the "direct install" model to provide turnkey services that include free energy audits, recommendations for efficiency improvements, generous incentives, and financing options. Given the nature of these small business customers, the vast majority of which use less energy than a typical single family home, they often have little awareness, time, knowledge, or financial wherewithal of larger corporations. The turnkey approach has been used for precisely this reason – to overcome the array of barriers that would otherwise limit the ability of these customers to participate in and benefit from the efficiency opportunities available to them.

For the past few years, National Grid has used a segmented approach to serving food sales customers through a 3rd party program manager. The initiative, called EnergySmart Grocer (ESG), serves national, regional and independent grocers by providing free audits, targeted marketing, and a team of specialized engineering and sales personnel with established relationships and segment-specific technical expertise with the objective of increasing participation and achieving much deeper and more comprehensive savings. In 2014, total grocer savings was nearly three times the level prior to launching ESG, with average savings per participating customer increasing over 300%, and refrigeration projects increasing just 24% to over 50% of total savings. Other PAs have also adopted variations on the ESG approach, or parts thereof.

ENERGY EFFICIENCY ADVANCEMENT OPPORTUNITIES

The PAs have made significant progress using customized approaches to certain market segments, and have completed multiple Evaluation, Measurement and Verification (EM&V) studies to better understand particular C&I market segments. EM&V is a way of evaluating the energy efficiency programs to better understand how they operate, to propose improvements to the program, and to confirm results from the programs. Some examples of recent EM&V studies include:

Mid-Size Customer Needs Assessment[4]

Mid-size customers are C&I customers with a peak electric load between 300-750 KW. This study was based on interviews with efficiency program staff and contractors, a survey of participants and non-participants, and data mining and analysis. It found that different PAs have different approaches to dealing with customers in this size segment. Recommendations made in the report to better serve this size customer include:

1. Mid-size customers require more complex solutions than small customers and sufficient financial incentives and limited paperwork requirements to make projects profitable for customers and Project Expeditors (PEX), i.e., PA Vendors, and non-PEX energy services firms.
2. PAs need to continue to diversify marketing strategies to specifically target mid-size customers
3. PAs need to improve marketing support for mid-size customers
4. There is a need for more contractors sufficiently trained in comprehensive solutions
5. PEX need more/better qualified leads for mid-size customers
6. No standard definition of 'mid-size' customer
7. Current customer data does not match PA account management claims

[4] http://ma-eeac.org/wordpress/wp-content/uploads/Mid-Size-Customer-Needs-Assessment-Final-Report-12.22.13.pdf

8. Current customer tracking systems could be improved for better marketing and analysis

Market Sector Profile: Small and Medium-Sized Food Stores[5] [6]***:***

This study was based on interviews with small to medium food stores and had a goal of providing more information about this customer segment to PAs, how these customers use energy and make energy based decisions, and to identify efficiency opportunities and areas that warrant further study. Recommendations from this report include:

1. Deploy retro-commissioning for HVAC and refrigeration systems
2. Continue to capture opportunities for LED lighting in refrigerated display cases
3. Enhance marketing strategies
4. Develop marketing materials based on case studies
5. Take advantage of business expansion plans

Common themes to successfully engage a market segment

Drawing from these studies and examples of customer engagement strategies, such as those deployed to serve municipalities and manufacturing customers, the following common themes may lead to more successful customer engagement:

1. Extensive dialogue between the customers, the PAs, and, often, third-party organizations with established relationships with those customers
2. Designated contacts for each party;
3. A mutual educational process on the efficiency programs and customer priorities and barriers;
4. Segment-specific marketing materials;
5. Active, on-going engagement in segment-specific events; and,
6. Market research and/or EM&V studies are used to better understand market barriers and opportunities.

Key points of communication

The PAs have developed a number of customer specific marketing materials. For example, the PAs worked with the AMC to develop updated marketing materials for the manufacturing sector on the Mass Save site. There were some barriers that manufacturers identified that were addressed in the materials,[7] including: a) explaining what "Program Administrator" means, b) how to contact the PAs, c) PA sponsored training offerings through MAEEP[8] , and d) information about financing offerings. These materials are highly targeted to the manufacturing sector, however much of the materials on the Mass Save website are more general and do not specifically address the barriers identified in collaboration with the AMC.[9] Individual PAs may have materials that are used by their sales teams, but this info is not readily available via Mass Save or individual PA websites.

In addition to confusion over marketing materials, there is a lack of transparency about how the EM&V results are being applied. Massachusetts has one of the most robust EM&V programs in the country. There are many Massachusetts program specific studies that are completed every year, and they offer recommendations for program enhancements. There is a need by the Council to have more clarity into how the EM&V study results are applied to the efficiency programs in order for the Council to better understand the complete processes of the

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[5] http://ma-eeac.org/wordpress/wp-content/uploads/Small-Medium-Sized-Food-Stores-Market-Sector-Profile-Final-Report.pdf
[6] http://ma-eeac.org/wordpress/wp-content/uploads/MA-Existing-Bldg-Survey-Results-Food-Stores-Data.xlsx
[7] http://www.masssave.com/~/media/Files/Business/Industry-Solution/NP_I0010_CI_SS_Manufacturing_LoRES.pdf
[8] http://www.maeep.org
[9] https://web.archive.org/web/20140801121829/http://www.masssave.com/~/media/Files/Business/Industry-Solution/NP_I0010_CI_SS_Manufacturing_LoRES.pdf

efficiency programs. In particular, if common themes are found across several studies, this could indicate an area needing more attention from the Council.

NEXT STEPS FOR CONSIDERATION FOR DRAFT PLANS

- → Create more targeted communications to different market segments, explaining the benefits from, and availability of, energy savings opportunities to drive participation.
- → Provide increased access to segment-specific marketing information and educational opportunities on the Mass Save site.
- → Ensure EM&V study, where applicable, and market research results are used to inform program design.
- → Biannual feedback to the Council regarding how sector specific strategies are being implemented across the state, what kind of sector specific materials are being used by the PAs, and how market research and/or EM&V lessons learned are implemented.

KEY QUESTIONS

1. What attributes make a segment a more likely / appropriate candidate for targeting?
2. What are the common elements of a successful segment-specific approach?
3. What are the key metrics for determining how well a market segment is served?
4. Do you support the potential next steps outlined above? What if anything would you like to add?

SECTION 3 – DELIVERED FUELS, OIL, PROPANE, AND BIOFUELS

DEFINITION

Fuel switching is the practice of changing from one fuel to another to serve the same purpose. Common examples include changing from burning oil to natural gas for space heat, or from an electric hot water heater to natural gas. Recently, the improvements in heat pump technology are leading to conversations about fuel switching from oil or propane to electric heat pumps for space heating, a practice that the Commonwealth is supporting to reduce greenhouse gas emissions.[10] Conversion to renewable thermal technologies (solar, biomass, etc.) are now also being supported by MA Clean Energy Center and other programs and policies.

BACKGROUND

Currently, energy efficiency funds are only collected on electricity and natural gas customers, therefore the PAs can only provide audits, energy efficiency recommendation support, and incentives for implementation for those commercial customers.[11] This is different from the low income and residential 1-4 unit program where audits can be offered and measures procured regardless of fuel type. Without new legislation, the PAs cannot help delivered fuels customers identify opportunities or implement for non-electric and/or non-gas efficiency measures in commercial buildings. PAs cannot defray the cost of audits for delivered fuels customers, however customers can pay for the thermal portion of an audit with the electric portion of the cost being paid for by the Mass Save programs. This could help streamline the audit process for these customers, however very few customers are aware of this option.

In addition to creating a barrier for customers, the restriction on efficiency services for delivered fuels also impedes the efficiency programs' efforts to increase the comprehensiveness of efficiency programs by creating a distinction between the various types of heating fuels. For example, vendors are less likely to be interested in understanding how to identify thermal efficiency measures if the majority of customers in their area use delivered fuels; they thus are more likely to miss natural gas efficiency opportunities for customers that are eligible.

Currently, most engineering studies are completed after a walk-through has been conducted to identify possible areas of efficiency opportunities. Based on the results of the walk-through, and in consultation with the customer, an engineering firm is engaged to conduct a thorough analysis of the identified areas or systems or, in many cases, a whole building. The results of that analysis, typically referred to as a technical analysis (TA) study, provides estimates of savings including gas, electricity, fuels, water, O&M, etc. Typically, the costs of these studies are shared on a 50/50 basis between the PAs and the customer. Also, when the customer is served by different gas and electric PAs and the systems being analyzed include both gas and electricity, the PAs will split their 50% of the costs based on the share of benefits that are likely to accrue to each

Fuel switching is usually done to save money, but it is also an opportunity for energy efficiency improvements. When switching from oil to natural gas, customers typically save money typically because natural gas is cheaper per Btu than oil or propane. Fuel switching from oil to natural gas reduces carbon dioxide emissions by about 20 to 30%.[12] Oil boilers and furnaces usually have combustion efficiencies in the mid-80% range, whereas condensing natural gas equipment can realize efficiencies in the mid-90% range. The challenge is that normal efficiency oil boilers can be inexpensively retrofitted to burn gas, but can't be retrofitted to the more efficient condensing gas boilers. If the customer chooses the least expensive option of a retrofit rather than a replacement,

[10] http://www.mass.gov/eea/docs/doer/renewables/thermal/carts-report.pdf
[11] https://malegislature.gov/Laws/GeneralLaws/PartI/TitleII/Chapter25/Section19
[12] http://www.edf.org/sites/default/files/10071_EDF_BottomBarrel_Ch3.pdf

the opportunity for efficiency improvement is missed, and because boilers have a long life, it is probably a long time before there is another chance for an efficiency project. While the PAs cannot offer incentives for a customer to switch fuels, they can offer incentives on the new higher efficiency equipment.

Gas system constraints currently preclude any new customers from connecting to the natural gas lines on the Cape and in western Massachusetts Berkshire Gas territory. Opposition to proposed new natural gas pipelines may be suppressing fuel switching as well. Additional possible barriers to switching include the fact that no incentives are offered by the PAs for fuel switching from oil to gas, only for the efficiency upgrade portion of the project. The proximity to a natural gas pipeline and available transmission capacity and gas availability are also potential barriers.

ENERGY EFFICIENCY ADVANCEMENT OPPORTUNITIES

One opportunity to expand the comprehensiveness of the efficiency programs and begin to address the efficiency of delivered fuels is to advertise the ability of customers with space and/or water heating to pay for the thermal portion of an energy efficiency assessment provided by the PAs and their vendors. This would facilitate a customer's ability to identify their greatest efficiency opportunities by creating a greatly simplified process. Additionally, this would begin to build a market for vendors to identify thermal efficiency measures for all customers and so incentivize the training and additional time required to increase comprehensive audits.

To address fuel switching, due to the falling cost of natural gas, it can be cost effective to truck compressed natural gas to industrial and large commercial sites that are not served by a pipeline. There are companies such as OS Comp and NG Advantage who sell and deliver compressed natural gas.[13,14] Trucked natural gas could expand the market for natural gas, and pave the way for future pipeline expansion.

Methane from biomass may be an option when natural gas is not available locally or is constrained. An NREL document estimates that Massachusetts has biomethane potential of about 100,000 metric tonnes annually from organic waste, wastewater plants, and landfills.[15] A pilot project in Dartmouth MA recently built a methane digester at the site of an existing landfill that already produces methane to make electricity. A recent ban on sending food waste to landfills caused concern that the landfill gas may decline in the future, so the new digester was built to process organic waste and ensure a steady supply of methane to the electric generators.[16]

Traditionally the trend has been away from electric resistance heat to fossil-fuel based space heating, but air-source heat pumps are starting to buck this trend. Air-source heat pumps can be cost-effective sources of heat in the Massachusetts climate. They are seen as a way to move towards a Zero Net Energy Building when paired with solar photovoltaic panels, particularly for residential and the smallest C&I customers. Air, water and ground-source heat pumps all reduce greenhouse gas emissions, whether used for space heating, water heating, or space cooling, but also increase Massachusetts natural gas use if powered by the electric grid. Additionally, although air-source heat pumps can also be used to replace less efficient air conditioning equipment, much of the market uptake is being used to add air conditioning load. Thus, heat pumps may have a multi-faceted impact on the electric grid, including on natural gas usage and summer and winter peak demand.

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13 http://www.ngadvantage.com/
14 http://www.oscomp.com/delivered-cng-service/
15 http://www.nrel.gov/docs/fy14osti/60178.pdf
16 http://biomassmagazine.com/articles/11044/pilot-biogas-project-at-massachusetts-landfill-site-complete

NEXT STEPS FOR CONSIDERATION FOR DRAFT PLANS

- → Seek ways to provide integrated thermal services, with or without incentives, to all C&I customers, regardless of delivered fuel status.
- → Council to work with DOER to explore using the efficiency programs to address natural gas market impacts and greenhouse gas reductions.

KEY QUESTIONS

1. What services could the PAs provide to C&I customers using delivered fuels? Would providing these services improve the integration between electric and gas efficiency programs and result in the identification of more gas measures?

2. Should the PAs incentivize fuel switching from oil or propane to natural gas and/or electric heat pumps? If yes, under what circumstances?

3. Should the Council work to explore and/or remove legislative barriers to serving C&I customers using delivered fuels?

4. Should the Council explore a market assessment of the thermal efficiency potential for all non-gas C&I customers?

5. Should the Council promote natural gas markets alternatives such as biogas and methane production and/or trucked compressed natural gas to increase the market for natural gas and possibly relieve pipe constraints?

6. Do you support the potential next steps outlined above? What if anything would you like to add?

SECTION 4 – C&I REPORTING

DEFINITION

Reporting refers to the data provided by the PAs in the quarterly and annual reports as well as data provided to the DPU in regulatory filings. Reporting typically addresses the costs, participation levels, savings and benefits associated with the energy efficiency programs and initiatives. Programs are overarching activities targeted at a particular market activity while initiatives are sub-sets of programs reported to provide more granularity about how markets are being served.

This briefing document and the councilors' recommendations will serve to inform both the ongoing discussion and development of a statewide database and the forthcoming Council Resolution for the next three-year plans.

BACKGROUND

In MA the commercial and industrial (C&I) energy efficiency activities are currently reported under two programs: ***Retrofit,*** with two initiatives, and ***New Construction***, with one initiative. For comparison purposes the Residential activities are currently reported under two primary programs "Whole House" and "Products" and seven separate initiatives.[17]

The *Retrofit Program* includes these two initiatives:

- Large retrofit – also known as custom retrofit which includes custom projects in which existing useful equipment is replaced or upgraded in order to obtain energy savings and other ancillary benefits. This section also includes CHP projects.

- Small Business – retrofit services targeted to smaller customers, provided by vendors under contract to the PAs on a performance basis, includes primarily standard or prescriptive measures with limited custom measures.

The *New Construction Program* includes several different market interventions which are not currently reported separately (i.e. they are not currently treated as initiatives). These include:

- Upstream in which incentives are paid to the manufacturers or distributors of efficient equipment to encourage stocking and promote sales of this equipment

- "True" new construction – the construction of new buildings, major renovation and additions to existing buildings all of which would fall under the energy code.

- Equipment replacement – the replacement of equipment at the end of its useful life with new energy efficient equipment.

[17] The Whole House Program includes New Construction, Multi-Family Retrofit, Home Energy Services, and Residential Behavior/Feedback initiatives. The Products Program includes the Cooling & Heating Equipment, Lighting and Consumer Products initiatives.

Goals are established at Program level. Changes in goals/achievement of over 20%[18] between Programs requires DPU approval. PAs report to the Council on a quarterly basis at the Program and the Initiative levels. One consideration for reporting is its impact on PA administrative costs if reporting changes increase the likelihood of regulatory proceedings.

Data reported includes program and initiative spending budgets and actuals for Program Planning and Administration, Marketing and Advertising, Participant Incentive, Sales, Technical Assistance & Training, Evaluation and Market Research. Reports also include performance data for Participants Served, and Savings/Benefits including, and compared to several other New England states:

[18] From page 61 of the 2013-2015 Three Year plan: D.P.U. 08-50-B "Guidelines § 3.8.2 should be interpreted such that Department approval is required for a program budget change that is 20 percent greater than the program's three-year budget." D.P.U. 10-106, at 7-8. Additionally, the Department noted that the D.P.U. 08-50-B Guidelines are not fixed and are intended to be updated over time. Id. at 8-9.

Reported Metric	MA	VT	RI	NYSEG	ME
Capacity (kW) Savings	Summer	Summer Winter		Yes	
Energy (annual MWh) Savings	Yes	Yes	Yes	Yes	Yes
Energy (Lifetime MWh) Savings	Yes		Yes		Yes
Annual Therm/MMBTU Savings	Yes		Yes	Yes	Yes
Lifetime Therm/MMBTU Savings	Yes		Yes		Yes
Total Benefits	Yes	Yes	Yes		
Total Electric Benefits	Yes	Yes	Yes		Yes
Total Gas Benefits	Yes		Yes		Yes
Total Other Resource Benefits	Yes	Yes			
Total Non Resource Benefits	Yes	Yes			
Annual Oil MMBTU Savings	Yes	Yes			
Benefits/Spending ratio	Yes	Yes	yes		Yes
Participation	Yes	Yes	Yes	Yes	Yes
Expenses	Yes	Yes	Yes	Yes	Yes
Benefits per Geographic Area (County)		Yes			
RES/Low Income Spending Metric		Yes			
End Use Breakdown by Measure type		Yes			Yes
Breakdown by Program and Initiative	Yes	Yes	Yes	Yes	Yes

OPPORTUNITIES

The current reporting paradigm provides a limited view of where savings are being achieved and the differences in cost to achieve savings for different market interventions. In Workshop #1 Councilors expressed an interest in having information available to track PA progress in areas of interest including Combined Heat and Power, which is currently included under the Large Retrofit Initiative, and for a package of activities directed at increasing energy efficiency through retrocommissioning, controls, sub-metering and monitoring.

Disaggregation of upstream activities from other market driven activities (new construction and equipment replacement) would enable the PAs and the Council to understand the scale of efficient product sales catalyzed by upstream intervention and the changes in market penetration over time. The upstream intervention is dominated by lighting sales. As PAs increase the use of upstream interventions in the HVAC, domestic hot water and other equipment types, additional granularity in upstream data would help the Council to understand trends and growth within these other areas. Without separate tracking the other end uses would be subsumed and dwarfed by lighting.

"True" new construction opportunities are largely market driven. After the 2008 recession, construction of new buildings, major renovations and additions ("true" new construction) fell off significantly. The construction of new buildings is increasing again both in terms of quantity and square footage of buildings in design and construction. This change results in significant opportunities for the PAs to engage and make investments in the efficiency of these new buildings that will endure into the next century. The ability to look at energy efficiency gains made in the market on a stand-alone basis would increase the ability to assess whether the energy efficiency achievement levels are consistent with an increasing market share and are appropriate relative to the actual market activity occurring at the time. (ie. enable the Council and PAs to understand when true new construction savings are down due to reduced investment in the construction market or up due to an expanding construction market). Reporting upstream, end-of-life replacement and "true" new construction interventions as separate initiatives would result in separate reporting for equipment replacement efforts.

NEXT STEPS FOR CONSIDERATION FOR DRAFT PLANS

- → The PAs should seek to split the new construction C&I program into separate initiatives for new construction, end of life replacement and upstream.
- → For the C&I retrofit program, the PAs should seek to increase the number of initiatives to correspond to the Council's interest in more detailed reporting data, such as:
  - CHP
  - Retrofit Programs
  - Control systems (including retrocommissioning, control upgrades, sub-metering and performance metrics)
  - Engagement programs (continuous energy improvement, strategic energy management, behavioral programs)
- → Goals should set at be at the Program level, so PAs have the flexibility to expand programs if they are more effective at providing savings. However, there should still be initiative level targets provided by the PAs.

KEY QUESTIONS

1. Does the Council see value in disaggregating and tracking data at a more granular level? If so, then what should be tracked?
2. Should separate goals be set for any newly tracked metric?
3. Do you support the potential next steps outlined above? What if anything would you like to add?

SECTION 5 – QUICK TOPICS

COMMERCIAL ZERO NET ENERGY BUILDINGS PROGRAM

A zero net energy building (ZNEB) is one that, over the course of a year, produces as much as it consumes through on-site renewable energy. The commercial ZNEB market in Massachusetts and the country as a whole has seen dramatic growth in the past few years. In 2014, the Massachusetts Department of Energy Resources (DOER) issued the Pathways to Zero program, a $3.5 million initiative to support the growing ZNEB market in Massachusetts. As a demonstration of market robustness, DOER received 42 applications for ZNEB projects in the Commonwealth. Of these, 20 were C&I projects, representing upwards of $270 million and 2 million square feet in ZNE development.

DOER has also been in contact with Program Administrators from National Grid based on the growing demand they are seeing internally for ZNEB projects. With the rise in ZNEB demand, PAs are facing new program challenges, including assumptions on the HVAC base case scenario, energy modeling expertise and costs, and integration with existing incentive structures.

→ DOER recommends that the PAs establish a formal ZNEB program and work to integrate the program with standard new construction offerings.

STREAMLINED, LOW-COST AUDITING

In recent years, innovative new energy audit methodologies have enabled whole building energy audits to be completed at a fraction of historical costs. Starting in 2012, some of these new approaches have been formally tested through the Massachusetts Building Asset Rating (BAR) Pilot, a joint project between the Massachusetts Department of Energy Resources (DOER) and the Northeast Energy Efficiency Partnership (NEEP). As stated on the NEEP website[19], "The MA BAR Pilot asks: can we improve building analysis to provide credible, investment-grade information in less time and with decreased cost?" The BAR pilot tested several new and innovative building modeling approaches from multiple firms on 41 commercial buildings across the Commonwealth. The pilot found that "actionable building assessments are available at a significantly lower cost than conventional methods: the traditional analyses averaged $25,000 per building while the innovative methods averaged less than $8,000 per building."[19]19

→ Based on these findings, DOER recommends that the PAs incorporate streamlined energy audit methodologies into their 2016 – 2018 programs and processes. This could lead to identification of operational and EE opportunities, particularly for mid-size customers. This would allow for multi-year leads/engagement of mid-size customers, a key barrier identified in the mid-size needs assessment.

[19] http://www.neep.org/initiatives/energy-efficient-buildings/building-asset-rating

STREET LIGHTING

The current inventory of approximately 370,000 municipal street lights, including both those owned by municipalities and those owned by the electric utilities and paid for by municipalities, is dominated by the ubiquitous high pressure sodium fixtures both in quantity and energy consumption. The next largest portion of the inventory by quantity is already comprised of LED street lights, reflecting its rapid adoption into the street light market. Statewide conversion of municipal street lights to LED technology represents an enormous savings opportunity to local governments and their residents of more than 105,239,000 kWh of annual energy use, an estimated $5.1 million in avoided energy charges and additional cost savings from avoided maintenance and the installation of advanced controls.

The main barriers to LED street lighting include the ownership structure and upfront capital requirements. Currently, any street lights owned by a municipality may be retrofit with LED technology but the majority of utility-owned street lights are not able to be retrofit with LEDs. This is because LED technology is not included in the electric tariffs for utility-owned streetlights for Eversource and National Grid. This barrier means that a full 42 percent of the street lights in Massachusetts are not able to be retrofit with LED technology.

→ To address this barrier and harvest the significant efficiency potential of LED street lighting, DOER recommends that the PAs create a plan to install LED street lighting technology in all utility-owned street lights by 2020.

MUNICIPAL EFFICIENCY PRIORITIES

→ DOER's Green Communities Division released a Request for Information to seek input from municipalities and other public entities on services they wish to see included in the 2016-2018 three-year efficiency plan.[20] The deadline for comments was extended to February 27, 2015 at 5 pm due to the municipal snow removal efforts. These comments will be compiled, summarized and provided to the Council at the third C&I workshop for their review.

OTHER TOPICS NOT DISCUSSED IN THE WORKSHOPS

- Energy Management and Project Management Support Services
- Enhanced comprehensiveness – Metrics for multiple-measures installed
- Mid-size customers
- Healthcare
- Hospitality
- C&I financing
- Performance contracting
- Expanded upstream programs

[20] http://www.mass.gov/eea/energy-utilities-clean-tech/green-communities/