



Commercial Real Estate Working Group Final Report

Prepared by Charles Michal and the Members of the CRE WG

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FINAL REPORT

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Executive Summary

This report provides a high-level summary report on the Commercial Real Estate Market in Massachusetts and the results of the Commercial Real Estate Working Group (CRE WG) investigation of means to improve penetration of utility energy-efficiency programs into that sector.

From April 2013 to March 2014, the CRE WG was convened to identify barriers and opportunities to create market based solutions that enable energy efficiency investments in the CRE sector. The CRE WG, through secondary research, contracted interviews & reports, and round-table discussions, has pursued the development of market based strategies and actionable results. A synthesis of the observations and findings of prior reports leads us to conclude that:

- Actors in the CRE market, like other small C&I customers, lack resources to pursue EE measures effectively
- Common lease structures create a split-incentive barrier against cooperative EE decision making
- Tenant fit-up decisions occur rapidly, creating a timing barrier for PAs to exert influence actions

Six themes were identified which might address these principal barriers to energy-efficiency improvements in the CRE market.

- Apply the Direct Install Model to Tenant Fit-up Activity in the CRE market
- Increase Access to Technical Assistance
- Structure New Incentives Developed Around Multi-measure Packages
- Promote 'Energy Labeling' and increase Energy Star Portfolio Manager Awareness
- Promote 'Dashboarding'
- Promote Green Leasing

Subsequent focus groups held with large building owners and tenants as well as interviews with representative small building owners explored interest in several CRE market strategies such a turnkey delivery models for small and mid-size customers, pre-packaged prescriptive options for speedier implementation, promotion of “energy dashboards” and “Energy Efficiency / Green” leases.

Key observations and recommendations for implementation from this work are that:

- Prescriptive Packages (suites) of energy efficiency options are of interest to both owners and tenants as a viable way to increase energy efficiency upgrades in buildings.
- Energy tracking and dashboards are useful to both owners and tenants. Some barriers exist to getting this data to stakeholders in its most useful form.
- Given strong landlord reluctance to change current lease structures, energy efficiency leases do not appear to be a viable near term tool to improve efficiency in the CRE market, and represents an opportunity for market transformation.

Commercial Real Estate Working Group Background

The Commercial Real Estate Working Group (CRE WG) came together with the mission to identify barriers and opportunities to create market based solutions that enable energy efficiency investments in the CRE sector. Improvement in the energy efficiency of the commercial real estate (CRE) sector is a critical objective for Massachusetts in the coming years. To capitalize on these potential savings the PAs' 2013-2016 Energy Efficiency Plans include development of this roadmap document to better serve the CRE sector.

The PA-sponsored Point 380 Market Opportunity study completed in 2012 identified CRE as a prime target for energy savings in the near future. Additionally, a number of Massachusetts municipalities are adopting building energy disclosure ordinances that would apply to commercial properties greater than 25,000 square feet. The ordinances may prompt greater participation in the PAs' efficiency programs.

The members of the CRE WG represent a cross section of practitioners in energy efficiency, commercial real estate, and government. The members include: DOER and Eversource as Co-Chairs of the group and National Grid, Commercial Real Estate Councilor on the EEAC, A Better City, Massachusetts Association of Realtors, The City of Boston, EEAC Consultant, and Meister Consulting.

The group convened in April 2013 and completed their work in March 2015, meeting every 2-3 months as a full group to progress the work forward, in addition to significant work outside of the CRE WG meetings. This work included:

- Secondary Research - 3/2013 to 10/2013 - Understanding the best practices locally and elsewhere to realize savings through investments in energy efficiency. This included secondary research from multiple sources that are outlined in Appendix 1. Based on this secondary research, the CRE WG concluded that research with market actors in Massachusetts was necessary to get a more thorough understanding of this sector.
- Primary Research – 11/2013 to 4/2014 – The CRE WG members recruiting interview participants for this Opinion Dynamics led research effort. The goals were to understand lease structures, the EE Decision Making Process, the best ways for PAs to approach tenants and how customers track energy use.
- Develop Strategies – 5/2014 to 8/2014 – Based on the interview results and secondary research, the CRE WG discussed and developed four (4) go-to market strategies. These strategies were further developed by Weller & Michal Architects, and then the CRE WG worked with Opinion Dynamics to develop specific questions and a discussion guide for the Roundtable Discussions.
- Roundtable Discussions – 9/2014 to 11/2014 – The CRE WG members recruited large commercial owners and tenants to participate in Opinion Dynamics led roundtable discussions in a focus group format to test and get feedback on the potential go to market strategies.

- Analyze and Present Findings – 12/2014 to 2/2015 – Opinion Dynamics prepared a final report on the Roundtable Discussions, which informed Weller & Michal Architects and the CRE WG’s final report and recommendations for the CRE sector.

Snapshot Characteristics of the Market – Secondary Research

The Massachusetts Commercial Real Estate Working Group (CRE WG) has access to a number of research studies that provide a backdrop for its review of the Commercial Real Estate Market. These studies cast light on the target sector – helping to characterize it through customer profiles, customer needs assessments, and market-sector analyses. These reports were reviewed in the secondary research phase of the CRE WG and later in the process as relevant. These reports were instrumental in understanding the background of the sector and the need for follow-on primary research. A full listing of all reports reviewed by the CRE WG can be found in Appendix 1.

Customer Profiles

Commercial Real Estate (CRE) customers are a subset of all Commercial and Industrial (C&I) customers. Programs addressing this particular market segment (CRE) must be informed by the PA’s past experience working with C&I customers.

C&I customer have been profiled in several reports. The 2011¹ Customer Profile Project: Final Report noted that larger customers participated more frequently in energy efficiency programs than small and medium customers. However, the average percent savings achieved by smaller customers was high. This emphasizes the potential to expand marketing efforts to smaller C&I customers. The 2011 study also noted that Prescriptive programs were less responsible for achieved savings, with the vast majority (64%) of electrical savings in 2011 coming from Custom projects.

The 2012 C&I Customer Profile Report: Final Report² further examined C&I energy efficiency program participation and energy savings trends. This study built on the 2011 C&I Customer Profile study , and involved the analysis of energy efficiency program participant data and billed usage data for all C&I electric and gas customers served by the Massachusetts PAs.

CRE customers are impacted by three primary end uses – lighting, HVAC and to a small extent refrigeration. The DNV-GL report established that lighting comprised the largest number of C&I projects and had the largest total contribution of energy savings, at nearly 69% and 51% respectively. The lighting end use project proportion was consistent with prior year results (70% of the projects in 2011.)

¹KEMA, 2011 Customer Profile Project: Revised Final Report, Massachusetts Program Administrators, EEAC, June 20, 2013, <<http://ma-eeac.org/wordpress/wp-content/uploads/Customer-Profile-Project-Revised-Final-Report-6.20.13.pdf>>

² DNV-GL, 2012 C&I Customer Profile Report: Final Report, Massachusetts C&I Program Administrators and the Energy Efficiency Advisory Council Consultants, Richard Crowley, September 23, 2014 <<http://ma-eeac.org/wordpress/wp-content/uploads/CI-Year-2012-Customer-Profile-Final-Report.pdf>>

HVAC projects contributed a larger percent of savings relative to the percent of projects that they represented at 10% of projects but nearly 21% of savings; this was in line with the 2011 results where HVAC contributed nearly 10% of projects and 18% of savings.

Refrigeration projects contributed a large proportion of projects relative to savings, indicating generally smaller projects. This trend is consistent with findings from 2011.

Mid-Size Customer Needs Assessments

KEMA Mid-size Customer Needs Assessment³ sought to identify the extent to which the current program offerings effectively serve the needs of mid-size commercial customers and whether new program offerings or variations of existing offerings could better serve those customers. The PAs use differing approaches for managing and marketing to customers within each of these size segments with smaller customers, those with demand of less than 300kW, being served through the Small Business initiative which is implemented by external program vendors. Depending on their respective customer base, the PAs typically characterize customers with demand above 300 kW up to 750kW as mid-sized and use a variety of approaches to serve those customers.

Commercial Real Estate customers are most likely small or mid-sized customers from a program perspective. The PAs use differing approaches for marketing to customers within each size segment, and smaller customers typically receive a mass-marketing approach to EE implementation. Data from the 2014 Office Sector Profile study show that there are about 160 small CRE customers for every large or medium customer.

The PAs have developed multiple organizational approaches to serving mid-size customers. Eversource (formerly NStar) classifies customers greater than 300KW as mid-size to large and assigns them to account management teams based on industry and consumption levels. National Grid account representatives are assigned to customers with greater than 750 KW demand. For the mid-sized customers account representatives are assigned to those customers who have demand between 300 and 750 KW⁴ in industries where energy is a relatively important cost consideration, load factors are high. The PA's use Project Expeditors, who are third party contractors, to help identify the needs of the more diverse smaller accounts.

All the PAs rely primarily on the Small Business vendors and implementation contractors to market efficiency programs and perform outreach to accounts with demand less than 300 KW. This is likely to include the smaller CRE customers.

³ KEMA, [Mid-size Customer Needs Assessment: Final Report](http://ma-eeac.org/wordpress/wp-content/uploads/Mid-Size-Customer-Needs-Assessment-Final-Report-12.22.13.pdf), EEAC Consultants and Massachusetts Energy Efficiency Program Administrators, December 22, 2013 <<http://ma-eeac.org/wordpress/wp-content/uploads/Mid-Size-Customer-Needs-Assessment-Final-Report-12.22.13.pdf>>

⁴ Targeting of specific industries is required because the number of accounts with demand between 300 and 500 KW was too great for internal staffing to provide account management to all customers in this size segment. Furthermore, NGrid suggested that implementation contractors are not trained to the extent necessary to adequately serve the needs of those customers in the targeted sweet spot industries. Customers not in an identified 'sweet spot' were allocated to implementation contractors, who may not have had adequate training to offer appropriate or comprehensive solutions.

KEMA examined participation and savings metrics by measure to assess whether existing programs have adequately met the needs of mid-sized customers. They reported high penetration of lighting measures. However, participation rates for HVAC measures have been relatively low, perhaps according to KEMA, because installation contractors serving mid-sized customers lack the depth of expertise necessary for more complex mechanical solutions. Data on refrigeration measures show the participation rate for managed mid-size customers is nearly two times that of un-managed customers.

Market Sector Profiles

An office market sector profile⁵ prepared by DVL GL as part of the Massachusetts Existing Buildings Market Characterization study provided an overview of office buildings using data collected in 2013. The profile provided a more detailed understanding of the office building industry.

Small, medium⁶ and large sized office buildings are categorized by their level of electricity peak demand (kW). Small office buildings have less than 300 kW demand while medium size office buildings have an annual demand between 300 to 750 kW. Large office building customers have demand greater than 750 kW. This grouping is consistent with the market segmentation used in the 2013 KEMA Mid-size Customer Needs Assessment. 56% of customers surveyed were in the small office size category, 12% were in the medium size office category and 30% occupied large office buildings.

CRE properties include medium- and large-sized office buildings customers who primarily occupy mixed-use/multi-tenant buildings.

The majority of small and medium office building customers who leased their space operated under a triple-net lease. Nearly 80% of large customers who lease facilities indicated they operate under a triple-net lease arrangement.

Financial payback thresholds for energy efficiency investments varies across the office sector. Nearly 82% of large office respondents stated that their payback threshold was four years or less. However, in the 2015 CRE Survey conducted by DNV-GL, 7% of CRE customers had a payback threshold of less than one year. Only 2% of non-CRE customers required a payback period this short. Also, Lessees were typically more sensitive to payback thresholds; 10% required a payback period of less than one year compared with 1% and 5% for owners and building managers. On average, lessees had a payback threshold of 2.8 years. The payback threshold for owners and building managers was slightly higher with both having thresholds around 3.2 years.⁷

⁵ DNV GL, Market Sector Profile: Office Buildings – Final, Massachusetts Program Administrators and EEAC Consultants, September 26, 2014, <<http://ma-eeac.org/wordpress/wp-content/uploads/Office-Buildings-Market-Sector-Profile-Final-Report.pdf>>

⁶ The median U.S. office building is 69,000 square feet, open for business 60 hours per week and has 2.4 workers per 1000 square feet. More energy intensive offices buildings are open longer hours, and have more workers per square foot, on average.

⁷ DNV-GL, Massachusetts Commercial Real Estate Survey Analysis – Draft Report, Massachusetts Program Administrators and Energy Efficiency Advisory Council Consultants, January 19, 2015 – Final report: <<http://ma-eeac.org/wordpress/wp-content/uploads/Massachusetts-Commerical-Real-Estate-Survey-Analysis-Final-Report.pdf>>

Massachusetts Commercial and Industrial Evaluation

The 2015 report on an evaluation of the commercial and industrial market⁸ in Massachusetts identified CRE customers as primarily occupying smaller, multi-tenant buildings that were less likely than other C&I properties to have been renovated or built recently.

A large portion of CRE businesses occupy malls and high-rise offices. CRE businesses occupied less space—an average of 57,000 SF compared with 108,000 SF for non-CRE businesses.

Slightly less than half of CRE businesses are located in single unattached buildings. CRE businesses were more likely to reside in buildings with multiple occupants. Only 44% of CRE businesses weighted by consumption were single occupants.

CRE businesses were less likely to have undergone a major renovation in the past five years than non-CRE businesses (approximately 20% versus 39%, respectively).

The length of leases for the majority of CRE businesses was less than 8 years. Nearly one quarter of all CRE businesses had less than one year remaining on their lease. Triple net leases were reported as the most common leasing agreement and

CRE business were slightly less likely to seek utility engagement than other businesses. CRE building managers were more likely than tenants to have a contact with a PA account manager.

Investment average payback threshold for CRE businesses is low at 2.9 years compared with 3.4 for non-CRE businesses. Lessees had the lowest reported payback threshold of 2.8 years; owners and building managers had an average of 3.2 years. Among Office business types 3 to 4 years was the most common period.

A Better City

A report⁹ prepared by the membership-based non-profit 'A Better City' (ABC) also characterized the Boston commercial real estate market and identified key barriers to wider energy efficiency technology adoption. Information was developed through focus groups, interviews and surveys of Boston building owners and property managers.

The CRE market in Boston is comprised of a diverse mix of property types, from large multi-million square foot office towers to small one- and two-story properties. Class A properties are typically the premier properties in a local market, likely to be owned by large national or international real estate investment trusts, while Class B and C properties provide functional office space with fewer amenities at discounted rental rates and may tend to be owned by smaller investment entities with fewer resources to devote to energy management and efficiency upgrades.

52 percent of the Boston market is Class A property while 34 percent and 14 percent are designated Class B and C respectively. There are many more Class B and Class C properties in Boston (1,350 total)

⁸ <http://ma-eeac.org/wordpress/wp-content/uploads/Massachusetts-Commerical-Real-Estate-Survey-Analysis-Final-Report.pdf>

⁹ http://www.greenribboncommission.org/downloads/ABC_Boston_Commercial_Real_Estate_Barriers_and_Opportunities.pdf

than Class A buildings (150) indicating that the Class B/C market is fragmented with a diversity of smaller properties.

The majority of Class A properties fall in the 100,000 square foot and greater classifications. The majority of Class B and C properties are under 50,000 square feet while a significant portion of the total city-wide Class B and C square footage is distributed across the building size spectrum.

The nature of the energy efficiency opportunities is different between Class A and Non-Class A properties. Many of the largest Class A building owners in Boston are actively engaged in improving the energy performance of their properties. Managers of many Class A properties report that they take advantage of utility-sponsored retrofit opportunities and have struggled to find other efficiency projects in their buildings that qualify for utility incentives.

Interviews with Class B and C building owners and property managers indicate that, in many properties, some of the most cost effective energy retrofits have yet to be implemented.

The ABC report provided ideas for programs and policies that could be pursued. Among these were:

- Implement programs to train building owners to use the Energy Star Portfolio Manager program in advance of the implementation of BERDO.
- Encourage the adoption of next-generation energy efficiency finance tools such as managed energy service agreements (MESAs)
- Help overcome the split incentive issue by encouraging the use of energy aligned leases in commercial office properties
- Capture savings opportunities that are currently overlooked by existing utility energy efficiency programs by implementing a behavior-based commercial energy conservation initiative.

Top-level Barriers Identified – Primary Research

Energy Efficiency & Commercial Real Estate

Based on the findings from the secondary research phase, the CRE WG determined that primary research with Massachusetts CRE market actors was necessary to best understand the market. To that end, the CRE WG members (with assistance from the Greater Boston Real Estate Board, and NAIOP) recruited Owners and Managers to participate in interviews to understand lease structures, the energy efficiency decision making process, the best ways for PAs to approach tenants and how customers track energy use. Opinion Dynamics Corporation conducted the interviews and prepared a report entitled “Energy Efficiency Decision-Making in the Massachusetts Commercial Real Estate Market, May 2014.” The report reflected interviews with executives at 16 of the largest Massachusetts CRE and property management firms, representing approximately 25% of office commercial real estate in Greater Boston.

The Opinion Dynamics review¹⁰ of the Massachusetts CRE Market laid out key factors contributing to the relatively low influence by the PAs in energy-efficiency decisions made by market actors and

¹⁰ Opinion Dynamics Corporation, Energy Efficiency Decision-Making in the Massachusetts Commercial Real Estate Market, May 2014

stakeholders. The document contributes to an understanding of the drivers and barriers to energy efficiency faced by CRE stakeholders and was an initial step in CRE WG efforts to better serve this sector.

The report presented results of stakeholder focus groups, interviews and surveys on the key barriers to energy efficiency investment for commercial office owners. Respondents cited a diverse array of barriers to energy efficiency investment. These included access to capital, lack of energy project expertise, challenges navigating and understanding utility incentive programs, split-incentive issues and building investment strategy priorities.

The report authors observed that:

- Common lease structures create a split-incentive context that doesn't incentivize EE. Lease structures vary widely, but the majority of leases pass along energy costs to tenants. Increasingly lease provisions are being included that allow for sharing of costs for energy efficiency projects, and owners tend to be the primary decision makers.
- An overwhelming majority of those interviewed formally track energy use in some manner. Managers find it useful to track building energy performance and compare to peer buildings using tools like ENERGY STAR® Portfolio Manager.
- Actors in the targeted market lack time and/or resources to pursue EE measures effectively.
- Energy efficiency upgrades are typically undertaken when the use of the space starts; typically on lease start or renewal during the tenant fit-up phase. Tenant fit-up decisions occur rapidly, often only a few months from commitment to occupancy.
- The window of opportunity for PA's to act and exert influence is very narrow.
- There is an opportunity for PAs to have greater involvement in this sector and firms are open to more regular contact from the PAs. Some barriers include lack of knowledge of the PA programs or building level opportunities, other owners are interested in more complex solutions and are interested in PA assistance in meeting these goals.

As the earlier customer profiles and market summaries indicate, there are many discrepancies between large and small buildings in terms of energy profiles, tenants, ownership structures, and leverage points.

The CRE market includes small retail and other small business uses typically found in strip commercial development, small office parks and Class B and C, rather than Class-A commercial office buildings. Market barriers for an institutional owner of Class-A office space in a major market will be vastly different from the barriers of a 3rd-party property manager for an open-air retail strip center in a suburban market. Consequently, ultimate 'go-to-market' strategies will vary based on building size as well as other segmentation factors.

A deeper penetration of the CRE market requires programs that work both for new construction as well as retrofit, and for small tenants and commercial real estate operators as well as large, sophisticated property owners and well-informed commercial tenants.

Market based Strategies Considered

Developing Actionable Goals

Drawing on the ODC study and prior research, the CRE WG hypothesized and discussed potential strategies as entry points in the CRE sector. These ideas were further developed by Weller & Michal (WMA) in a report¹¹ suggesting action themes to explore further with CRE market actors; themes that could lead to new initiatives and strategies. From a review of the literature WMA focused on three of the primary barriers to energy efficiency decisions:

1. The 'split-incentive' context of most leases that inhibit EE decisions
2. Actors in the market lacking resources to pursue EE measures effectively
3. The narrow window of opportunity in which to exert influence as EE decisions are made

WMA recommended continued work toward improving CRE market participation in PA programs be linked to four goals:

1. Agreements Structured to Benefit Both Landlord and Tenant
2. Energy Use and Costs Made More Transparent
3. Energy Efficiency Incorporated in Tenant Fit-Outs
4. Tenants and Occupants Engaged in Saving Energy

A number of actionable themes on which further initiatives might be based were identified. PAs were advised to consider:

1. Creating a Turn-key Model for Tenant Fit-up Activity in the CRE market
2. Structuring New Incentive Forms and Packages
3. Promoting 'Energy Labeling' and 'Dashboarding'
4. Promoting Green Leasing
5. Increasing Access to Technical Assistance

Expand on Turnkey-delivery Models for CRE customers

A turn-key delivery model, like the Direct Install program, eliminates the need for CRE owners and tenants to carry out multiple steps and may make EE decisions easier. Turnkey programs address the primary barriers for these smaller actors (perceived high transaction costs, lack of confidence and lack of time to pursue). WMA observed that the PA's could consider the following activities:

- Provide technical and sales training, so that vendors understand the unique CRE market dynamics. Partner with key trade associations (BOMA, NAIOP) that are active in this marketplace.
- Provide target customer lists, using utility data as filters to focus on mid-size and smaller customers. Lists can be further refined by sub-segment or geography.

¹¹ Weller & Michal Architects, The CRE Market: 'GO-TO-MARKET' OPTIONS BASED ON MARKET BARRIERS, August 12, 2014, prepared for Northeast Utilities

- Target both owners (common area projects) and tenants for retrofit projects.
- Target building owners/managers and leasing agents to capture new-construction opportunities.
- Develop specific offerings for Tenant Fit-outs.

Offer “Packaged options” Targeting Specific CRE Market Segments

Simplified choices expedite decision making when coupled with utility partnered preferred contractors and vendors, particularly if marketed to key sub-segments such as offices, retail properties, restaurants, and light manufacturing or industrial sales locations. WMA observed that the PA’s could consider the following activities:

- Package typical measures including lighting, lighting controls, HVAC, refrigeration and gas equipment where possible to encourage ‘multi-measure’ solutions.
- Reduce paperwork and streamline application processes.
- Define incentives in terms more aligned with CRE market decision making, such as \$/sq. ft.
- Test higher incentives for multiple measures (bundles or packages).
- Test different incentive levels based on occupancy rate, location, rental rates and other market factors. Improve small and mid-size customer payback by offering higher incentives than typically for large C&I customers to increase market penetration.

Promote “Dashboards” and Building Labeling

The PAs should provide meaningful energy usage data to building owners, managers and tenants, possibly by leveraging customer engagement platforms and other commercially available “remote auditing” tools. PAs can:

- Provide building energy usage data to assist owners and managers who must comply with mandatory benchmarking and disclosure ordinances.
- Encourage transmitting energy-usage information to building operators to lead them to make informed decisions about reducing energy consumption in a building.
- Offer peer and portfolio level benchmarking data to asset owners and managers to support energy-efficiency retrofit projects
- Explore plug-load reduction programs, behavioral programs, and other ways to reduce occupant driven energy use in office buildings.

Champion the use of “Energy Efficiency Leases”

The PAs may wish to partner with industry groups and Non Profit Organizations (NPOs) to promote and encourage:

- Lease Riders and other adjustments in lease languages related to Escalation Clauses and Common Area Maintenance (CAM) charges.

- Incorporate language with the intent of addressing the split incentive issue whenever possible
- Development of portfolio-wide work building standards to foster the build-out of more energy-efficient spaces.
- Provision of energy consumption data to tenants, and sub metering energy use wherever practical.

Reactions of Market Actors to Strategies and Recommendations – Focus Groups

Because of the segmentation of this market, it is difficult to determine how broadly any given strategy can be applied. Understanding potential CRE market response to these themes will assist in the design and planning of New Construction and Retrofit initiatives. Meaningful feedback from members of the real estate sector and their tenants was sought through a series of CRE WG “Roundtable Discussions” held in a focus group format (for sake of clarity, they will be referred to as focus groups).

The CRE WG, using the WMA report, developed a series of questions that ODC developed into a discussion guide to test four specific “go-to-market” strategies with CRE stakeholders. The CRE WG members then recruited market actors to participate in these focus groups. Opinion Dynamics conducted focus groups in October and November 2014 with two groups of stakeholders: building owners/managers of large CRE portfolios, and tenants. The large building owners and managers represented firms whose portfolio includes Massachusetts buildings. Tenants included several types of companies leasing office space. The focus group included some tenants who has a particular focus on energy use in their tenant space, and may not be representative of a typical tenant in the Greater Boston area. Opinion Dynamics also conducted in-depth interviews with building owners/managers of smaller CRE portfolios to gain a perspective in that sector. The CRE WG also sought out brokers as potential focus group participants since they are very involved in the leasing process. However, there was not sufficient interest on the part of brokers to participate in these discussions, and the CRE WG concluded that brokerage may not be the best path to pursue energy efficiency in the CRE sector.

The specific market strategies tested in the focus groups were:

- Turnkey delivery model for small and mid-size CRE customers
- Pre-packaged options for CRE customers
- Promotion of dashboards and building labeling
- Energy Efficiency Leases

Primary goals were to determine a) if these strategies were viable means to promote energy efficiency in the CRE market and b) if so, how they could be best refined to produce results.

Pre-Packaged Options for the CRE Market

The CRE market may logically be broken into occupancies with similar energy consuming characteristics. The premise is that the CRE market can be subdivided into specific targeted tenant/building occupancies, and that these occupancies would generally benefit from the same ‘package’ of efficiency upgrades, either as retrofit actions or as new-construction choices. Easily identified use-types include

offices, outpatient medical offices, retail properties, light manufacturing or industrial sales locations and food-related retail (including 'mom & pop' grocery stores and restaurants).

Focus group participants agreed that the optimum time for making energy-related improvements in tenant spaces is during the build-out phase. This is a 'new construction' condition¹². 'Pre-packaged' and simplified palettes of choices could expedite decision making. Participants discussed the potential for the PAs to offer pre-packaged suites of energy efficiency measures for commercial real estate that would allow for quicker build-outs.

Packaged options for EE improvements should have appeal for PAs hoping to deliver prescriptive solutions to customers. They may be best received by smaller customers, however. Larger building owners and management team may view each building as a unique asset, and are more likely to scrutinize individual measures on a case by case basis.

Packages could be described for implementation by CRE preferred contractors and engineering teams, or even delivered through a participating Project Expeditors. Customers would be offered a bundle of measures that wherever possible address lighting, space conditioning, and specific process related energy loads, like refrigeration and commercial cooking.

Lighting measures are the most commonly installed by larger owners and managers, as well as tenants, during build-outs. Owners/managers stated that low wattage T8s are the most commonly installed lighting measure, and that tenant requests for energy efficient measures frequently include LEDs and lighting controls.

HVAC and refrigeration measures were identified as overlooked opportunities that are not frequently addressed in the commercial real estate sector. Owners and managers speculated that this might be because modeling is required for these systems, rather than prescriptive "plug-and-play" measures like lighting that are easier to specify and install.

Both tenants and owner/managers showed interest in pre-packaged suites of measures targeted at commercial real estate. Focus group participants believed that pre-packaged measures could reduce the number of missed opportunities. Additionally, both groups expressed interest in the PAs offering a bonus incentive for installing multiple measures, and understood that measures could be "linked" (e.g., lighting fixtures and controls). There would be positive customer response to 'bonus' incentives awarded for multiple measures implemented in one project.

Tenants suggested that PAs offer different "levels" of packages, such as "good", "better", and "best" options, to cater to firms' varying needs and budgets. Tenants suggested adding plug load monitoring and control to the menu of measures. Tenants believe that PAs should consider offering equipment and

¹² The opportunities for (and barriers to) EE adoption are dramatically different between the New Construction characteristics of a tenant-build-out or fit-up on initial occupancy, and the Retrofit opportunities over the course of a lease. New Construction involves opportunities that exist only briefly during the design and build cycle. Tenant improvements have narrow decision windows and can be difficult to influence due to the numerous parties involved including contractors, installers, tenants, and property managers. When PA's intervene in a tenant-fitup, the baseline for calculation energy savings must be current code. These two characteristics have significant impacts on the ability of PAs to influence EE decisions.

performance incentives together. Tenants also suggested providing incentives for smart strips and plugload metering that can provide very detailed usage information and control.

Dashboards and Building Labeling

Dashboards

Focus groups discussed tracking and displaying energy usage at a tenant and building level and agree that this can contribute to energy efficiency. It is clear that customers really open to becoming more conscientious about their energy usage. Tenants say that real-time tracking can improve occupants' awareness of energy use and behaviors. Owners/managers and tenants discussed the benefits of behavior programs that reduce energy use by targeting tenant equipment and operations.

Sharing of energy data varies dramatically by building and tenant. Some tenants reported getting information on usage directly from their landlord. Some receive this information real-time (due to sub-metering), some monthly or quarterly, and some at the end of the year. Many owners are reluctant to share data with tenants. One focus group participant commented that "no good" can come from sharing this information because it often prompts questions and creates a time burden on the landlord, without getting to better energy efficiency practices.

Benchmarking

Owners/managers believe that the Building Energy Reporting and Disclosure Ordinance (BERDO) has helped them better track energy use at a building level. They believe that tracking at that level would have been previously impossible for landlords to do in a time-efficient manner.

Both tenants and owners/managers believe that having benchmarked data to compare to other buildings and tenants can be very beneficial.

Tenants noted that information about the energy use of their space compared to others would be especially helpful for those with less knowledge about energy efficiency. Tenants would like to track and compare their energy use by square footage, and indicated that pure metrics of energy use per year, such as kWh/sf and MBTU/sf, are more useful to them than rankings or relative information. Tenants would also like to see the energy use data linked to cost.

The Turn-key or Direct Install Model

Direct Install programs rely primarily on trade allies/partnered vendors to identify projects. Through these pre-qualified vendors, tenants and/or building owners receive free technical assistance to identify energy saving opportunities. Most project involve:

- replacing or retrofitting outmoded lighting and adding lighting controls
- high-efficiency HVAC equipment upgrades
- adding advanced controls to high-efficiency HVAC systems

Traditionally the PAs have used this model to service the Retrofit/Existing Buildings market. Much of the uncaptured savings in the CRE market involves new construction activity – not necessarily the construction of new buildings, which the PAs existing New Construction programs target well, but time-dependent new construction activity triggered by tenant changes and 'churn' in the CRE market. This is

why the PAs should consider how the Direct-Install model might be adopted to service the unmet needs of the CRE market.

The broader CRE market includes owners and property managers of smaller portfolios (even single buildings) who may not have the resources to identify potential improvements and keep track of available incentives. The Turn-key model provides support to the market by reducing the cost of the improvement as well as the time and resources required to research and coordinate energy-efficiency actions. The equipment installed would be either free or heavily discounted via incentives provided by the PAs.

Those interviewed expressed interest in the turnkey model, primarily due to the perceived decrease in owner/tenant cost to achieve energy efficiency upgrades. Any type of financial help, from incentives to financing, is likely to increase the likelihood of making energy efficiency upgrades. Focus group results did not result in detailed information on what offerings would help most, and the sample was small as the topic was not discussed with tenants or large property owners.

Energy Efficiency Leases

The structure of most commercial leases works against rational energy-efficiency decision making in the CRE market. Under most net leases and modified gross leases, the most common types of leases¹³, the building owner is responsible for bearing the cost of all capital upgrades. Energy costs, being a routine operating expense, are typically paid by the tenants. Existing CRE lease language likely does little to remove the resulting 'split-incentive':

Green Leases (also known as aligned leases, high performance leases, or energy efficient leases) are intended to better align the financial and energy incentives of building owners and tenants so they can work together. Owners were of the opinion that the only viable way to get energy efficiency explicitly built into the lease is if there is widespread tenant demand for this type of lease language.

The resistance to lease language was noted in the focus groups, as well as in-depth interviews with smaller building owners. Building owners and managers expressed strong resistance to changing the typical lease structure. Both landlords and lessee value a short, concise lease - adding too much additional language creates legal roadblocks. One owner said that tenants "don't want to be told how to run their business."

Owners believed many energy efficiency changes can be made through coordination of the owner and tenant, but would be best done on an informal basis and do not need to be included in the lease. One owner said that the "easiest way to do it is NOT include it in the lease," and suggested it is easier to meet directly with the tenant to discuss the details of an energy efficiency opportunity, such as weekend thermostat setbacks. Tenants echoed these sentiments, and stated that when they pay for their own

¹³Opinion Dynamics reports that triple net leases represent perhaps 47% of Massachusetts CRE leases. In these leases the tenant is responsible for all costs associated with the space, including the cost of utilities. The cost of utilities can be based on separately metered accounts or based on the tenant's share of the building area. Prorated leases (which may be known as 'modified gross leases) account for 43% of all leases, Opinion Dynamics concluded. In prorated leases, the tenant pays a fixed cost per month based on the projection of expenses for common area maintenance and the cost of utilities. Gross leases are not common and are typically used for small spaces or short-term leases, but can also include some buildings where there is no need to break out expenses by tenant.

utility costs, they are motivated to be efficient, and will try to work with the building owner or property manager where applicable. There are alternatives to energy efficiency for existing tenants....

“...green leasing ... is not a practical option for an existing tenant. Even at the time of lease renewal, the landlord and tenants are often reluctant to enter into a new lease agreement, as it is often a very lengthy and arduous process. Frequently, the only terms of the lease that are renegotiated are the term and rate. To combat this barrier, letter agreements have been successfully implemented in some cases and could prove useful when renegotiating a green lease is not practical. A letter agreement is typically used when the building owner has a specific retrofit planned and needs to get the tenants’ buy-in, or renegotiate some of the terms of the lease to more equitably share the costs and the savings of the proposed retrofit—without reopening any of the other terms of the lease contract.”¹⁴

Improving Technical Assistance and Outreach

Focus group feedback suggests smaller market actors may appreciate more regular contact from PAs and their account managers about energy efficiency opportunities and available incentives. Their properties may still have “low hanging fruit” – technically straightforward opportunities for energy savings - and they may be open to assistance from PAs to make suggestions for reducing energy use.

Both tenants and owner/managers agree that PAs should be involved as early as possible to allow decision-makers to work with the most information available. Both groups also stated that the PAs should reach out to the tenants because they often do not have the knowledge to make upgrade decisions¹⁵. However, both groups also believed that the property manager should be engaged as well because they will often be involved in build-outs by providing suggestions and helping to get more savings.

Tenants often rely on design firms for their lighting choices. Tenants also felt that PAs should not directly provide design assistance or draft specification language as this would introduce legal liability and likely slow down the design and approval process. However, owners find that trade allies seem relatively insulated from projects and that outreach to architects and engineers, who lead the design process, could help.

¹⁴ From: Working Together for Sustainability: The RMI-BOMA Guide for Landlords and Tenants 2011

¹⁵ One participant stated that time and non-financial resources are not a barrier in conducting energy efficiency upgrades. Despite this, he also repeatedly indicated that he had “not yet gotten to” the point in the process for a project under consideration where he felt he was well-informed, suggesting that perhaps time and information were also barriers.

Pragmatic Constraints to Overcome – Next Steps

As the Massachusetts PAs continue to explore ways to increase CRE participation in utility incentive programs they will need to develop approaches that overcome a number of obstacles. The research conducted to date suggests that:

- The number and complexity of CRE accounts require diversified marketing strategies

PAs need to continue to diversify marketing strategies. KEMA found that further segmentation by industry is desirable, as needs differ greatly by industry. While small customer needs are relatively commoditized and can be handled through prescriptive programs, the diversity of mid-size businesses, coupled with the need for more customized solutions restricts the effectiveness of the direct install program, and its primarily lighting contractors, to meet the needs of the large number of mid-size firms.

From a marketing strategy perspective, mid-size customers lie between the commoditized widgets (small customers) for whom energy use consists primarily of lighting and moderate use of refrigeration and air conditioning, and the highly specialized custom solutions required by large business. Mid-size customers have elements of both widgets and the super-specialized; consequently, the marketing approach should reflect these characteristics.

Mid-size customers are less aware and participated less often than large customers in the programs for which they are qualified. However, the number of mid-size accounts is too great for direct PA account management, alone, to service effectively. In addition, our analysis found that the larger PAs further segment mid-size customers by industry in order to assign account and sales representatives, and PEX. This approach attempts to address the heterogeneous nature of mid-size customers.

Research suggests that tenants who are not direct utility customers (i.e. tenants that pay for their utility consumption through their landlords) encounter challenges when attempting to access utility energy efficiency services, even when they own their own lighting and other energy related equipment. In Non-Class A properties where both landlords and tenants may have limited staff capacity to navigate utility program administrative requirements, this is particularly problematic.

- CRE customers require complex solutions with sufficient financial incentives.

Mid-size customers require solutions that are more complex than those addressed by simple prescriptive measures. Since mid-size customers operate closer to the margin than large customers, costs and downtime associated with energy efficiency projects are significant concerns. Higher incentives and simpler paperwork requirements are necessary to attract more mid-size customers, and to make projects profitable for both customers, trade allies and energy services firms.

Focus group participants observed that HVAC and refrigeration measures are not frequently addressed and may be overlooked opportunities in the CRE sector. This is consistent with the 2013 Mid-size Customer Needs Assessment finding that many customers are well served in lighting measures, handled through the Direct Install program, but that fewer customers were found to have heating, refrigeration, or motor and drive measures installed.

Owners and managers speculated that this might be because modeling is required for these systems, unlike prescriptive “plug-and-play” measures like lighting that are easier to specify and install. This is

aligned to observations by some of the PAs and the PEX contractors that there are insufficient contractors trained in non-lighting measures to meet the needs of this market segment.

- CRE customers require quick decision-making and limited paperwork requirements.

In the CRE market speed of replacement is a major factor for critical systems like HVAC. When equipment fails the property owners/managers often need to replace it within a day, leaving little time to research the best available option. This was illustrated by a focus group participant who said, “these decisions are made within thirty minutes, so if there is a program, it needs to be something that you can act on that you know what you are getting.”

Both building owners and managers have identified existing processes as a possible barrier to the implementation of projects. Seemingly small paperwork issues may create resistance. A common critique was that participants had to fill in their company and contact information on every application even if they did ‘repeat business’ with the PAs. Suggestions for a more user-friendly program design included moving to an internet-accessible, online, paperless system and developing an “app” to submit applications. Focus group participants suggested that application information could be prepopulated based on the account or customer number and would substantially reduce the paperwork burden for frequent participants. The PAs may increase participation by introducing ‘on-line’ applications and upload/submission of supporting data.

- There is a need for more contractors sufficiently trained in comprehensive solutions.

KEMA research indicates that the number of contractors trained in comprehensive or custom solutions to service the needs of mid-size customers is insufficient. Many mid-size businesses are well served in lighting measures, which are typically handled through the Direct Install program; fewer customers were found to have heating, refrigeration, or motor and drive measures installed. This supports the claim by some of the PAs and the PEX contractors that there are insufficient contractors trained in non-lighting measures to meet the needs of this segment. The PAs should increase education, training and marketing to PEX and non-PEX energy service providers to ensure firms have the necessary specialized expertise required to identify and service CRE customer needs.

- New Prescriptive Packages will require complex technical work

The positive potential of sector-specific prescriptive packages leaves a number of questions unanswered. While ‘packages’ may simplify customer decision-making and were viewed as attractive to focus group participants, we do not know if ‘packages’ create synchronicities, or insure greater ‘depth’ to EE measures being adopted.

Unanswered implementation questions include how incentives would be established and assumed savings calculated. Significant technical work would be required to pursue questions such as:

1. Is it possible that a prequalified menu of products tied into CRE owners/property managers building standards would have a positive influence on EE decisions?
2. Could Massachusetts PAs offer a product menu that might include preferred pricing and streamlined incentive options?
3. How would packages’ be viewed differently than traditional utility prescriptive buy-down rebates?

4. How could energy savings be established on a 'per package' basis?
5. What is the best way to communicate these packaged EE measures to customers?
6. Do 'packages' create synchronicities, or insure greater 'depth' to EE measures being adopted?
7. Can 'packages' be combined with Point of Sale Rebates – collected by vendors?

Institutional Barriers

Review of the literature and market analyses identified the potential for PAs to accelerate adoption of energy-efficient decision making in the CRE sector by the promotion of 'Energy Labeling' and 'Dashboarding', and the encouragement of "Green" or Energy-Efficient Leasing practices.

These strategies are ranked lowest given the institutional nature of the issues. Leasing practices in particular are embedded private-sector issues (tenant landlord issues) and cannot efficiently or pragmatically be addressed through utility programs.

Energy Efficiency Leases

Proponents of energy efficiency, or "green," leases see them as a means to address non-technological barriers to energy efficiency in the CRE market. However, widespread adoption of Green Leases is slowed by several factors.

The commercial lease process is inherently a potentially stressful undertaking between two parties (Property Manager/Building Owner and the prospective Tenant) often working through a Leasing Agent. These main actors and decision makers have primary objectives, goals and metrics which can be very far apart. In particular, Leasing Agents may see utility involvement as an obstacle. "Green" leases may find greater acceptance by parties entering into negotiations on a property for the first time, and when the lease period being contemplated by the tenant is a longer one. Such leases are often viewed as impractical to existing tenants needing to renew their lease. Tenants interested in a shorter time commitment may see little value and much to be avoided in a Green Lease.

The value proposition for the PAs in promoting "Green" or energy-efficiency leases is not clear. Documenting measurable energy savings as a result of green leasing can be difficult, as drawing a linear connection between the use of lease language and the implementation of an energy efficiency measure will often be obscured by many other market and building-specific factors.

While in theory PAs can introduce energy-efficient lease resources to their customer base, the reality is that PAs rarely, if ever, have the ability to influence specific lease negotiations. Simply, PAs are not viewed as a trusted advisor on this topic in the way that leasing agents and attorneys are. While generating greater awareness and education of leasing issues may be good public policy, these efforts may be most effective when coordinated by local real estate organizations that bring historic credibility and market expertise to the task, with the support of the PAs.

Dashboard/Labeling/Benchmarking Energy Usage

Benchmarking can be a hot-button issue. Even though the BOMA International supports energy efficiency in buildings, it formally opposed mandatory energy benchmarking rules, such as the City of Boston Building Energy Reporting and Disclosure Ordinance (BERDO) which in 2016 will require commercial buildings over 25,000 square feet to report their annual energy to the City, to be made publicly available.

But longer term influences and lobbying efforts are driving industry change from inside out. Owners/managers in focus groups agreed that BERDO has helped them better track energy use at a building level. They believe that tracking at that level would have been previously impossible for landlords to do in a time-efficient manner.

Opinion Dynamics reported that nearly all of the larger CRE operators they interviewed formally track the use of energy in their portfolio of properties. Approximately half of the total square footage being managed is tracked with the Environmental Protection Agency's ENERGY STAR® Portfolio Manager, the balance of property managers use other systems and databases. Larger operators use tracking and benchmarking in the pursuit of corporate goals, including in some instances the marketing of projects as 'energy efficient'. However, owners generally report being reluctant to share data with tenants.

Difficulties applying Direct Install and Technical Assistance Models in the CRE market?

The Direct Install program is clearly identified as a key offering to Massachusetts Small Businesses on the Mass Save® website and on individual PAs websites. Most projects are initiated by one of the DI partners, and opportunities seized are mostly retrofit. A key difference between the market served by DI programs and the targeted CRE market is that that the DI program services existing accounts with retrofit EE measures.

Ideas for Future Exploration

Alternative Incentive Structures

Keeping incentive application processes simple and straightforward increases participation. Program administrators should consider fulfilling rebates through dealer point of sale systems. PG&E saw ENERGY STAR commercial fryer rebate submissions increase greatly¹⁶ when they moved to point of sale rebate processing.

Tenants believe that PAs should consider offering equipment and performance incentives together. Tenants also suggested providing incentives for smart strips and plug load metering that can provide very granular usage information and control.

Potential Packages Linked to Characteristic Tenant Occupancies

Any 'packaging' of EE measures or options to facilitate rapid decision making will likely draw from existing prescriptive measures typically recommended or applied to CRE end uses. Initially, targeted end

¹⁶ Energy Star – Commercial Food Service Guide 508, EPA

uses/property types could be offices (including outpatient medical offices), retail properties (including ‘mom & pop’ grocery stores and restaurants), and light manufacturing or industrial sales locations.

Packaged Restaurant Equipment Measures

Food service and lodging represented the greatest share¹⁷ of single unattached buildings within CRE businesses when weighted by kWh consumption.

ENERGY STAR certification currently is available in eight product categories: commercial hot food holding cabinets, solid and glass door refrigerators and freezers, fryers, steam cookers, ice machines, ovens (convection and combination ovens), griddles, and dishwashers. With the PAs territories, there are currently numerous prescriptive rebates available for both gas and electric-fire commercial kitchen equipment.

Packaged Light Industrial Measures

Light industrial wholesale sales, light manufacturing and similar uses are likely to have common lighting, motor and HVAC needs. There may be a compressed-air component found in these building and spaces.

Packaged Retail Display Lighting Measures

LED Lighting is changing the landscape of retail lighting. There is an abundance of LED fixtures and lamps to meet specific application needs. LED technology can be the basis of a Retail Lighting Makeover package of measures. Most every fixture used in retail applications now has an LED version.

Packaged Small Refrigeration Measures

The energy consumption of the refrigerators and freezers used in supermarkets, convenience stores, restaurants, and commercial kitchens defines a targeted market segment. Significant reductions in energy use are made possible by the availability of technologies such as LED lighting and occupancy sensors, high-performance glass doors, and high-efficiency motors.

Dashboards linking Customer and Utilities

Structured methods for informing customers about the specifics of their energy use can support tailored, custom recommendations for saving energy; and push customers towards action to achieve energy savings.

What is the value of web-based Dashboards linking Customer and Utilities? What role can Customer Engagement Platforms play in reaching the CRE market? Will energy-related recommendations seem more relevant and persuasive when based on the customer’s own experience? What limitations, if any, exist to its application to all customers, regardless of size?

¹⁷ DNV-GL, Massachusetts Commercial Real Estate Survey Analysis – Draft Report , Massachusetts Program Administrators and Energy Efficiency Advisory Council Consultants, January 19, 2015

Innovative Submetering

The benefits of Dashboarding can be enhanced with submetering for tenant spaces and primary building equipment. PAs can explore incorporating and incentivizing innovative technologies to better measure energy use in particular spaces and applications.

Promotion of Advanced Building Operator Training

Current PA programs should be examined for opportunity to expand. If additional training or certifications are needed, PAs can work with BOMA out how to bridge these gaps.

Streamlined Whole Building Energy Audits.

Without confidence on what are appropriate measures for various CRE uses, tenants and owners need to look for informed guidance. Finding out how to address the mid-size and Class B & C sectors as identified by the ODC Interviews should be a priority. Do focus group participants feel they have access to qualified energy assessment audit services? Is cost-sharing a barrier to obtaining guidance on how to pursue energy efficiency?

Do current DI and TA vendors have the capacity to provide additional services? If not is a 'Circuit Rider' program an alternative to traditional TA vendors?

Streamlined, lower cost (with a cost share) whole building audits can identify a number of operational and project-based opportunities for energy savings.

Work to implement best practices study for Retro-commissioning (RCx)

Find ways to implement deeper measures in CRE sector based on RCx projects.

Support services and Financing for mid-size customers.

Explore the need and possibility of providing incentives for project management support to owners in the CRE sector.

How would Vendors operate in a 'turn-key' fashion yet interface with other tenant fit-out contractors?

How can turn-key vendors communicate to higher-level actors in the CRE space? Who are decision makers that vendors need to connect with to be successful?

Are focus group participants open to DI and turn-key vendor involvement?

What do participants see as barriers to turn-key operations in the CRE sector?

Does the incentive level need to be higher for mid-size customers to engaging a turn-key track?

Is financing important to implement turn-key solutions? What is the best structure?

Appendix 1 – CRE WG Secondary Research

- C&I Customer Profile reports
 - 2012 - <http://ma-eeac.org/wordpress/wp-content/uploads/CI-Year-2012-Customer-Profile-Final-Report.pdf>
 - 2011 - <http://ma-eeac.org/wordpress/wp-content/uploads/Customer-Profile-Project-Revised-Final-Report-6.20.13.pdf>
- Mid-size Customer Needs Assessment - <http://ma-eeac.org/wordpress/wp-content/uploads/Mid-Size-Customer-Needs-Assessment-Final-Report-12.22.13.pdf>
- Market Sector Profile: Office buildings - <http://ma-eeac.org/wordpress/wp-content/uploads/Office-Buildings-Market-Sector-Profile-Final-Report.pdf>
- ABC- Energy Efficiency & Commercial Real Estate - Barriers and Opportunities in the Boston Market - http://www.greenribboncommission.org/downloads/ABC_Boston_Commercial_Real_Estate_-_Barriers_and_Opportunities.pdf
- Interview report – “Energy Efficiency Decision-Making in the Massachusetts Commercial Real Estate Market “ ODC – May 2014
- Roundtable discussion reports from ODC – Q4 2014/ Q1 2015
- The CRE Market report from WMA – July 2014
- NEEA/Better Bricks webinar and information – Sarah Hall Presentation to CRE WG, April 2013
- NEEA - Existing Building Renewal/Commercial Real Estate Research: <http://neea.org/docs/default-source/reports/existing-building-renewal-commercial-real-estate-research-market-characterization-attitudes-and-behavior-of-owners-and-service-providers.pdf>
- NEEA White Paper: Embedding Energy Efficiency in the Business of Buildings: Commercial Real Estate Contracts & Transactions - <https://www.aceee.org/files/proceedings/2010/data/papers/2033.pdf>
- PACE research for CRE - <http://www.institutebe.com/InstituteBE/media/Library/Resources/Financing%20Clean%20Energy/Setting-the-PACE-Financing-Commercial-Retrofits.pdf>
- Massachusetts Commercial Real Estate Survey Analysis - <http://ma-eeac.org/wordpress/wp-content/uploads/Massachusetts-Commerical-Real-Estate-Survey-Analysis-Final-Report.pdf>