

# Market Sector Profile: Office Buildings - Final

Massachusetts Program Administrators and EEAC Consultants

— Prepared by DNV GL  
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# 1. INTRODUCTION

This market sector profile is provided as part of the Massachusetts Existing Buildings Market Characterization study. It provides an overview of office buildings using industry information and the Massachusetts Commercial and Industrial (C&I) Telephone Survey data collected between September and December 2013.

The purpose of the market sector profile is to:

1. Provide the Massachusetts Program Administrators (PAs) and Energy Efficiency Advisory Council (EEAC) Consultants with a more detailed understanding of the office building industry.
2. Identify key customer data and show the distribution of building, decision making and equipment characteristics across customer size segments and building uses.
3. Identify key potential energy efficiency opportunities or areas that warrant further investigation using primary and secondary data.

## Methodology / Data Sources

The market sector profiles were developed by:

1. Analyzing the buildings, operations and maintenance practices, and equipment information collected from office buildings during the Massachusetts C&I Customer Telephone Survey conducted on behalf of the PAs and EEAC in the fall of 2013.
2. Collecting and reviewing information on office buildings from secondary data sources including: the California Energy Use Survey (CEUS) but not limited to; Commercial Buildings Energy Consumption Survey (CBECS); Energy Information Administration (EIA), and the Department of Energy.
3. Comparing the data from the Massachusetts C&I Telephone Survey with the secondary sources and reporting the results.

One hundred and twenty seven respondents to the Massachusetts C&I Telephone Survey were office buildings. Seventy two of those customers were in the small office size category, 15 were in the medium size office category and 40 occupied large office buildings.

Small, medium and large sized office buildings were defined in this research according to 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.

While this study is based upon the survey data collected for 127 office respondents, the number of respondents for the individual sub-categories (i.e. small, medium, large office) is small. Therefore, some of the findings in this study may not be statistically representative of the small, medium and large population of office buildings in Massachusetts.

This profile contains:

- A general industry overview
- A synopsis of office building customer characteristics according to industry data and the telephone survey (building, customer, and equipment characteristics)
- Key findings

## 2. INDUSTRY OVERVIEW

Office buildings make up 17% of all commercial building energy use in the United States (U.S.). Up to 51% of the energy use in this sector is consumed by HVAC end-uses (heating, cooling, and ventilation) and up to 25% by lighting according to the U.S. Energy Information Administration.<sup>1</sup>

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.<sup>2</sup>

The sector can be divided into the 10 sub-sectors defined in the Commercial Building Energy Consumption Survey (CBECS)<sup>3</sup>:

- Financial /Insurance/Real Estate
- Legal
- Mixed-Use/Multi-tenant
- Lab/R&D Facility
- Software Development
- Office with Warehouse
- Government Office/Public Services
- Public Safety (fire, police, etc.)
- Telecom/Call Center
- Data Processing/Computer Center

Most small office buildings customers in the MA C&I Telephone Survey were financial, insurance, real estate firms (46%). Medium- and large-sized office buildings customers were primarily mixed-use/multi-tenant (39% and 42% respectively).

According to the Building Owners and Managers Association (BOMA) International, the economic outlook for Office Buildings across the U.S. has improved since the 2008 recession but recovery is slow to gain traction.<sup>4</sup> Low corporate profit and high unemployment have battered the sector since the 2008 recession and contributed to the relatively low 1.7% annual growth rate<sup>5</sup>. Based on a study conducted by IBIS World on commercial leasing in the U.S, it is expected that office building vacancies to slowly fill as consumer spending and business confidence returns but growth may be slowed by the rise in e-commerce and the number of employees working from home.<sup>6</sup>

The Boston and Springfield metropolitan areas are expected to realize lower vacancies than the U.S. and northeast region over the next five years.<sup>7</sup> Furthermore, the Northeast region will see lower vacancy rates than the rest of the U.S.

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<sup>1</sup> Pacific Northwest National Laboratory and PECL. Advanced Energy Retrofit Guide – Office Buildings, Prepared for: U.S. Department of Energy, September 2011. [http://www.pnnl.gov/main/publications/external/technical\\_reports/PNNL-20761.pdf](http://www.pnnl.gov/main/publications/external/technical_reports/PNNL-20761.pdf)

<sup>2</sup> ENERGY STAR Portfolio Manager, Energy Use in Office Buildings.

<sup>3</sup> The Commercial Buildings Energy Consumption Survey (CBECS) is a national sample survey administered by the U.S. Energy Information Administration that collects information on the stock of U.S. commercial buildings, including their energy-related building characteristics and energy usage data (consumption and expenditures)

<sup>4</sup> BOMA News Release, "BOMA's Experience Exchange Report® Findings Show Strong Asset Management Key for Commercial Real Estate," June 20, 2013. <http://www.boma.org/research/newsroom/press-room/2013/Pages/BOMA%E2%80%99s-Experience-Exchange-Report%C2%AE-Findings-Show-Strong-Asset-Management-Key-for-Commercial-Real-Estate.aspx>

<sup>5</sup> For all commercial buildings, including office. IBISWorld, Commercial Leasing in the U.S, November 2013.

<sup>6</sup> Ibid.

<sup>7</sup> <https://www.reisreports.com/real-estate-market-report/office/massachusetts/boston/entire-market/?uuiid=2869EDCC-9E91-2863-E95F079538369ACB>

<sup>8</sup> Data are not available for the non-metropolitan regions in Massachusetts.

**Table 2-1: Office Vacancy Rates<sup>9</sup>**

	Annualized	Three Year Average	Five Year Average
Boston	14.4%	14.2%	13.5%
Springfield	14.3%	N/A	N/A
Worcester	19.3%	17.7%	17.7%
Northeast	14.6%	14.6%	13.6%
U.S.	17.3%	17.3%	16.1%

Real estate firm Cushman and Wakefield named Boston one of the top 10 global office building markets and forecasts over 10% compound annual growth rate from 2013 to 2015. According to Cushman and Wakefield, the global office market is poised for slow steady growth in 2014, while 2015 should be more robust as recovery takes hold and business gains renewed confidence.<sup>10</sup> Boston is expected to see the highest office rental rate growth through 2015 among all U.S. cities and is one of the top three cities globally. While this may be the case for Boston, office market conditions can vary widely across Massachusetts due to the divergence between high growth cities versus secondary markets and large versus small buildings.

Industries such as technology, energy and new media sectors are driving the real estate recovery in the large buildings sector. Despite significant construction in the pipeline, Boston is expected to have continued strong demand and low vacancy rates that push rental prices up 11%.<sup>11</sup>

Conversely, slower growth is predicted where large office building tenants represent a more traditional mix of sectors such as financial and legal services. These business sectors have been more cautious about growth plans and workplace efficiency trends of consolidation and densification will continue further suppressing the growth of this building sector. Rental pricing will see little upward movement in the next two years until business gains confidence and significant job creation take place.<sup>12</sup>

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<sup>9</sup> Ibid

<sup>10</sup> Cushman & Wakefield, *Global Office Forecasts 2013-2015*, December 2013.

<sup>11</sup> Ibid.

<sup>12</sup> Ibid.

### 3. OFFICE BUILDING CHARACTERISTICS

#### 3.1 Building Characteristics

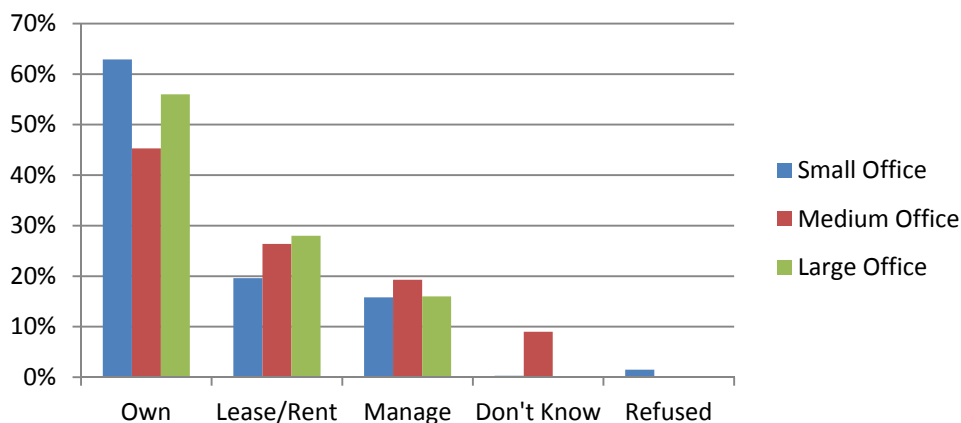
Small office buildings primarily consisted of financial, insurance and real estate firms. The medium sized firms generally consisted of multi- or mixed-use firms, while large offices consisted of financial, insurance, real-estate, mixed-use, and government buildings. Table 3-1 shows the population of offices in Massachusetts based upon billing data provided by the electric PAs.<sup>13</sup>

**Table 3-1: Population of Offices classified by PA**

PA and Size	# of Office Customers			
	Small	Medium	Large	Total
Cape Light Compact	3,337	6	3	3,346
NGRID	24,519	286	124	24,929
NSTAR	18,926	176	170	19,272
Unitil	601	3	1	605
WMECo	4,445	37	14	4,496
Total	51,828	508	312	52,648

Nearly 57% of office buildings representatives interviewed (weighted by kWh)<sup>14</sup> in the C&I Telephone Survey are the owners of the premises (Figure 3-1). Based on the survey, this is similar to ownership of facilities across other industries as well. Twenty five percent of respondents reported that they lease there spaces. In the medium and large office categories, a number of the respondents were building managers (20% and 28% respectively).

**Figure 3-1. Respondent Status (by kWh)**



Overall 47% of the customers operated out of single, unattached buildings while 14% operated out of a space that is part of a low-rise complex. Other customers indicated their facilities were part of a high-rise

<sup>13</sup> Gas billing data for the population was not complete at the time of the analysis.

<sup>14</sup> C&I Telephone Survey Data is weighted by kWh unless otherwise noted

building, or part of a campus of buildings. Table 3-2 shows the distribution of customers across single, attached, high-rise and campus type facilities.

**Table 3-2: Distribution of Survey Respondents Across Facility Types (by kWh)**

	Small Office Buildings	Medium Office Buildings	Large Office Buildings
A single, unattached building <sup>15</sup>	42.1%	44.0%	51.0%
Part of a low-rise complex	30.4%	7.5%	4.2%
Part of a high-rise office building	11.2%	32.8%	29.3%
Part of a campus of buildings	9.3%	15.8%	13.2%
Other	7.0%	0.0%	2.4%

\*\*\* Totals due not add to 100% due to do not know and refused responses.

Approximately 32% of all office customers indicated they operate in buildings that were built before 1980. In relation to the size, the larger customers indicated their buildings were relatively newer facilities with over 60% of the large office customers indicated their building was built after 1990. Table 3-3 shows the distribution of building ages.

**Table 3-3. Office Building Age (by kWh)**

Age of Building	Small Offices	Medium Offices	Large Offices
Before 1950	13.5%	25.5%	7.7%
1950-1989	40.2%	38.4%	31.6%
1990-2005	8.5%	5.4%	55.0%
2006-Present	16.0%	0.0%	5.8%
Total	100%	100%	100%

\*\*\* Totals due not add to 100% due to do not know and refused responses.

The leasing arrangements vary for the customers across the size segments. Of the 25% respondents who lease their offices, nearly 80%, or 31 respondents, of the large customers surveyed indicated they operate under a triple-net lease arrangement<sup>16</sup>. Among medium customers with leases slightly more than half, 50.3% or eight respondents indicated they operated under gross leasing agreements where the building owner pays the utility bills. For small customers, their leasing agreements were fairly split among gross and net leases, 30.3% (22 customers) and 25.8% (19 customers) respectively.

<sup>15</sup> A single, unattached building is defined as a free standing low rise building.

<sup>16</sup> In a Triple Net Lease, the tenant pays taxes, insurance and operating costs in addition to rent



**Figure 3-2. Leasing Arrangements (by kWh)**

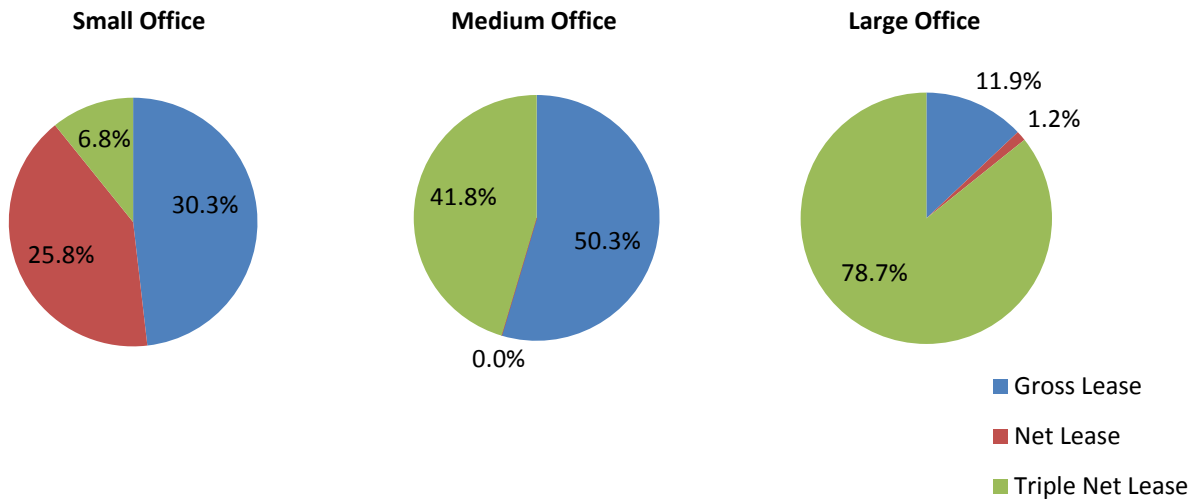


Table 3-4 shows the average length of lease for respondents who rented their office spaces. Month-to-month leases were common only to small offices while larger offices tended to enter into longer term leases. Furthermore, over one third of large office respondents reported having leases of more than 10 years.

**Table 3-4. Average Lease Lengths (by kWh)**

Length of Lease	Small Offices	Medium Offices	Large Offices
Month-to-Month	31.4%	0.0%	0.0%
1 Year	18.5%	17.0%	0.0%
2-4 Years	14.3%	13.2%	0.0%
5-9 Years	8.5%	0.0%	18.2%
10 Years	0.0%	15.0%	13.5%
More than 10 Years	9.6%	0.0%	34.9%
Total	100%	100%	100%

\*\*\* Totals due not add to 100% due to do not know and refused responses.

One of the main deterrents to energy efficient improvements can be commercial real estate leasing structures and the issue of “split incentives.” Net and modified gross leases, where the owner bears the costs of capital improvements and the tenants pay operating expenses, are common in the commercial real estate industry. Under these types of agreements, the building owners make the investment while the tenant becomes the beneficiary of the reduced operating expenses. The result is that the building owners have little direct financial incentive to invest in more efficiency equipment. To further complicate the issue, unless the tenant space is separately metered or sub-metered, all of the tenants pay a pro rata share of the

building's energy costs. In this case, tenants share in both the reward of their improved behavior and the costs of other tenants' wasteful behavior. This results in little incentive for tenants to modify their behavior or implement any energy-reduction strategies.<sup>17</sup>

### 3.2 Customer Characteristics

Almost 40% of the office building customers surveyed in the Massachusetts C&I Customer Telephone Survey were mixed-use/multi-tenant facilities. These customers were generally concentrated in urban and metropolitan areas in eastern and central Massachusetts. Financial, insurance or real estate firms accounted for a third of the respondents.

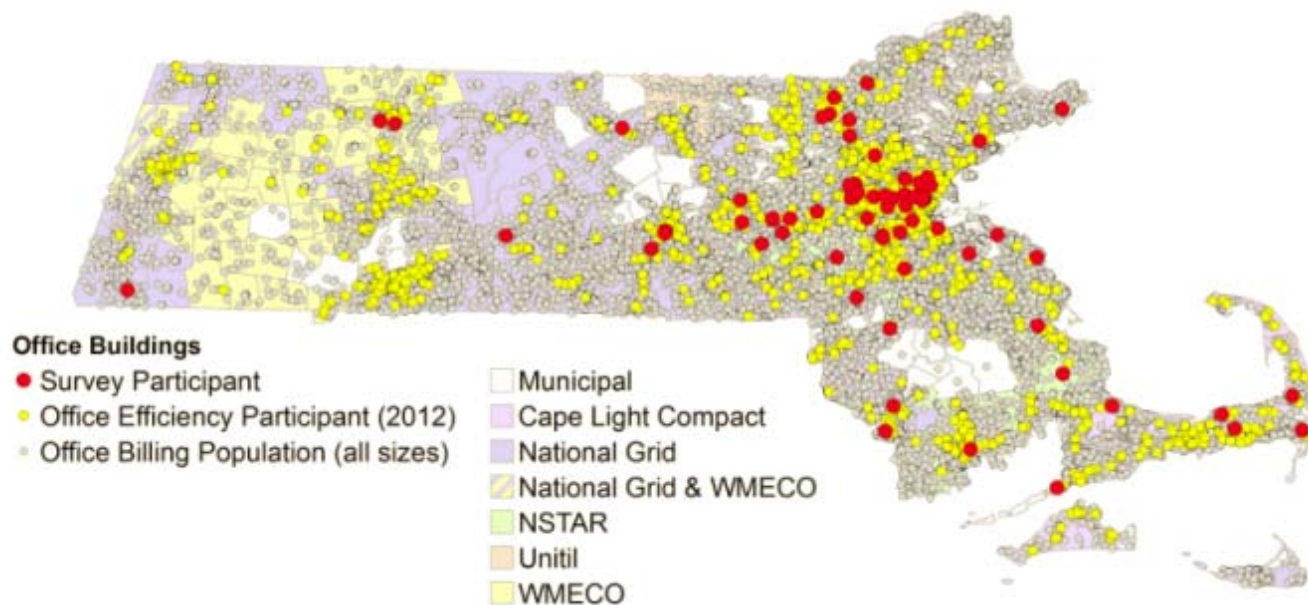
**Table 3-5. Distribution of Offices Surveyed (by kWh)**

Type of Office	Small Offices	Medium Offices	Large Offices
Financial /Insurance, Real Estate	38.4%	0.0%	35.8%
Legal	0.8%	0.0%	1.2%
Mixed-Use/Multi-tenant	27.9%	38.6%	45.2%
Lab/R&D Facility	0.0%	18.5%	6.6%
Software Development	0.0%	0.0%	1.7%
Office with Warehouse	5.9%	11.7%	4.5%
Government Office/Public Services	12.9%	0.0%	5.1%
Telecommunications Center	0.0%	8.2%	0.0%
Other	6.5%	8.6%	0.0%

\*\*\* Totals due not add to 100% due to do not know and refused responses.

<sup>17</sup> Rocky Mountain Institute / Building Owners and Managers Association, "Working Together for Sustainability: The RMI – BOMA Guide for Landlords and Tenants," June 2012

**Figure 3-3. Total Population and Location of Survey Participants**



Overall, office building customers who participated in the electric energy efficiency programs in 2012 were fairly well distributed across the state with clusters around cities and surrounding communities of Boston, Worcester, and Springfield (Figure 3-4). Gas program participants in 2012 were located primarily in eastern and southeastern Massachusetts (Figure 3-5).

The maps also show several areas of aggregate high energy usage, where many office buildings operate, and where none participated in 2012 efficiency programs.

Figure 3-4. Electric Program Participants According to Electric Consumption<sup>18</sup>

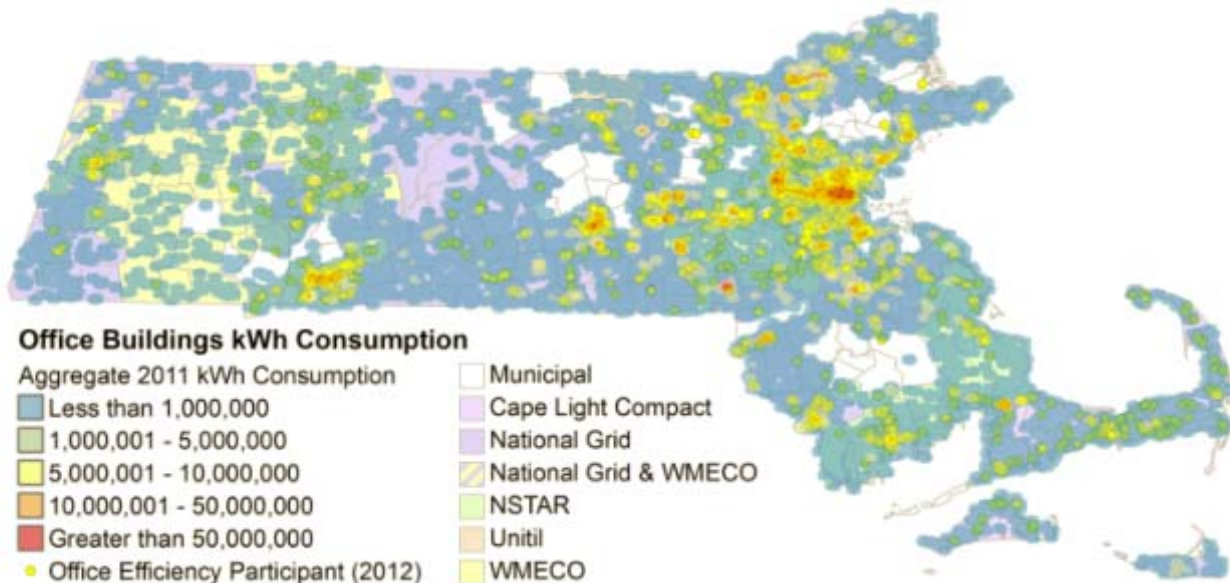
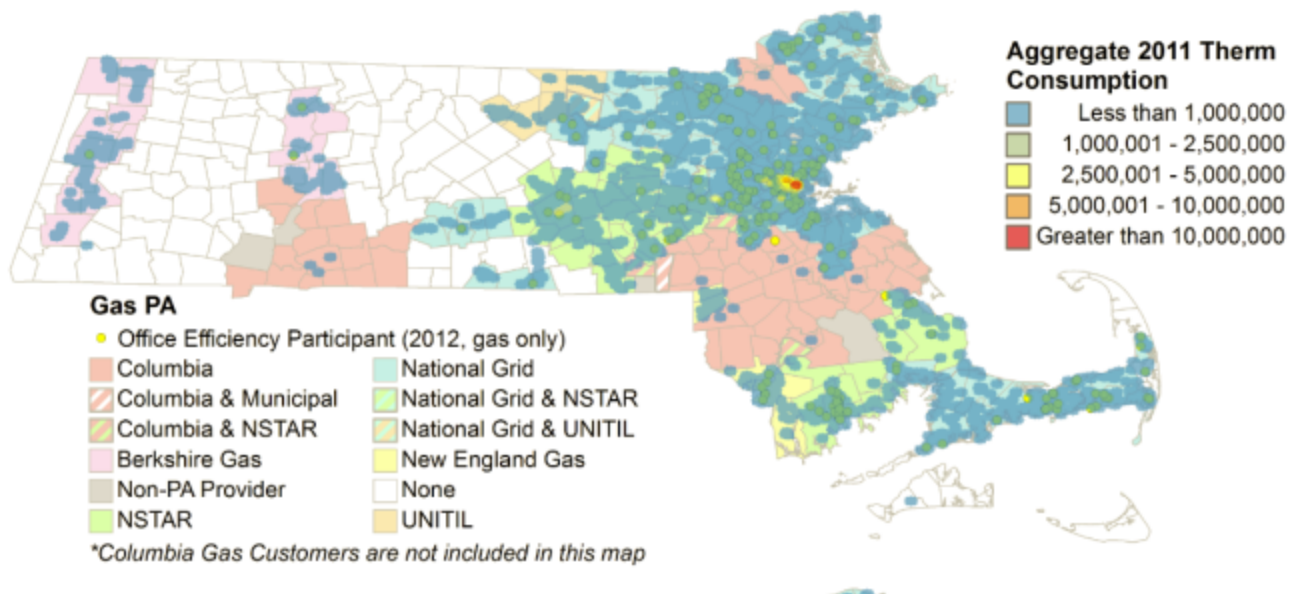


Figure 3-5. Gas Program Participants and Gas Consumption<sup>19</sup>



<sup>18</sup> Please refer to the 2012 Customer Report Chapter 8 for a complete breakdown of program participants by PA and business type.

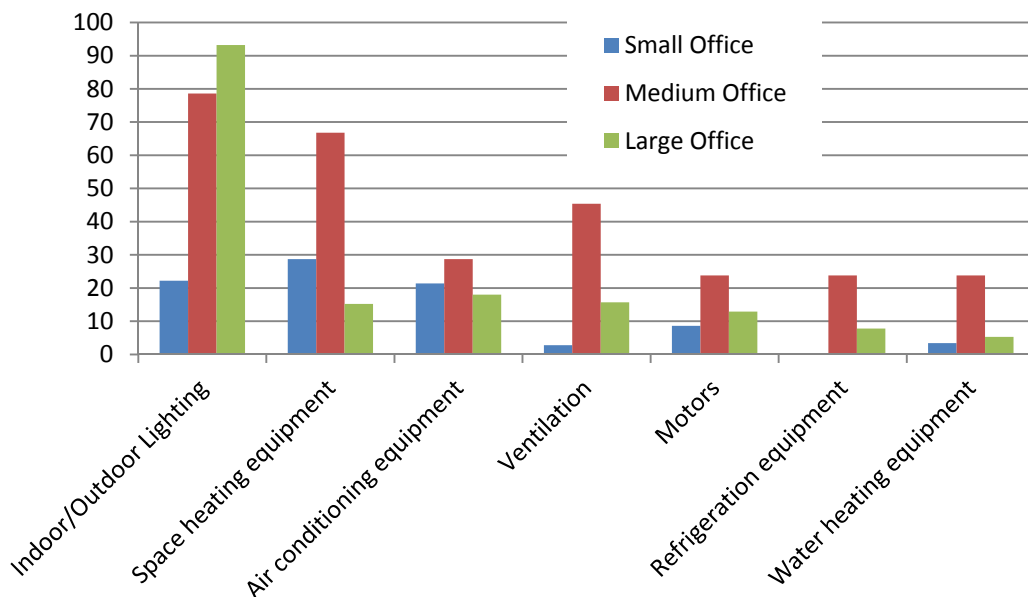
<sup>19</sup> Ibid.

Overall less than 15% of the offices surveyed reported that they had undergone major renovations in the last 5-years. Of those respondents who completed major renovations, the most renovations were completed by large offices (35%).

Among the offices that did make improvements to their facilities, most focused on air conditioning (25%), hot water heating (14%) and indoor lighting measures (14%). The primary reasons given that that these changes were made were:

- Air conditioning: Improve efficiency, new installation, and failed or broken equipment.
- Lighting: Improve efficiency
- Hot water heating: Improve efficiency, new installation, and failed or broken equipment
- Additionally, 5.9% of the cooling systems and 9.3% of the heating systems installed were done as part of a larger remodeling project by the respondents

**Figure 3-6. Equipment Upgrades Being Considered**



According to the responses to the survey, many office type customers continue to consider improvements in lighting, particularly medium and large office customers. There was also interest in heating, air conditioning and ventilation among other ECM's to some extent within the medium and large office customers. The primary focus on the installation of lighting equipment differs from the past renovations where air conditioning measures were the most common project.

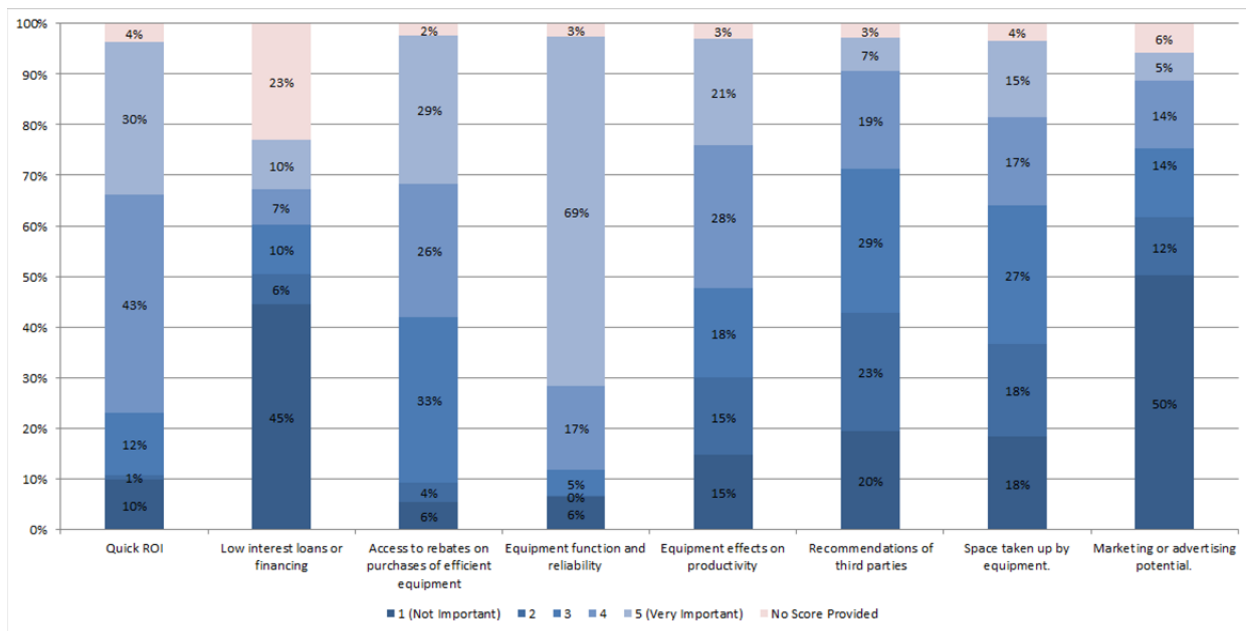
Customers indicated that the reason they have not moved forward with implementing these additional measures relate to:

- Lack of or no funds available for investments
- Other priorities for capital spending
- Issues with integrating technologies

### 3.2.1 Investment Decision Factors

Office building managers and owners consider a variety of factors when assessing whether or not to undertake an equipment upgrades. However, according to the MA C&I telephone survey results, equipment reliability was the most important factor when deciding on investing in new equipment office building customers. Sixty- nine percent of survey respondents answered that this is ‘very important’ when making these types of decisions. This was followed by quick return on investment that 30% rated as “very important “ and access to rebates that 29% rated ‘very important.’

**Figure 3-7. Importance of Investment Decision Factors**



Financial payback thresholds for energy efficiency investments varied across the office sector respondents. For large offices, nearly 82% of respondents stated that their payback threshold was four years or less while only 17% of small offices cited the same threshold. However, 23% of all offices indicated that they did not have an investment threshold when considering purchasing energy efficiency equipment.

Previous research has also shown that building owners and managers recognize non-energy benefits when making energy efficient upgrades<sup>20</sup>. These can include:

- For lighting improvements – decreased time spent changing bulbs; decreased time spent overseeing contractors who replaced less efficient lighting more frequently; decreased cost of purchasing due to energy efficient light bulbs lasting longer
- HVAC - decrease in annual maintenance of the HVAC systems; saved labor hours from overseeing contractor visits, repairs, and purchasing new parts or supplies; improved occupant comfort leading to decreased renter turnover
- Water Heating - decrease in staff time spent on equipment maintenance.

<sup>20</sup> Massachusetts Program Administrators, “Commercial and Industrial Non-Energy Impacts Study,” June 2012

Customers also claimed that due to the new energy efficient equipment, there were less equipment failures leading to fewer disruptions in the work day.

Combining non-energy benefits and the direct energy and cost benefits in promotional materials to real-estate professionals, may further enhance energy efficiency marketing campaigns.

### 3.3 Equipment Characteristics

#### 3.3.1 Heating and Cooling Equipment

Types of HVAC equipment varies across office buildings. Small and medium sized office buildings usually use unitary (packaged) HVAC equipment and systems, while large offices typically use built-up equipment and systems.

In the Massachusetts C&I Telephone Survey, small office buildings reported packaged air conditioning and window units as the most common systems for cooling. For medium size office buildings, respondents indicated that packaged rooftop units, heat pumps and central chilled water systems were commonly used. For the large customers, packaged rooftop units were found to be the most common source of cooling. Typically in large office buildings the package rooftop units are units that provide both heating and cooling, and not just cooling. The high response rate may reflect the respondents' limited familiarity with the buildings' HVAC systems. The C&I On-site Study will verify the type of primary cooling equipment installed in offices.

**Table 3-6. Primary Cooling Equipment, Office Buildings<sup>21</sup>**

Cooling Equipment	Small Office	Medium Office	Large Office
Central chilled water plant	23.1%	49.7%	37.8%
Packaged air conditioners	46.2%	20.9%	57.2%
Split-system heat pumps	0.7%	9.2%	0.0%
Split-system air conditioners	1.8%	0.0%	1.9%
Individual window or wall units	4.8%	13.8%	1.1%
Evaporative (swamp) coolers	3.7%	0.0%	0.0%
Other / Don't Know	19.7%	6.4%	2.0%
Total	100.0%	100.0%	100.0%

\*\*\* Totals do not add to 100% due to do not know and refused responses.

In regards to heating systems, central boilers are the most common source of heating for their facilities irrespective of size. Small building reported central furnaces as also being a common source of heating.

<sup>21</sup> Data summarized within this table has been self-reported and may not be representative of the broader industry. This data will be confirmed during the C&I Customer On-site Study.

**Table 3-7. Primary Heating Equipment, Office Buildings**

Heating Equipment	Small Office	Medium Office	Large Office
Central boiler(s) that produce steam or hot water	39%	51%	25%
Central furnace(s)	21%	0%	22%
Rooftop or packaged heating units, other than heat pumps	3%	9%	3%
Split-system heat pumps	1%	9%	1%
Portable space heaters, other than heat pumps	2%	0%	0%
District steam or hot water piped in from outside the building	13%	11%	2%
Other / Don't Know	20%	20%	43%
Total	100.0%	100.0%	100%

\*\*\* Totals due not add to 100% due to do not know and refused responses.

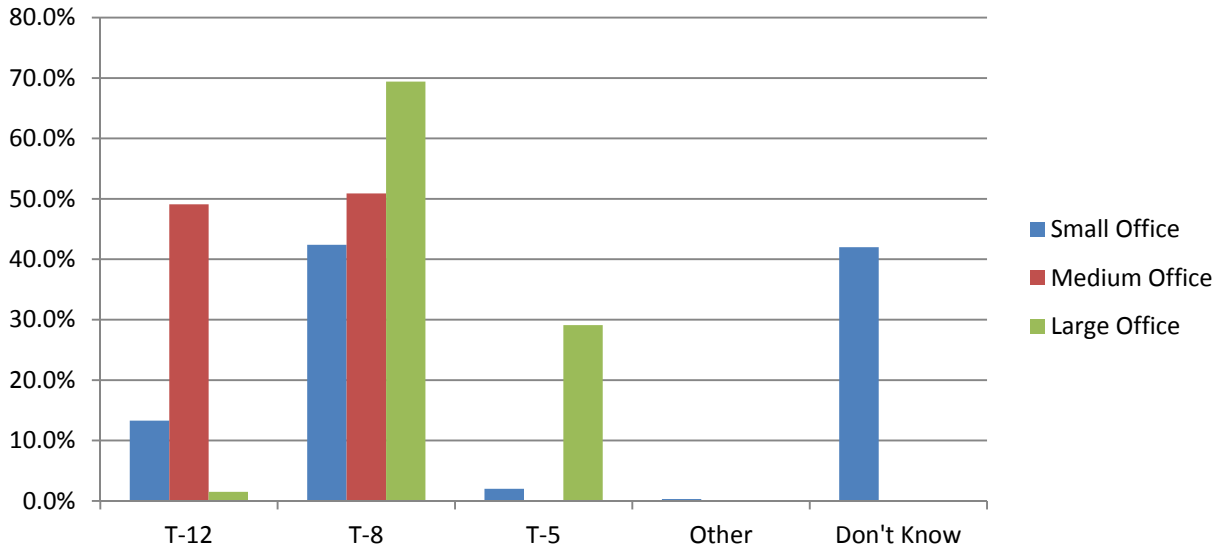
### 3.3.2 Lighting

Linear fluorescents are the primary lighting source for office buildings, particularly in medium and large size facilities where 76% and 89% respectively gave this response. In small facilities, 54% reported having linear fluorescents. A number of small customers also reported having incandescent and compact fluorescents as their primary lighting source (24% each).

Thirty-two percent, or five medium size offices reported that their linear fluorescents were T-12s. Sixty-seven percent (10 customers) indicated that had T-8s. While this finding was not statistically significant it does indicate an opportunity to further explore the potential for replacing T-12s in this market segment. In the small office segment, the majority of respondents did not know what type of linear fluorescents were installed (73%). Seventy-one percent of large customers indicated their linear fluorescent lights were T-8s.



**Figure 3-7. Type of Linear Fluorescent Lights Installed, Office Buildings**



The majority of medium and large offices, 62% and 79% respectively, have LEDs installed in their facilities. However, for small offices, only 37% claimed to have some type of LED lighting technology in their facilities. The higher rate of reported penetration of LEDs in the medium and large offices maybe the result of a higher penetration in these sectors of energy/facility managers who have a greater technical understanding of energy efficiency. For medium size and large offices, 74% and 75% of the respondents respectively were either a facilities manager or operations managers or engineers while only 21% of small customers claimed to be a facilities, operations/ energy manager or engineer.

The majority of small office respondents were owners, presidents, vice presidents, or chief financial officers. For these customers, energy related decisions were typically made at this level. Marketing LED technologies to these who are generally less technical in nature, may provide an opportunity for capturing additional savings.

Of those customers who do have LED lights installed, 43% of the customers reported installing them to replace screw-in light bulbs, 15% replaced linear fluorescents, and 13% use them as spot lights.

### 3.3.3 Energy Management Systems, Controls and Sensors

As might be expected, the use of a building energy management system (EMS) was not common for smaller customers. Seventy one percent of small customers did not report having EMS type control in their facilities. At the medium size and large size customer facilities, EMS controls were more common. Approximately 37% of medium size customers claimed to have an EMS. For large customers, 97% indicated that they have EMS controls in-place. The EMS systems were primarily direct digital control (DDC) systems, although 37% of medium customers and 31% of large customers indicated their systems use pneumatic controls. The systems were used to control primary heating and cooling, auxiliary heating and cooling, ventilation systems and lighting.

Regarding occupancy sensors, 60% of small customers claimed to not have occupancy sensors in the buildings while, 67% and 92% of medium and large sized customers did employ occupancy sensors at some level in their facilities. Most often these were installed in individual offices, conference rooms and kitchens.



Daylight sensors were reported somewhat less frequently:

- Less than 2% of small customers reported having daylight sensors within their facilities.
- 42% of large customers indicated their facilities used daylight sensors.
- 63% of medium customers indicated their facilities used daylight sensors.

## 4. KEY FINDINGS

Energy use is the single largest operating expense in commercial office buildings, representing approximately one-third of typical operating budgets according to the EPA.<sup>22</sup> Lower energy costs reduce operating expenses and increase property values. However, one of the main deterrents to energy efficient improvements is the issue of “split incentives” in commercial real estate leasing agreements. Net and modified gross leases are common in the commercial real estate industry. Under these types of agreements, the building owners bear the cost of improvements while the tenant becomes the beneficiary of the improvements through reduced operating expenses. The result is the building owners have little direct financial incentive to invest in more efficiency equipment.<sup>23</sup>

The results of the MA C&I Telephone Survey indicated that the majority of small and medium office building customers who leased their space operated under a triple-net lease; whereas the majority of larger customers operated under a gross leasing structure. Gross leasing agreements should pose less of a barrier to adopting energy efficient technologies since building owners are able to directly realize the savings benefits from investing in energy efficient equipment. While the number of respondents in this study was relatively small for the size categories, the results did indicate opportunities to pursue further research and data collection to determine the relevance to the larger office population. The data that will be collected as part of the PA’s Existing Building On-site Data Collection Study will help to further expand this information collected in this analysis.

To overcome the barriers associated with net leasing agreements the PA’s may consider:

- Engaging the tenants to make them more aware of energy use and offer suggestions for improving the energy culture. For example, meet with tenants to increase awareness of energy efficiency options. One such option could include an assessment of their potential for saving opportunities with respect to plug loads. Encourage tenants to inventory their plug loads to identify non-energy efficient equipment. Provide links to information sources that explain and list energy efficient alternatives. Encourage and support the development of a purchasing procurement plan.<sup>24</sup> Given the investment that building and property managers would need to implement these strategies, these activities should be targeted to larger tenant-leased buildings.
- Work with the owners to incorporate energy efficiency into retrofits or tenants fit-out. Engaging with tenants during the design and build out phase will provide opportunities to incorporate energy efficient technologies that might be missed in the design and may not be cost effective to retrofit later. Support the development of energy efficiency guidelines for use by building and property managers to help tenants during the fit-out process.<sup>25</sup>
- Promote “energy-aligned” leasing structures wherein both parties benefit from energy upgrades. To help encourage tenants to adopt energy efficient measures and address the split incentive barrier,

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<sup>22</sup> US EPA, “Commercial Real Estate: An Overview of Energy Use and Energy Efficiency Opportunities”

<sup>23</sup> Rocky Mountain Institute / Building Owners and Managers Association, “Working Together for Sustainability: The RMI – BOMA Guide for Landlords and Tenants,” June 2012

<sup>24</sup> Working Together for Sustainability – The RMW-BOBA Guide for Landlords and Tenants.

<sup>25</sup> Ibid.

landlords can offer leases that share the cost savings to both parties based on the predicted savings to be achieved by the equipment that is upgraded.<sup>2627</sup> Under these leases, a portion of the energy savings can be used to offset the cost of the equipment incurred by the landlords. These leases can often have longer payback periods to allow tenants to make smaller recurring payments.<sup>2829</sup>

Other strategies to consider when working with office type customers in general are:

**Target Retrofits for Major Energy-Using Equipment.** HVAC and lighting represent about three-fourths total energy use and are therefore primary targets for energy retrofits.<sup>30</sup> While the PAs' suite of programs already target HVAC and lighting, there remains opportunities to identify sub-sectors of the C&I market where these technologies have not sufficiently penetrated, such as small offices. In addition, build greater awareness among tenants of the savings and options associated with energy efficient plug load equipment. More education about the energy and financial benefits can help to engage customers and encourage more proactive energy efficiency planning (e.g., development of an energy efficiency or sustainability procurement plan).

**Continuous Improvement through Operations & Maintenance (O&M).** Developing a detailed O&M plan to incorporate preventative maintenance and regular performance checks is one of the most cost-effective approaches to achieve energy savings. Measuring the impacts over time can quantify savings and will help justify the O&M program.<sup>31</sup> Review O&M best practices for tips and to gauge the program's effectiveness.

**Adopt a targeted EE approach to reflect the divergence in office building outlooks.** Larger office buildings in major metropolitan areas (primarily Boston) with low vacancy rates will have different drivers of energy efficiency improvements than office buildings located outside major cities with higher vacancy rates and/or tenants engaged in business sectors showing.

**During major retrofits and fit-outs work with customers to ensure HVAC equipment is properly sized by providing sizing guidelines as well as O&M plans to ensure the system continues to operate optimally in the future.**

**Speak to real-estate professionals in their own language.** According to our secondary research, when discussing the benefits of energy efficient upgrades, speaking to real estate practitioners in their own language – i.e. explain energy-efficiency improvements in relation to increased net operating income and improved asset value<sup>32</sup>.

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<sup>26</sup> Ibid

<sup>27</sup> <http://www.nyc.gov/html/gbee/html/initiatives/clause.shtml>

<sup>28</sup> Ibid

<sup>29</sup> <http://www.nyc.gov/html/gbee/html/initiatives/clause.shtml>

<sup>30</sup> Pacific Northwest National Laboratory and PECL. *Advanced Energy Retrofit Guide – Office Buildings*, Prepared for: U.S. Department of Energy, September 2011.

<sup>31</sup> Ibid.

<sup>32</sup> US EPA, "Commercial Real Estate: An Overview of Energy Use and Energy Efficiency Opportunities," June 2012



## ABOUT DNV GL

Driven by our purpose of safeguarding life, property and the environment, DNV GL enables organizations to advance the safety and sustainability of their business. We provide classification and technical assurance along with software and independent expert advisory services to the maritime, oil and gas, and energy industries. We also provide certification services to customers across a wide range of industries. Operating in more than 100 countries, our 16,000 professionals are dedicated to helping our customers make the world safer, smarter and greener.