# Commercial Building
# Interval Meter Data Analytics Study
# Final Report

**Submitted by:**

Retroficiency    CADMUS

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# Executive Summary

Retroficiency, Inc. ("Retroficiency") and The Cadmus Group ("Cadmus") partnered to develop and execute a commercial baseline energy usage and energy efficiency study for the Efficiency Maine Trust ("Efficiency Maine"). Using new advancements in data analytics, Retroficiency and Cadmus (as the "Retroficiency Team") designed the study to assess a sample of more than 500 buildings across 8 commercial sectors within Central Maine Power's ("CMP") service territory, representing more than 158 gigawatt-hours of annual consumption.

Retroficiency's Virtual Energy Assessment ("VEA") solution leveraged interval meter data to remotely perform energy assessments across several commercial building use types to determine the energy usage and energy savings potential on an end-use basis (e.g., lighting, plug loads, heating, cooling, ventilation, etc.) for each building, without ever going on-site. By using meter analytics as the basis for this study, the report provides savings estimates that account for seasonal and time-of-day characteristics across several commercial building use types.

Because hundreds of buildings, containing tens of thousands of consumption data points each, were analyzed as a starting point, this Retroficiency and Cadmus study reflects the unique characteristics of certain medium and large commercial buildings[1] across CMP's service territory.

The savings potential presented in this study is not meant to be a substitute for Efficiency Maine's full electric potential study that incorporates all subsectors of the commercial sector, extends over ten years and takes into consideration adoption rates. Instead the efficiency potential presented in this report will be used to inform program design and customer acquisition.

[1] As defined by rate class. Specifically, the buildings analyzed as part of this study were subject to CMP's Medium General Service, Intermediate General Service, and Large General Service tariffs.

# Introduction

Retroficiency and Cadmus partnered to provide Efficiency Maine with a commercial baseline energy usage and energy efficiency study, using interval meter data analytics. This approach leveraged deep, building-specific analytics on a carefully selected sample of hundreds of buildings, and the extrapolation of those results to the greater Maine market.

With extensive interval/smart meters deployed throughout Maine's electric utility territories and having previously seen the value of interval analytics through its Innovation Pilot program, Efficiency Maine was motivated to use this technology to rapidly characterize the current energy consumption and savings potential of CMP's population of medium and large commercial customers. Efficiency Maine sought to gain a better understanding of the baseline energy consumption and energy efficiency potential of key commercial sectors through this study. There were four key areas of interest:

- Percentage of accounts and load at the sector level
- Benchmark energy intensity at the sector level
- End-use consumption and energy savings potential at the sector level
- End-use consumption and energy savings at the building level

Using stratified random sampling, stratified by size and business type, the Retroficiency Team designed a representative sample of buildings across eight key sectors. Sample sizes were developed to minimize variance of estimates.

The study used Retroficiency's VEA to analyze this representative sample of various commercial buildings. VEA provides a detailed assessment of buildings using proprietary rapid energy modeling approaches, without ever going on site. Using a building's address and 12 months of historical meter data as the inputs, VEA delivered building-specific insights, including end-use consumption and savings potential.

Finally, the Retroficiency Team developed and applied case weights to the VEA results to correct for sample bias. The study relied on CMP consumption data for medium and large commercial customers, and thus the results are only extrapolated to that population of customers. However, the eight key sectors selected for this study represent 76% of consumption amongst CMP's medium and large commercial accounts.[2] The results of this study are most applicable to Efficiency Maine's C&I Prescriptive program and C&I Custom program.

The study weaved together a number of complex tasks in a relatively short time period. The steps involved and the associated timing are summarized in Figure 1, beginning with the initial data transfer.

[2] The eight selected sectors represent 59% of the energy consumed by CMP's medium and large commercial customers. Production/process accounts were not analyzed for this study. Excluding production/process consumption, the study's eight sectors represent 76% of annual consumption.

**Figure 1. Timeline**

| Phase | Milestone | Owner | Duration | Week # | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 |
| **Pre-Sample Design Preparation** | | | | | | | | | | | | |
| | Transfer Required Customer Data | CMP | 2 weeks | | | | | | | | | |
| | Procure Third Party Data | Retroficiency | 1 week | | | | | | | | | |
| | Align Third Party Data with Customer Data | Retroficiency | 1 week | | | | | | | | | |
| **Sample Design** | | | | | | | | | | | | |
| | Sample Design | Cadmus | 1 week | | | | | | | | | |
| **Interval Data Analysis** | | | | | | | | | | | | |
| | Transfer Required Interval Data | CMP | 2 weeks | | | | | | | | | |
| | Interval Data Analysis | Retroficiency | 2 weeks | | | | | | | | | |
| **Extrapolate to Market** | | | | | | | | | | | | |
| | Extrapolation Analysis | Cadmus | 1 week | | | | | | | | | |
| | Transfer Results to Efficiency Maine | Retroficiency | 1 day | | | | | | | | | |

This report describes the study methodology, results, and findings.

# Methodology

This section of the report discusses the four phases of the study, and the underlying methodology:

- **Pre-Sample Design Preparation**: The Retroficiency Team procured proprietary third-party firmographic and building data, and aligned this data with customer billing data from CMP. Retroficiency and Efficiency Maine collaborated on the selection of the eight key sectors (as identified below) that reflect the majority of Maine's commercial building stock for this study.
- **Sample Design**: Cadmus designed a representative sample of buildings for interval analysis, focusing on the eight key sectors.
- **Interval Data Analysis**: Retroficiency conducted VEAs on the Cadmus-identified sample of buildings. In total, 537 buildings were analyzed across eight sectors.
- **Estimate Market Potential**: Using a case weighting methodology designed to mitigate potential bias, Cadmus extrapolated the results of Retroficiency's VEAs to characterize end use consumption and savings potential across the eight selected sectors.

## Pre-Sample Design Preparation

### Rate Classes

CMP interval data is exported by rate class. CMP interval data is available as 15-minute readings for Medium General Service ("MGS"), Intermediate General Service ("IGS"), and Large General Service ("LGS") rate classes, and as hourly readings for the Small General Service ("SGS") rate class.[3] VEA is compatible with 15-minute interval data and hourly interval data formats.[4]

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[3] The CMP rate schedules detail rate descriptions and service thresholds: http://www.cmpco.com/YourHome/pricing/pricingSchedules/default.html. At a high-level, SGS is applicable to customers whose maximum monthly measured demand does not exceed 20 kW, MGS is applicable to customers between 20 kW and 400 kW, IGS covers between 400 kW and 1,000 kW, and LGS covers above 1,000 kW.

[4] VEA is also compatible with monthly consumption data, although this study was limited to interval data analytics.

During initial data discussions, Efficiency Maine, CMP, and the Retroficiency Team determined that the study would focus on three commercial rate classes: MGS, IGS, and LGS. Streamlining CMP data requests, retaining consistent data granularity, and a quick timeline were key factors in Efficiency Maine's decision. As a result, the study covered only MGS, IGS, and LGS rate classes, and thus the final results are only applicable to customers in those rate classes.

The Retroficiency Team received customer billing data from CMP for all MGS, IGS, and LGS commercial customers for purposes of selecting both the sectors for analysis and the specific buildings for the sample.

### Sector Selection

Before moving forward with the sample design and interval data analytics, the Retroficiency Team and Efficiency Maine had to select the eight key sectors for the study. The team procured additional firmographic data, mapped buildings to sectors, and summarized the sector distribution of unique accounts and annual usage to inform the sector selection. The following steps were required to create the sector summary:

- The Retroficiency Team sourced firmographic and square footage data from proprietary third-party sources, and mapped this to the CMP billing data.[5]
- The team aggregated annual usage from the billing data across all unique accounts received from CMP. This was sourced from the April 2014 to March 2015 monthly usage values in the CMP billing data.
- The aggregated annual usage was grouped by sector, as determined using third-party firmographic data. In cases where third-party data was not available, the SIC codes received from CMP were used.

The following chart (Figure 2) shows the sector distribution of all unique accounts and annual usage.[6] Appendix A provides a more granular presentation of the aggregated annual usage results, in addition to specific sector examples.

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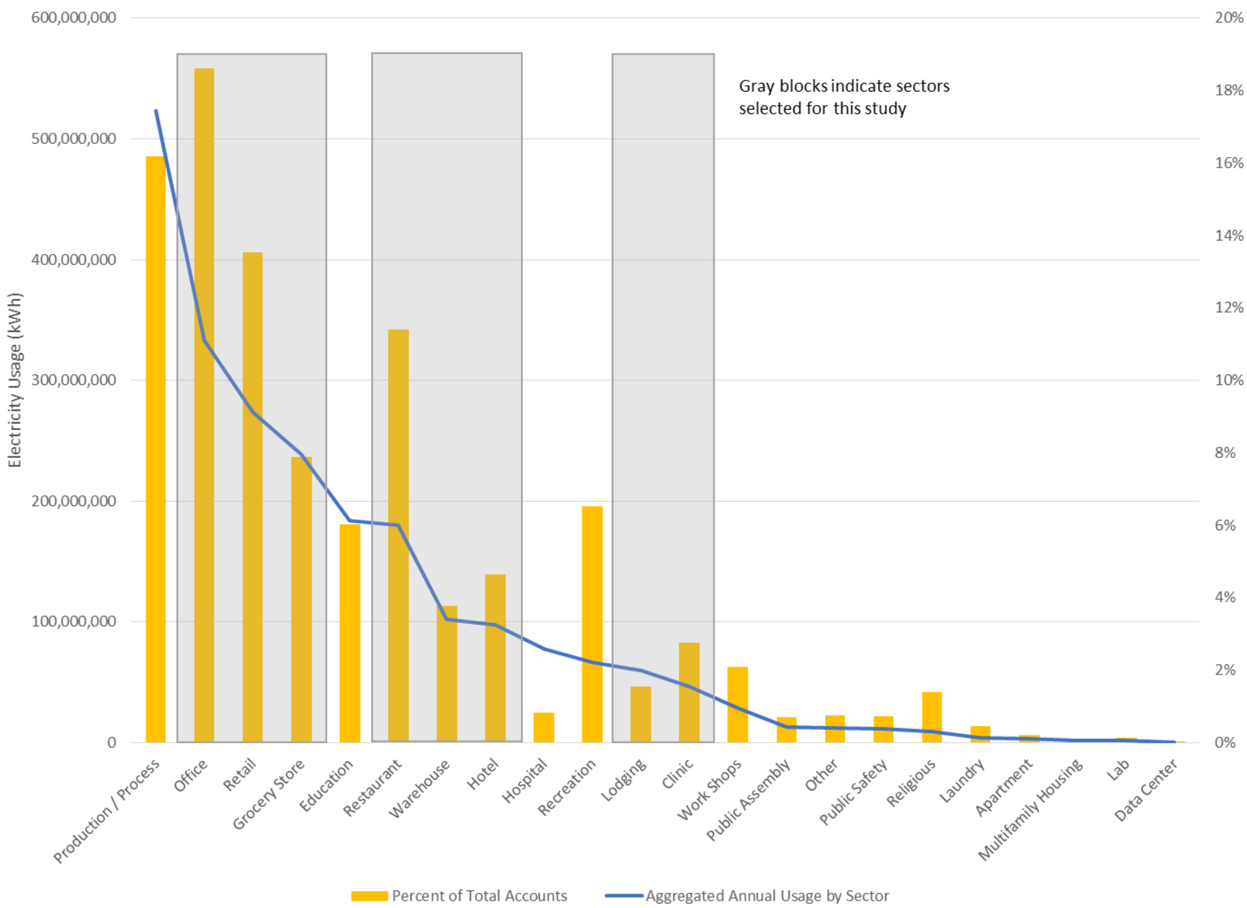
[5] The CMP billing data did not include service address street suffix (Street, Road, Avenue, etc.). Efficiency Maine instructed Retroficiency to move forward with the billing data as-is, and document the necessary assumptions in the final report. Retroficiency's software verified building service addresses using postal databases. Without the service address street suffix, Retroficiency relied on the other available address components to verify service addresses of the available buildings.

[6] Figure 2 depicts all MGS, IGS, and LGS accounts received from CMP, including accounts not eligible or selected for the in-depth interval analysis.

**Figure 2. Sector Distribution of All Unique Accounts & Annual Usage**




The team collaborated with Efficiency Maine to select eight sectors for the study that represent a majority of Maine's commercial building consumption. The following eight sectors were selected: Office, Retail, Grocery Store, Restaurant, Warehouse, Hotel, Lodging, and Clinic. These eight sectors were selected after consideration of annual usage, number of accounts and relevance for Efficiency Maine programs. The study's eight selected sectors cover 76% of annual consumption (excluding production/process accounts).[7] The sample design, interval data analysis, and market extrapolation phases focused on the eight selected sectors.

Retroficiency provided Cadmus with a list of buildings for sample consideration. This file included 6,277 buildings in total, and 2,622 applicable buildings within the eight selected sectors.

[7] Or 59% of total annual consumption (including production/process) across CMP's medium and large commercial customers.

## Sample Design

Cadmus developed a stratified random sample to identify specific buildings to analyze. This process involved the following five steps:

1. **Identify commercial segments to analyze**. The team worked with Efficiency Maine to determine which eight segments would be analyzed (as discussed in the preceding Pre-Sample Design Preparation section).
2. **Determine sample sizes for each segment.** The team then determined the sample sizes required to produce estimates with 90% confidence, ± 10% relative precision.[8] Because this study involved estimating averages, the team used the following standard formula to determine the initial sample size:

$$n = (\frac{z}{e} \text{ x CV})^2$$

   Where z = 1.645 (the z value for a desired 90% confidence interval), e = 10% (the desired level of precision), and CV = 0.5 (a standard assumption for a coefficient of variation). For most segments, this formula yielded an initial sample size of 68 buildings.[9]
3. **Inspect sales and floor space to data to determine if stratification will improve estimates.** The distribution of consumption and floor space in each segment was examined to determine if sampling by subgroups of each segment (or strata) will reduce standard errors. The team identified fifteen strata within the eight segments. Strata are based on either a floor space cutoff or a segment subtype.
4. **Calculate optimal sample size for each strata.** A Neyman allocation was used to determine optimal sample sizes for each strata. This is a standard approach to minimize the expected variance of estimates for different segment.
5. **Select a random sample of buildings for analysis**. Once the team determined the optimal sample size for each strata in step four, the team identified a random sample of buildings for analysis. Within each strata, each building had an equal probability of selection.

Table 1 shows sample sizes for the fifteen strata. The team broke out offices, retail, hotels, restaurants, and clinics by building size (floor space). The team stratified the food sales segment by business type, including supercenters, convenience stores, and lightly refrigerated (LR) food sales. Warehouses and lodging are relatively homogenous segments and did not require stratification.

[8] Assuming a coefficient of variation of 0.5. While most estimates achieve 90/10 confidence and precision, some do not due to high variance.
[9] Final sample sizes for some buildings may be greater than the requisite 68 buildings due a minimum sample of 5 buildings required for individual strata. The Retroficiency Team only analyzed 47 buildings in the "lodging" segment.

**Table 1. Strata and Sample Sizes**

| Strata | | Sample Size |
|---|---|---|
| Segment | Subgroup | |
| Office | Small < 30,000 Square Feet | 43 |
| Office | Large ≥ 30,000 Square Feet | 26 |
| Retail | Small < 30,000 Square Feet | 59 |
| Retail | Large ≥ 30,000 Square Feet | 10 |
| Hotel | Small < 30,000 Square Feet | 28 |
| Hotel | Large ≥ 30,000 Square Feet | 41 |
| Restaurant | Small < 30,000 Square Feet | 68 |
| Restaurant | Large ≥ 30,000 Square Feet[1] | 5 |
| Food Sales | Lightly Refrigerated (LR) Food Sales | 6 |
| Food Sales | Convenience Store | 43 |
| Food Sales | Supercenter | 21 |
| Clinic | Small < 30,000 Square Feet | 67 |
| Clinic | Large ≥ 30,000 Square Feet | 5 |
| Warehouse | | 68 |
| Lodging[2] | | 47 |
| **Total Buildings** | | **537** |

[1] After the team developed the initial sample, the team identified some restaurants included in the large sample with floor space less than 30,000 square feet. The team preserved the "large" restaurant strata, as the buildings selected still represent the largest restaurants in the population and had higher variance than smaller restaurants, even if they were not above an initial 30,000 square foot threshold.
[2] The Retroficiency Team analyzed all available buildings in the "lodging" segment (a census). For this reason, we did not require 68 buildings.

While this sample design represents most commercial buildings in Maine, the following caveats must be noted:

- The sample only includes CMP customers.
- The sample excludes customers without interval meter data, or for which interval meter analysis cannot be performed (such as customers with on-site generation). The sample design included most of CMP's MGS, IGS, and LGS customers.
- For offices, retail, hotels, restaurants, and clinics, the Retroficiency Team used floor space to stratify the sample because characteristics such as equipment types, fuel types, efficiencies, and occupancy tend to vary in large and small buildings. Floor space was the best available proxy.
- The team did not apply a finite population adjustment to sample sizes due to the uncertainty of the total number of buildings for each segment in Maine.

Also, the Retroficiency Team did not develop a sample to produce estimates for each strata. Stratification only reduces the uncertainty of segment-specific estimates, but does not ensure estimates for subgroups of each segment meet certain levels of confidence and precision.

These caveats should be considered before applying results to a broader population of buildings. For instance, study results may not represent buildings in Emera Maine's or another utility's service territory. Also, since the study sample only included MGS, IGS, and LGS customers (and excluded SGS customers), the study results may only apply to larger buildings.

With these caveats in mind, the sample satisfies the study's broad objectives, which include:

- Produce estimates with 90% confidence and ± 10% precision for eight segments;
- Account for the diversity of buildings within each segment through stratification; and
- Produce estimates that represent most commercial buildings in Maine.

## Interval Data Analysis

Retroficiency requested one year of historical, whole-building 15-minute electric interval data from CMP for all buildings in the Cadmus sample set. Retroficiency then conducted VEAs on the sample set, following the prioritized order of analysis provided by Cadmus. The analysis and building-level results are based on interval data for the period of June 2014 - June 2015.[10]

### How it Works

The VEA software takes three key analytical steps to analyze interval data:

**Step 1:** VEA leverages one year of historical energy consumption data and the building's physical (premise) address to algorithmically detect key attributes about the building. This step involves applying hyper-local weather information[11] and leveraging a number of advanced inverse modeling and statistical techniques to detect key attributes of the building, including building type, end-use consumption, and operational characteristics.

**Step 2:** Based on the attributes determined in step 1, the software develops two unique energy models - one which represents how the building is currently using energy and a second energy model of how the building would use energy with efficient systems and operations. Efficient systems and operations are based on a number of best practices, including recent energy codes and building controls strategies. The analysis is focused on proven market measures with short-to-moderate paybacks, targeting no more than 7-8 years. The system and operational characteristics used to generate the efficient models are specific to each building analyzed and have been refined using engineering expertise and judgement.

**Step 3:** VEA uses the two models created in step 2 to compare a building's performance across every hour of every day, including end-use consumption and responses to weather, occupied vs. unoccupied periods, and seasons. This comparison enables VEA to estimate the total energy savings potential of a building and identify specific energy savings opportunities.

The above process enabled Retroficiency to evaluate a sample of Maine's commercial building portfolio at mass scale and yielded insights based on tens of thousands of energy consumption data points. This analysis provides a much deeper understanding of energy efficiency performance than other methods, which typically utilize a single data point, such as total annual energy consumption or square footage. This study did not consider how Retroficiency's models compare to Efficiency Maine's TRM. The results

[10] VEA results reflect historic local weather data coincident with the interval data analysis period (June 2014 - June 2015). The results are not weather adjusted to a typical meteorological year.
[11] Weather is actual observed data in a 1 km to 5 km grid.

presented in this report are not dependent on the cost of electricity. Table 2 below shows the resulting data fields from Retroficiency's analysis.

**Table 2. Data Outputs**

| | |
|---|---|
| Customer and Building Data | Customer Name |
| | Premise Address |
| | Estimated Square Footage |
| | Sector |
| Current Consumption and Demand | Annual Electric Consumption (kWh) |
| | Peak Electric Demand (kW) |
| | Annual Average Electric Energy Intensity (kWh/ft2) |
| | Annual Average Electric Demand Intensity (W/ft2) |
| Energy Savings Potential | Potential Annual Electric Savings (kWh) |
| | Potential Annual Electric Savings (%) |
| Energy Savings Potential by Category | HVAC Annual Savings (kWh) |
| | Indoor Lighting Annual Savings (kWh) |
| | Outdoor Lighting Annual Savings (kWh) |
| | Domestic Hot Water Annual Savings (kWh) |
| | Refrigeration Annual Savings (kWh) |
| | Plug Loads Annual Savings (kWh) |
| Current Annual Energy End Use Disaggregation | Indoor Lighting (kWh) |
| | Outdoor Lighting (kWh) |
| | Cooling (kWh) |
| | Ventilation (kWh) |
| | Plug Loads (kWh)[12] |
| | Electric Heating (kWh) |
| | Domestic Hot Water (kWh) |
| | Refrigeration (kWh) |
| | Pumps (kWh) |
| | Baseload (kWh)[13] |
| | Misc. (kWh) |

[12] Plug loads includes all pluggable devices and plug-in equipment. This varies by building type. For example, plugs loads in clinics would include small refrigerators and any supplemental support - electronic scales, exam lights, lots of computers, copiers. Plug loads in restaurants would include ice machines, soda fountains, plate warmers, non-freeze refrigerators, warming lamps, electric griddles, etc. Plug loads in offices would include computer equipment, treadmill desks, televisions, soda machines, microwaves, security systems, etc.
[13] Baseload refers to load that Retroficiency detects running 24/7/365, above and beyond what Retroficiency's algorithms would typically detect in that building, and is not impacted by external factors (e.g. weather, occupancy, etc.).

The building-level results of the interval data analyses were provided to Cadmus for extrapolation. The results of the analysis are outlined later in this report.

### Validation

Leading utilities, program administrators, portfolio owners, and energy service providers, have leveraged Retroficiency's platform to analyze more than 3 billion square feet of building space (since March 2011). These analyses and engagements encompass a breadth of building use types and sizes, including buildings that are thousands of square feet to those that are millions of square feet. Retroficiency's software and underlying models are continuously updated and improved, based on learnings and validation efforts.

In field tests, VEA has consistently shown the ability to very accurately estimate energy savings in buildings when (1) compared to measured and verified (M&V) project savings, and (2) relative to traditional detailed on-site audits.

Some examples include:

- Schneider Electric compared Retroficiency's interval analytics with M&V savings results and sub-meter data. Retroficiency's estimates of HVAC savings were within 3% of M&V results from a major retrofit, and end-use estimates averaged a 4% difference from sub-meter building data.[14]
- The US Department of Energy funded a comparison of Retroficiency's VEA results to 23 on-site audits. Fraunhofer, a well-known non-profit international testing organization, conducted the study. This technical validation demonstrated that Retroficiency's solution averaged a median difference of 5% and a mean difference of 8% from on-site audit saving estimates, and that Retroficiency's approach was a superior way to prioritize buildings by energy savings potential relative to basic benchmarks. Furthermore, the study concluded that Retroficiency's recommendations complemented these on-site audits by identifying opportunities not captured through the traditional process.
- One of Efficiency Maine's recent pilot programs showed savings estimates from VEA to be within 3%, on average, of savings identified through on-site audits in small-and-medium sized commercial buildings.[15] Retroficiency, along with subcontractor Energy Resources Solutions, Inc. (ERS), were selected by Efficiency Maine through a competitive RFP to deliver an Innovation Program with a focus on leveraging AMI data and analytics to drive increased awareness and activity within small and medium businesses. Retroficiency worked with four portfolio owners to rapidly, remotely analyze more than 100 office and retail buildings to identify overall energy savings potential and specific opportunities for improvement. Overall, the energy savings identified by the virtual assessments was within 3% of the energy opportunities identified through on-site audits; additionally the on-site/in-person assessment revealed that virtual assessments of kWh savings was a more accurate predictor of a building's energy savings potential than other metrics such as square footage, energy utilization index (EUI), or total consumption.

[14] For more information, see the associated Retroficiency report: http://www.retroficiency.com/resources/virtual-energy-assessment-schneider-electric/
[15] For more information, please visit: http://www.retroficiency.com/retroficiency-blog/innovation-project-building-portfolio-assessments-show-promise/

## Case Weight Development

After the Retroficiency Team identified optimal sample sizes for each strata, the team compared sample sizes to estimates of population sizes and produced and applied case weights. Case weights are necessary for any stratified random sample as the distribution of buildings in the sample often does not equal those in the population—failure to apply case weights may bias results towards a particular building subtype.  Weights equal the ratio of the number of buildings in the population for a given strata divided by the number of buildings in the sample. The team then normalized case weights by dividing the ratio by the mean weight for each segment—normalized weights make it easier to identify which strata were over- or –under-sampled. Table 3 shows normalized case weights for each strata.

**Table 3. Case Weights**

| Strata | | |
|---|---|---|
| Segment | Subgroup | Weight |
| Office | Small < 30,000 Square Feet | 1.31 |
| Office | Large ≥ 30,000 Square Feet | 0.69 |
| Retail | Small < 30,000 Square Feet | 0.98 |
| Retail | Large ≥ 30,000 Square Feet | 1.02 |
| Hotel | Small < 30,000 Square Feet | 1.66 |
| Hotel | Large ≥ 30,000 Square Feet | 0.34 |
| Restaurant | Small < 30,000 Square Feet | 1.39 |
| Restaurant | Large ≥ 30,000 Square Feet[a] | 0.61 |
| Food Sales | Lightly Refrigerated (LR) Food Sales | 1.27 |
| Food Sales | Convenience Store | 1.09 |
| Food Sales | Supercenter | 0.64 |
| Clinic | Small < 30,000 Square Feet | 0.75 |
| Clinic | Large ≥ 30,000 Square Feet | 1.25 |
| Warehouse | | 1.00 |
| Lodging | | 1.00 |

The team used weights to calculate weighted average estimates (e.g. floor space, consumption, and savings) by summing the product of the weight and the observation, for each observation in a segment, then divided by the sum of the weights in a segment. This approach corrects for bias introduced by over- or under-sampling a given strata.

# Results

## Summary

The Retroficiency Team produced three sets of data for Efficiency Maine: 1) Accounts and Annual Usage by Sector, 2) Building Characteristics and Baseline Energy Consumption and 3) Energy Savings Potential. The building characteristics and baseline energy consumption data was incorporated into Efficiency Maine's market potential study and the Third Triennial Plan. The savings potential estimates were calculated by Retroficiency using the VEA software.

Using VEA, the Retroficiency Team analyzed a sample of 537 buildings across the eight selected sectors. The results are not biased to the subset of buildings with the greatest savings potential, but rather reflect deep building-specific insights on a carefully selected sample of buildings. The building-level and summary results of the analysis were provided to Efficiency Maine via spreadsheet. The results include end-use consumption and energy savings potential for each analyzed building. Key summary results are included in this section.

## Accounts and Annual Usage by Sector

Table 4 below shows the eight sectors selected by Efficiency Maine for deeper analysis. Appendix A and the Sector Selection portion of this report provides a more granular analysis of the aggregated annual usage results.

**Table 4. Selected Sectors**

| Sector | Unique Accounts | Percent | Aggregated Annual Usage (MWh) | Percent |
|---|---|---|---|---|
| Office | 2,052 | 29.0% | 332,982 | 25.0% |
| Retail | 1,491 | 21.1% | 273,813 | 20.6% |
| Hotel | 512 | 7.2% | 97,932 | 7.4% |
| Restaurant | 1,258 | 17.8% | 180,380 | 13.5% |
| Food Sales | 868 | 12.3% | 238,654 | 17.9% |
| Clinic | 303 | 4.3% | 46,248 | 3.5% |
| Warehouse | 416 | 5.9% | 102,029 | 7.7% |
| Lodging | 168 | 2.4% | 60,011 | 4.5% |
| **Total** | **7,068** | **100.0%** | **1,332,049** | **100.0%** |

## Building Characteristics and Baseline Energy Consumption

The team compiled the building-specific VEA output, applied case weights, and calculated weighted average estimates for each segment. The team calculated weighted average floor space, consumption (both for the whole building and by end use), and savings.  The results fall into three general categories:

- Floor space
- Consumption
- Savings

The team calculated 90% confidence intervals (two-sided limits) for each estimate—these confidence intervals do not incorporate a finite-population adjustment, as the true population size is uncertain.

Table 5 and **Error! Reference source not found.**Figure 3 shows the average floor space by segment, with 90% confidence intervals.

**Table 5. Average Floor Space**

| Segment | Square Feet | 90% CI (±) |
|---|---|---|
| Office | 21,397 | 594 |
| Retail | 18,631 | 730 |
| Hotel | 23,418 | 1,108 |
| Restaurant | 3,189 | 716 |
| Food Sales | 4,683 | 1,142 |
| Clinic | 14,657 | 1,508 |
| Warehouse | 29,226 | 1,176 |
| Lodging | 33,734 | 2,008 |

**Figure 3. Average Commercial Floor Space (with 90% Confidence Intervals)**

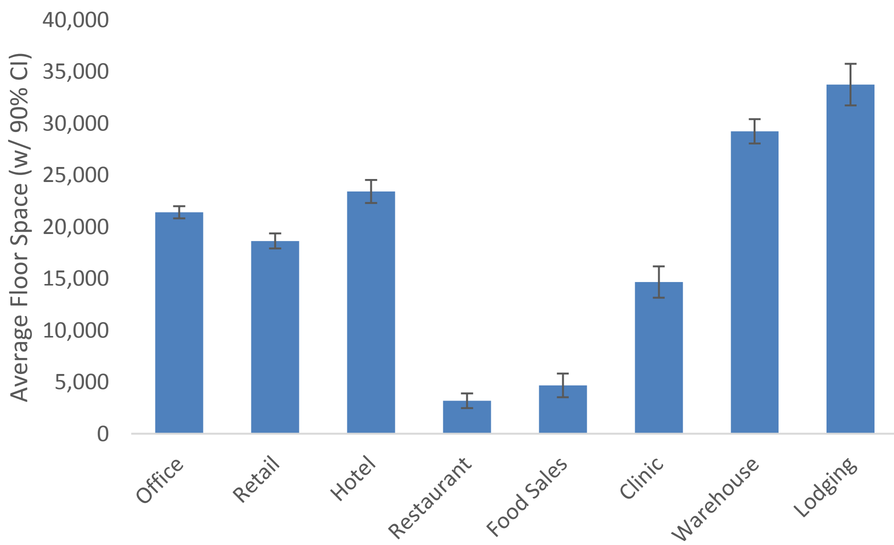



Table 6 shows the average total energy consumption and non-coincident peak demand for each segment. The team's analysis produces average estimates of building peak consumption (non-coincident demand) which is not necessarily coincident with CMP's system peak. Instead, it reflects the average of each building's maximum consumption over the 12 months of data.

**Table 6. Average Annual Energy Consumption and Peak Demand**

| Segment | Energy | | Demand | |
|---|---|---|---|---|
| | kWh | 90% CI (±) | kW | 90% CI (±) |
| Office | 278,674 | 8,153 | 83.7 | 2.1 |
| Retail | 224,007 | 10,020 | 71.0 | 2.6 |
| Hotel | 318,704 | 15,214 | 97.6 | 3.9 |
| Restaurant | 193,730 | 9,826 | 53.7 | 2.5 |
| Food Sales | 222,954 | 15,682 | 47.8 | 4.0 |
| Clinic | 211,361 | 20,698 | 64.6 | 5.3 |
| Warehouse | 165,757 | 16,151 | 59.8 | 4.1 |
| Lodging | 432,572 | 27,560 | 108.3 | 7.0 |

Average whole building and end use consumption are commonly expressed as energy use intensities (EUIs)—these equal total building or end use consumption divided by the gross floor area. EUIs included in Appendix Table B1 represent average consumption per square foot, weighted only by the case weights. However, within each strata, there is variation in consumption. Consumption weighted EUIs are an alternative way to look at EUIs—these intensities do not weight an observation in each strata equally, but instead, also weight the observation by the building's overall consumption. These estimates, in effect, are weighted to reflect higher consuming buildings in each segment and produce a mathematical relationship between square footage, EUIs and average annual energy consumption for the buildings in the sample (where square footage * EUI = energy consumption). Table 7 shows consumption weighted energy intensities for each end use and segment.

**Table 7. Electric Energy Use Intensities by Segment and End Use (kWh/sqft)**

| Segment | EUI (kWh/Sqft) | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | Indoor Lights | Outdoor Lights | Cooling | Ventilation | Plug Loads | Electric Heating | Domestic Hot Water | Refrigeration | Pumps | Electric Cooking | Baseload | Misc. | Total |
| Office | 2.9 | 0.2 | 1.0 | 1.6 | 5.3 | 0.3 | 0.0 | 0.0 | 0.1 | 0.0 | 1.7 | 0.1 | 13.0 |
| Retail | 6.6 | 0.5 | 0.4 | 2.0 | 2.3 | 0.2 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 12.0 |
| Hotel | 3.6 | 0.3 | 1.3 | 0.9 | 4.0 | 2.5 | 0.4 | 0.1 | 0.1 | 0.0 | 0.0 | 0.4 | 13.6 |
| Restaurant | 10.0 | 1.3 | 2.5 | 10.4 | 27.1 | 0.3 | 0.0 | 9.3 | 0.0 | 0.0 | 0.0 | 0.0 | 60.7 |
| Food Sales | 11.1 | 1.6 | 2.2 | 6.8 | 4.4 | 0.2 | 0.0 | 21.4 | 0.0 | 0.0 | 0.0 | 0.0 | 47.6 |
| Clinic | 3.1 | 0.1 | 1.4 | 1.3 | 6.6 | 0.3 | 0.0 | 0.0 | 0.1 | 0.0 | 1.5 | 0.0 | 14.4 |
| Warehouse | 3.7 | 0.1 | 0.0 | 0.8 | 0.8 | 0.3 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 5.7 |
| Lodging | 3.2 | 0.1 | 1.0 | 0.6 | 4.8 | 1.3 | 0.5 | 0.7 | 0.4 | 0.0 | 0.2 | 0.0 | 12.8 |

Energy use intensities include equipment saturations and fuel shares embedded in the estimates. That is, the estimates do not represent the average building with the end use. Rather, the estimates represent the average building in Maine. For instance, the electric heating energy intensities account for buildings that do not have electric space heat—the denominator is effectively total conditioned floor space, not total floor space heated with electricity.

The aggregated VEA analysis provides valuable insights into the distribution of end use consumption for each segment. Lighting and plug loads account for the majority of consumption in most segments. Figure 4 shows the distribution of end use consumption for each segment, including the percentage share for interior lighting and plug loads

**Figure 4. Distribution of End Use Consumption**

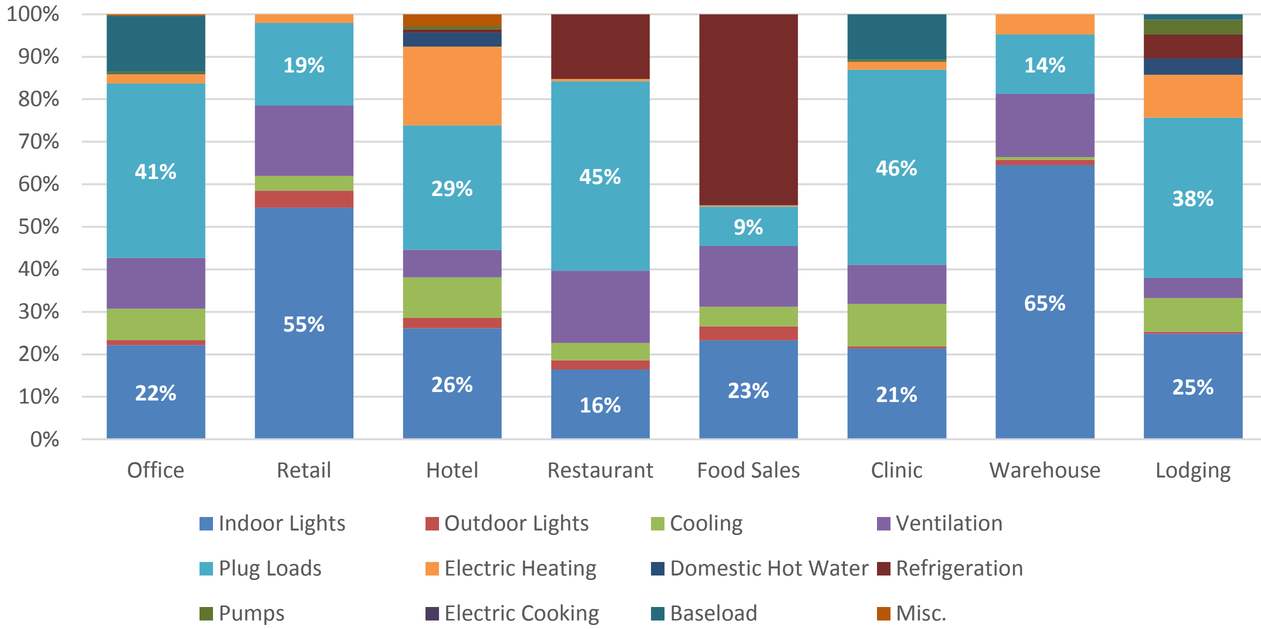



Table 8 expresses the same data as Figure 4 and shows the EUIs as a percent. The percentages can be used alongside a load forecast provided by CMP for the MGS, IGS and LGS rate classes to create a reasonable forecast of energy consumption by end use.

**Table 8. Electric Energy Use Intensities by Segment and End Use (%)**

| | EUI (kWh/Sqft) | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Segment | Indoor Lights | Outdoor Lights | Cooling | Ventilation | Plug Loads | Electric Heating | Domestic Hot Water | Refrigeration | Pumps | Electric Cooking | Baseload | Misc. | Total |
| Office | 22% | 1% | 7% | 12% | 41% | 2% | 0% | 0% | 1% | 0% | 13% | 0% | 100% |
| Retail | 55% | 4% | 4% | 16% | 19% | 2% | 0% | 0% | 0% | 0% | 0% | 0% | 100% |
| Hotel | 26% | 2% | 10% | 6% | 29% | 19% | 3% | 1% | 1% | 0% | 0% | 3% | 100% |
| Restaurant | 16% | 2% | 4% | 17% | 45% | 0% | 0% | 15% | 0% | 0% | 0% | 0% | 100% |
| Food Sales | 23% | 3% | 5% | 14% | 9% | 0% | 0% | 45% | 0% | 0% | 0% | 0% | 100% |
| Clinic | 21% | 0% | 10% | 9% | 46% | 2% | 0% | 0% | 0% | 0% | 11% | 0% | 100% |
| Warehouse | 65% | 1% | 1% | 15% | 14% | 5% | 0% | 0% | 0% | 0% | 0% | 0% | 100% |
| Lodging | 25% | 0% | 8% | 5% | 38% | 10% | 4% | 6% | 3% | 0% | 1% | 0% | 100% |

.

Interior lighting accounts for between 16% and 65% of total consumption per square foot, depending on the building type. Plug loads account for between 9% and 46% of consumption per square foot, depending on the building type. Differences in end use consumption across building types are driven by a number of factors, including end use saturations, hours of use, and fuel shares. For example, food sales and restaurants are much more likely to have refrigeration saturations therefore the end use accounts for 45% and 15% of end use consumption in these segments, respectively, while in other segments refrigeration accounts for less than 4% of end use consumption.

### Energy Savings Potential

The savings potential presented in this study is not meant to be a substitute for Efficiency Maine's full electric potential study that incorporates all subsectors of the commercial sector, extends over ten years and takes into consideration adoption rates. Instead the efficiency potential presented in this report will be used to inform program design and customer acquisition.

Retroficiency developed energy savings estimates by end use and building type. Behavioral, operational and plug load savings opportunities identified by Retroficiency are not necessarily covered by Efficiency Maine's C&I programs. Solutions designed to reduce energy consumption from pluggable devices and plug-in equipment are factored into Retroficiency's models, but not incentivized by Efficiency Maine. Examples of plug-in equipment include, but are not limited to: Computers, copiers, and other equipment; Vending machines; Televisions; and Microwaves.

Retroficiency's analytics also identify energy savings opportunities that may be captured via tenant and occupant behavioral changes and operational improvements. Efficiency Maine does not incentivize behavioral and operational improvements, such as proper HVAC start-up and shut-down or modifying set points.

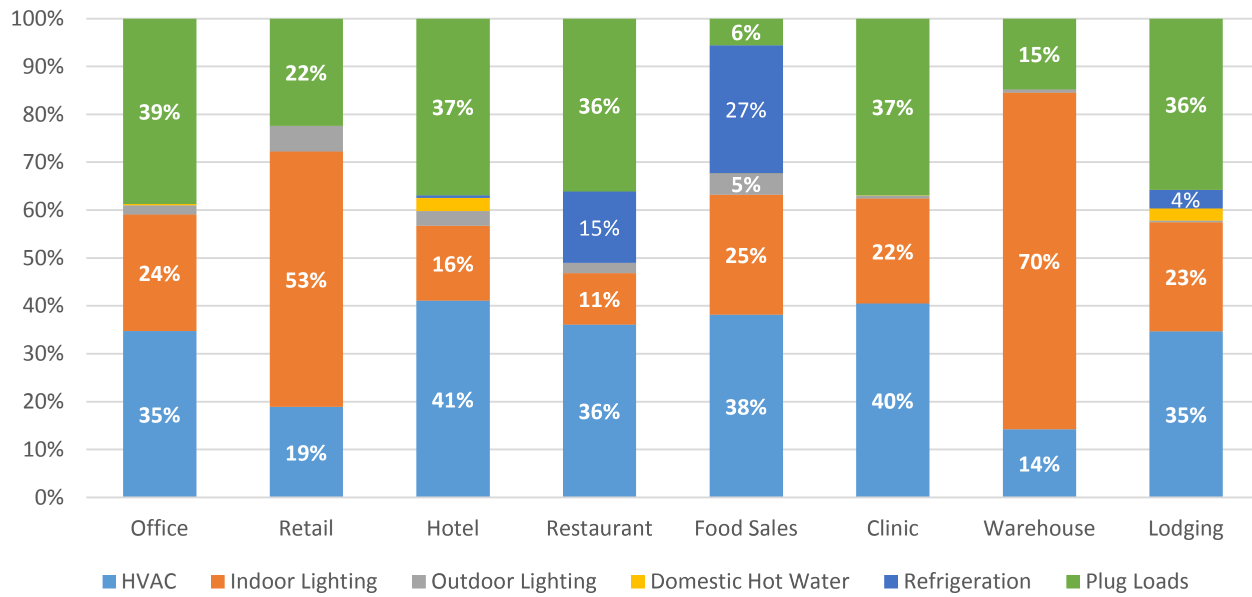
Table 9 shows estimates of average savings for each end use category.

**Table 9. Average Savings Potential by End Use Group**

| Segment | Annual Savings (kWh) | | | | | | |
|---|---|---|---|---|---|---|---|
| | HVAC | Indoor Lighting | Outdoor Lighting | DHW | Refrigeration | Plug Loads | Total |
| Office | 16,294 | 11,414 | 911 | 122 | 0 | 18,181 | 46,921 |
| Retail | 7,752 | 21,879 | 2,194 | 0 | 0 | 9,186 | 41,012 |
| Hotel | 12,843 | 4,891 | 965 | 863 | 158 | 11,542 | 31,263 |
| Restaurant | 11,145 | 3,310 | 673 | 0 | 4,600 | 11,151 | 30,878 |
| Food Sales | 12,831 | 8,433 | 1,520 | 5 | 8,993 | 1,869 | 33,651 |
| Clinic | 13,548 | 7,356 | 197 | 12 | 0 | 12,375 | 33,488 |
| Warehouse | 2,914 | 14,432 | 135 | 0 | 0 | 3,036 | 20,517 |
| Lodging | 15,176 | 10,001 | 139 | 1,125 | 1,697 | 15,666 | 43,804 |

In most building types, the interior lighting and HVAC end use groups represent the greatest share of savings potential. Figure 5 shows the distribution of savings potential by end use group for each segment—the figure indicates the percent share of total potential for end uses that represent greater than 5% of total potential.

**Figure 5. Savings Potential by End Use Group**




Non-savings weighted potential, as expressed as a percent of baseline sales, varies from 7% to 17%, depending on the building type. After accounting for the variation of savings and baseline consumption within each strata, savings weighted average potential as a percent of baseline ranges from 10% to 18%, depending on the building type. Table 10 shows both savings weighted and non-savings weighted potential, expressed as a percent of baseline consumption.

**Table 10. Savings Potential as a Percent of Baseline Consumption**

| Segment | Average Savings as % of Baseline | Savings Weighted Average as a % of Baseline | Absolute Precision - 90% CI (±) |
|---|---|---|---|
| Office | 17% | 17% | 0.2% |
| Retail | 14% | 18% | 0.2% |
| Hotel | 7% | 10% | 0.4% |
| Restaurant | 12% | 16% | 0.2% |
| Food Sales | 11% | 15% | 0.4% |
| Clinic | 14% | 16% | 0.5% |
| Warehouse | 10% | 12% | 0.4% |
| Lodging | 10% | 10% | 0.7% |

While energy efficiency can contribute to between a 7% and 17% reduction in baseline consumption, this reduction varies across end use groups. For instance, energy efficiency can contribute to a larger decrease in baseline HVAC consumption than baseline interior lighting consumption, for most segments. **Error! Reference source not found.** shows savings potential expressed as a percentage of baseline consumption for each end use group and segment.

**Table 11. Savings Potential as a Percentage of Baseline Consumption by End Use Group**

| Segment | HVAC | Indoor Lighting | Outdoor Lighting | DHW | Refrigeration | Plug Loads |
|---|---|---|---|---|---|---|
| Office | 27.0% | 18.0% | 28.0% | 41.0% | - | 12.0% |
| Retail | 16.0% | 18.0% | 25.0% | - | - | 21.0% |
| Hotel | 12.0% | 6.0% | 12.0% | 8.0% | 6.0% | 11.0% |
| Restaurant | 27.0% | 10.0% | 16.0% | - | 16.0% | 13.0% |
| Food Sales | 30.0% | 16.0% | 20.0% | 4.0% | 9.0% | 9.0% |
| Clinic | 30.0% | 16.0% | 23.0% | 17.0% | - | 10.0% |
| Warehouse | 9.0% | 13.0% | 7.0% | - | - | 13.0% |
| Lodging | 15.0% | 9.0% | 8.0% | 7.0% | 7.0% | 9.0% |

## Study Considerations

For this study, Efficiency Maine was focused on leveraging deep meter data analytics to accurately understand energy consumption and savings potential, on an end use basis, across as large of a representative sample of building as possible given the constraints of the model.

Virtual assessments were conducted on buildings where accurate building square footage data was available via third-party data sources. The Retroficiency Team designed the sample from a subset of buildings with available third-party building area data.

Before the results were extrapolated to the full population, an investigation was conducted to determine whether building area data availability was random or if it introduced a systematic bias. The investigation confirmed that limiting the sample to buildings with building area data did not introduce a bias, and the results of the analyzed sample set are applicable to the full population of CMP medium and large commercial customers.

There were buildings with other certain unique characteristics that were excluded due to time, budget and data constraints. These included some buildings with co-generation, as well as highly seasonal occupancy. Given the relative consumption contribution of these buildings and past experience, it is not believed that these exclusions meaningfully biased the overall market results.

# Conclusion

The Retroficiency Team's streamlined market characterization study revealed a number of unique insights about CMP's medium and large commercial customers:

- The overall energy use intensities are greatest for the food sales and restaurant segments, and lowest for the warehouse segment.
- As a percent of baseline consumption, non-savings weighted potential varies from 7% to 17%, depending on the building type. Savings-weighted potential varies from 10% to 18%, depending on the building type.
- Regardless of whether savings weighted or non-savings weighted, the office and retail segments are the two segments with the greatest savings potential as a percent of baseline consumption.

- The hotel and lodging segments have the lowest savings potential as a percent of baseline consumption, relative to the other six segments considered for this study.

The aggregated VEA analysis can provide valuable insights into which segments and end uses have high savings potential. The analysis identifies end uses with the highest savings potential for each segment. Specifically:

- While **HVAC** end uses represent a moderate share of baseline consumption (between 19% and 35% of total consumption), the end use group in generally the highest saving group. HVAC savings accounts for between 14% and 41% of total savings potential, depending on the end use. This is because HVAC savings relative to baseline sales are high—energy efficiency could contribute to between a 9% and 30% reduction in baseline HVAC consumption, depending on the segment.
- **Interior lighting** accounts for a significant share of baseline consumption in most segments. Depending on the segment, lighting consumption as a percent of total consumption is between 16% and 65%. While this end use accounts for a significant share of baseline consumptions, savings relative to baseline consumption is moderate—energy efficiency can contribute to between a 6% and 18% reduction in interior lighting consumption. Due to the moderate savings potential and high baseline consumption, interior lighting is either the second or third highest saving end use group in most segments. However, interior lighting offers the highest savings potential in retail and warehouse segments, where the end use accounts for 53% and 70% of total potential in each segment, respectively.
- **Plug loads** account for between 9% and 46% of total baseline consumption, and energy efficiency can contribute to between a 6% and 39% reduction in this baseline consumption. In many segments, plug loads are either the second or third highest saving end use group. In offices and lodging, plug loads represent the highest saving end use group.
- Savings potential for **other end uses** including domestic hot water, outdoor lighting, and refrigeration are relatively small. In most segments, these end use groups account for less than 5% of total savings potential. There are, however, exceptions. **Refrigeration** efficiency improvements, for instance, accounts for 27% of total potential in the food sales segment. In the restaurants segment, refrigeration accounts for 15% of total potential. In all other segments, where the presence of commercial refrigeration is less likely, the end use accounts for less than 5% of total savings potential.

# Appendix A: Aggregated Annual Usage by Sector

The aggregated annual usage by sector table includes all accounts the Retroficiency Team received from CMP, irrespective of whether an individual account was not considered for interval analysis because of incomplete data (less than 12 months of data, missing co-generation data, negative/monthly readings), unanalyzable building type (such as production/ process), or not selected as one of the eight key sectors for this study (i.e. education and hospitals). Grey highlighting indicates the sector was selected for deeper analysis.

**Table A1. Sector Details**

| Sector | Unique Accounts | Aggregated Annual Usage (kWh) | Percent of Total | | Percent of Eligible | |
|---|---|---|---|---|---|---|
| | | | Accounts | Usage | Accounts | Usage |
| Production/Process | 1,783 | 523,465,971 | 16.2% | 23.1% | | |
| Office | 2,052 | 332,982,046 | 18.6% | 14.7% | 26.2% | 20.9% |
| Retail | 1,491 | 273,812,752 | 13.5% | 12.1% | 19.1% | 17.2% |
| Grocery Store | 868 | 238,654,453 | 7.9% | 10.5% | 11.1% | 15.0% |
| Education | 663 | 183,800,758 | 6.0% | 8.1% | 8.5% | 11.5% |
| Restaurant | 1,258 | 180,380,308 | 11.4% | 7.9% | 16.1% | 11.3% |
| Warehouse | 416 | 102,029,081 | 3.8% | 4.5% | 5.3% | 6.4% |
| Hotel | 512 | 97,931,679 | 4.6% | 4.3% | 6.5% | 6.1% |
| Hospital | 91 | 77,749,756 | 0.8% | 3.4% | 1.2% | 4.9% |
| Recreation | 717 | 66,173,634 | 6.5% | 2.9% | | |
| Lodging | 168 | 60,010,941 | 1.5% | 2.6% | 2.1% | 3.8% |
| Clinic | 303 | 46,284,188 | 2.7% | 2.0% | 3.9% | 2.9% |
| Work Shops | 230 | 28,533,149 | 2.1% | 1.3% | | |
| Public Assembly | 77 | 12,941,283 | 0.7% | 0.6% | | |
| Other | 81 | 12,213,236 | 0.7% | 0.5% | | |
| Public Safety | 80 | 11,524,742 | 0.7% | 0.5% | | |
| Religious | 153 | 9,453,656 | 1.4% | 0.4% | | |
| Laundry | 50 | 3,878,287 | 0.5% | 0.2% | | |
| Apartment | 21 | 3,575,550 | 0.2% | 0.2% | | |
| Multifamily Housing | 3 | 1,986,947 | 0.0% | 0.1% | | |
| Lab | 14 | 1,432,801 | 0.1% | 0.1% | | |
| Data Center | 2 | 365,612 | 0.02% | 0.02% | | |
| **Total** | **11,033** | **2,269,180,830** | **100%** | **100%** | **100%** | **100%** |

The sector examples reflect Retroficiency's typical sector guidelines we use in our analytics. In other words, these definitions should not be interpreted as official, industry-wide definitions. Grey highlighting indicated the sector was selected for deeper analysis.

**Table A2. Sector Examples**

| Sector | Retroficiency Sector Examples |
|---|---|
| Production / Process | Manufacturing facilities, industrial buildings, pumping stations, wastewater treatment plants, etc. |
| Office | Administrative, general, professional office spaces, bank branches and financial offices |
| Retail | Department stores, dry good retailers, storefronts |
| Grocery Store | Grocery stores, supermarkets, convenience stores, drug stores |
| Education | Elementary/junior/senior high schools and vocational schools |
| Restaurant | Quick and full serve restaurants |
| Warehouse | General storage buildings |
| Hotel | Hotel, inn, motel |
| Hospital | Hospital, medical center, emergency care |
| Recreation | Athletic centers, gymnasiums, bowling alleys, skating rinks, pools, golf courses |
| Lodging | Dormitories, military barracks, senior care facilities/rehabilitation centers |
| Clinic | Medical and dental offices |
| Work Shops | Assembly and maintenance facilities (heavy equipment, electric, aircraft, etc.) |
| Public Assembly | Public gatherings spaces for performance, recreation, social/public/civic activities, transportation terminals, etc. |
| Other | Otherwise uncategorized facilities |
| Public Safety | Dispatch centers, correctional facilities, etc. |
| Religious | Worship-oriented facilities such as churches, mosques, synagogues, temples, etc. |
| Laundry | Dedicated laundry and/or dry cleaning facilities for commercial or institutional use |
| Apartment | Mid and high rise apartment buildings |
| Multifamily Housing | Low rise residential |
| Lab | Research and development, biological, chemical, medical or veterinary labs |
| Data Center | Data centers, cluster computing, telecommunication buildings |

# Appendix B: Confidence Intervals

EUIs included in Appendix Table B1 represent average consumption per square foot, weighted only by the case weights.

**Table B1. Electric Energy Use Intensities by Segment and End Use (kWh/sqft)**

| | EUI (kWh/Sqft) | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Segment | Indoor Lights | Outdoor Lights | Cooling | Ventilation | Plug Loads | Electric Heating | Domestic Hot Water | Refrigeration | Pumps | Electric Cooking | Baseload | Misc. | Total |
| Office | 3.1 | 0.4 | 0.7 | 1.9 | 5.3 | 0.5 | 0.0 | 0.0 | 0.0 | 0.0 | 1.8 | 0.0 | 13.8 |
| Retail | 6.2 | 0.5 | 0.4 | 1.9 | 2.1 | 0.4 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 11.5 |
| Hotel | 3.5 | 0.4 | 1.2 | 1.0 | 3.3 | 2.2 | 0.9 | 0.0 | 0.0 | 0.0 | 0.0 | 0.1 | 12.6 |
| Restaurant | 9.9 | 1.4 | 2.6 | 10.7 | 27.3 | 0.6 | 0.0 | 9.4 | 0.0 | 0.0 | 0.0 | 0.0 | 61.8 |
| Food Sales | 10.9 | 3.3 | 3.4 | 7.6 | 4.3 | 0.4 | 0.1 | 25.5 | 0.0 | 0.0 | 0.0 | 0.0 | 55.5 |
| Clinic | 3.2 | 0.1 | 1.3 | 1.3 | 6.4 | 0.3 | 0.0 | 0.0 | 0.1 | 0.0 | 1.1 | 0.0 | 13.9 |
| Warehouse | 3.7 | 0.1 | 0.1 | 0.9 | 0.8 | 0.4 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 6.1 |
| Lodging | 3.3 | 0.1 | 1.0 | 0.6 | 5.0 | 1.1 | 0.4 | 0.7 | 0.4 | 0.0 | 0.1 | 0.0 | 12.9 |

Table B2 includes estimates of absolute precision for the EUIs presented in Table B1—all estimates of absolute precision use a 90% confidence interval.

**Table B2. Absolute Precision for Electric Energy Use Intensities by Segment and End Use (kWh/sqft)**

| | Absolute Precision with a 90% Confidence Interval (±) | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Segment | Indoor Lights | Outdoor Lights | Cooling | Ventilation | Plug Loads | Electric Heating | Domestic Hot Water | Refrigeration | Pumps | Electric Cooking | Baseload | Misc. | Total |
| Office | 0.09 | 0.06 | 0.03 | 0.09 | 0.20 | 0.05 | 0.01 | 0.21 | 0.00 | 0.00 | 0.04 | 0.00 | 0.11 |
| Retail | 0.11 | 0.08 | 0.04 | 0.11 | 0.25 | 0.06 | 0.02 | 0.26 | 0.00 | 0.00 | 0.05 | 0.00 | 0.13 |
| Hotel | 0.16 | 0.11 | 0.06 | 0.17 | 0.38 | 0.09 | 0.03 | 0.39 | 0.01 | 0.00 | 0.08 | 0.01 | 0.20 |
| Restaurant | 0.10 | 0.07 | 0.04 | 0.11 | 0.24 | 0.06 | 0.02 | 0.25 | 0.00 | 0.00 | 0.05 | 0.00 | 0.13 |
| Food Sales | 0.17 | 0.12 | 0.06 | 0.17 | 0.39 | 0.09 | 0.03 | 0.40 | 0.01 | 0.00 | 0.08 | 0.01 | 0.20 |
| Clinic | 0.22 | 0.16 | 0.08 | 0.23 | 0.52 | 0.12 | 0.04 | 0.53 | 0.01 | 0.00 | 0.11 | 0.01 | 0.27 |
| Warehouse | 0.17 | 0.12 | 0.07 | 0.18 | 0.40 | 0.09 | 0.03 | 0.41 | 0.01 | 0.00 | 0.08 | 0.01 | 0.21 |
| Lodging | 0.29 | 0.21 | 0.11 | 0.30 | 0.69 | 0.16 | 0.05 | 0.70 | 0.01 | 0.00 | 0.14 | 0.01 | 0.36 |

Table B3 shows estimates of absolute precision using 90% confidence intervals for the estimates shown in Table 9.

**Table B3. Absolute Precision for Savings Potential by End Use Group**

| Segment | Absolute Precision for Savings Potential (±) | | | | | | |
|---|---|---|---|---|---|---|---|
| | HVAC Annual Savings | Indoor Lighting Annual Savings | Outdoor Lighting Annual Savings | DHW Annual Savings | Refrigeration Annual Savings | Plug Loads Annual Savings | Total |
| Office | 656 | 589 | 67 | 39 | 277 | 558 | 1,284 |
| Retail | 806 | 724 | 83 | 48 | 340 | 685 | 1,578 |
| Hotel | 1,223 | 1,100 | 126 | 72 | 517 | 1,041 | 2,396 |
| Restaurant | 790 | 710 | 81 | 47 | 334 | 672 | 1,548 |
| Food Sales | 1,261 | 1,134 | 130 | 75 | 533 | 1,073 | 2,470 |
| Clinic | 1,664 | 1,496 | 171 | 99 | 703 | 1,416 | 3,260 |
| Warehouse | 1,299 | 1,167 | 134 | 77 | 549 | 1,105 | 2,544 |
| Lodging | 2,216 | 1,992 | 228 | 131 | 937 | 1,885 | 4,341 |