ENERGIZE DENVER

annual report

APPENDICES | 2017

DENVER
PUBLIC HEALTH &
ENVIRONMENT

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DATA QUALITY CHECKS

The data submitted to Denver as a requirement of the Energize Denver Benchmarking Ordinance in 2017 was reviewed for completeness and accuracy by Energize Denver staff before any building was passed into compliance. About half of the submissions did not pass at least one of the data quality checks initially and received manual review of the data and usually then a phone call to help the person submitting the report correct any errors. The following list of Portfolio Manager fields was reviewed as part of the quality control process.

Fields reviewed for completeness
“Denver Building ID” field should have 4 digits and no letters, and should not have "Not Available"
“Electricity Use - Grid Purchase and Generated from Onsite Renewable Systems (kWh)” field should have a number > 0, and should not have “Not Available.”
The "ENERGY STAR score" field should have a 1-100 value if the building is one of the property types currently eligible to receive an ENERGY STAR Score.
Fields reviewed to ensure the data was reasonable
Unusual data in the following fields does not necessarily indicate an error, but in these cases help center staff would call the person submitting the report to verify the data.
ENERGY STAR score not below 5 or above 95
EUI not below 25 or above 375
No natural gas use – There are some all electric buildings, but other times someone has forgotten to enter natural gas data.
Natural gas units wrong or missing steam – If these two are too low, a decision to find out how the building is heated.
Reported Gross Floor Area more than 10% greater or less than the Assessors Gross Floor Area on file
Office - Weekly Operating Hours unusually low or high
Office - Number of Workers on Main Shift unusually low or high
Office - Number of Computers unusually low or high
Financial Office - Weekly Operating Hours unusually low or high
Financial Office - Number of Workers on Main Shift unusually low or high
Financial Office - Number of Computers unusually low or high
Hotel- Number of Rooms unusually low or high per square foot
Medical Office - Weekly Operating Hours unusually low or high
Medical Office - Number of Workers on Main Shift unusually low or high
Multifamily Housing - Total Number of Residential Living Units unusually low or high per square foot

Multifamily Housing - Number of Units in Low-rise setting (1-4 stories) – units in multiple settings is unusual and a common error.
Multifamily Housing - Number of Units in Mid-rise setting (5-9 stories) – units in multiple settings is unusual and a common error.
Multifamily Housing - Number of Units in High-rise setting (10+ stories) – units in multiple settings is unusual and a common error.
Multifamily Housing- Number of Bedroom unusually low or high per square foot.
Portfolio Manager alerts that prompt further review by Energize Denver staff
Alert - Data Center No IT Meter
Alert - Gross Floor Area is 0 ft2
Alert - Individual monthly meter > 65 days
Alert - Meter has overlaps
Alert - Meter has gaps
Alert - Meter has less than 12 mos of data
Alert - No meter associated with property
Alert - Property has no uses
Whole building data: “Metered Areas (Energy)” field should be “Whole Building”

EXEMPTIONS

Type of Exemption	Number of Approved Exemptions
A building for which the Owner can demonstrate that its energy performance is a confidential business practice that includes trade secrets, privileged, or confidential commercial information. In order to qualify for this exemption, the Owner shall specifically identify the information it believes is confidential and provide a written statement below describing the manner in which public disclosure would cause substantial harm to the Owner's competitive position. Inefficient energy usage alone will not be considered confidential commercial information.	1
A demolition permit has been issued for the entire building and demolition work has commenced on or before the date the benchmarking report is due.	6
I am unable to obtain whole building data because my building has less than 4 tenants or one tenant who is more than 50% of the energy usage, so Xcel Energy will not aggregate whole building energy data for me AND I have requested consent to obtain that data from my tenants and they have refused that request.	65
I purchased or acquired the building since January 2016. Therefore, I do not have 12 months of energy consumption data and am unable to benchmark the building for calendar year 2016.	49
The building had an average physical occupancy of less than sixty (60) percent throughout the calendar year for which benchmarking is required.	37
The building is presently experiencing qualifying financial distress, as defined by any of the following: (1) the building is the subject of a qualified tax lien sale or public auction due to property tax arrearages; (2) the building is controlled by a court appointed receiver; or (3) the building has been acquired by a deed in lieu of foreclosure.	7
The building is used primarily for industrial or agricultural processes. This exclusion only applies if the industrial or agricultural process uses significant energy. To qualify for this exemption please explain below what sort of industrial or agricultural process is happening in the building and state if that process uses electricity or natural gas.	75
The building was not occupied, due to renovation, for all twelve (12) months of the calendar year for which benchmarking is required.	7
The building was not occupied and did not have a certificate of occupancy or temporary certificate of occupancy for all twelve (12) months of the calendar year for which benchmarking is required.	60

ADDITIONAL ANALYSES

This section provides additional analyses on the data submitted to Denver as a part of the first year of reporting for the Energize Denver Benchmarking Ordinance. Figure 1 below shows the energy use distribution of buildings providing data that passed all data quality checks. Offices represent 19 percent of total energy use (compared to 22 percent of square footage), apartments are 19 percent (17 percent square footage) and condominiums 9 percent (7 percent square footage). In comparison, municipal buildings represent 8 percent of total square footage but 12 percent of total energy use among the City's largest buildings.

Figure 1: Total Energy Use by Building Type

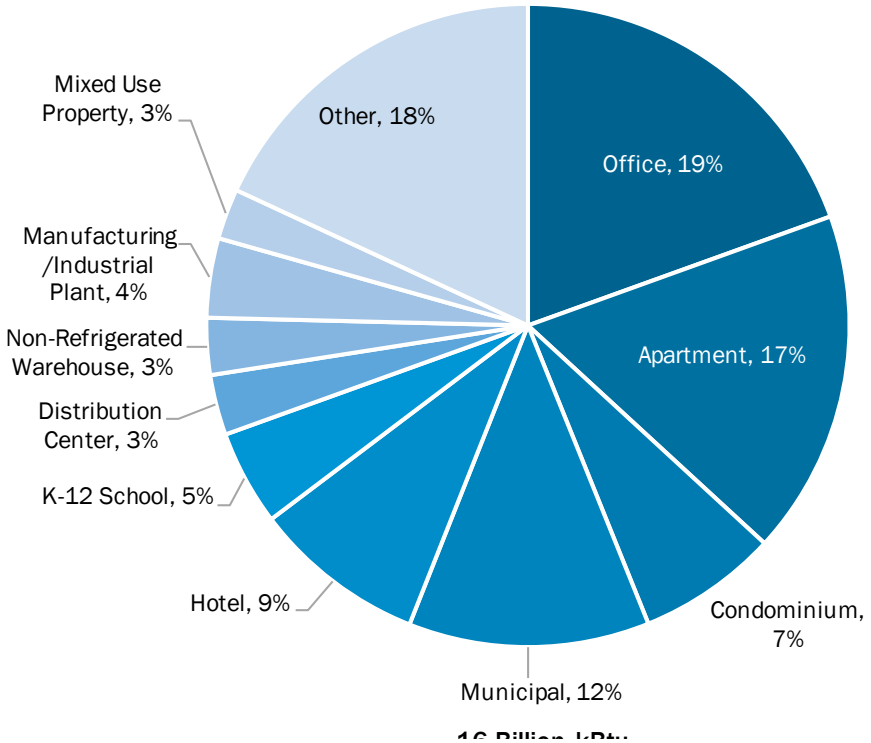

Figure 2 shows the building type distribution by number of buildings included in this analysis. While offices represent 22 percent of the total square footage of buildings in this analysis, they are only 15 percent of the total buildings. In contrast, apartments are only 19 percent of total square footage, but 23 percent of total buildings. Condominiums are also 9 percent of total square footage and 10 percent of total buildings.

Figure 2: Building Type Distribution by Number of Buildings

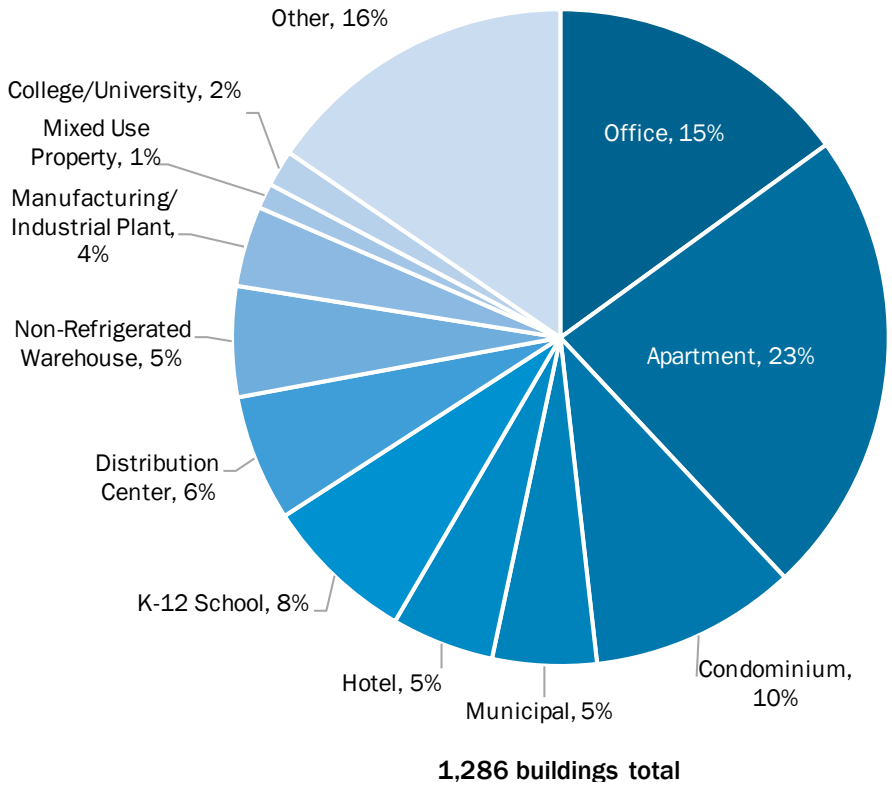

Figure 3 shows the fuel mix distribution among the largest building types in Denver. Offices and manufacturing/industrial plants have the greatest share of electric consumption. Multifamily buildings, K-12 schools, distribution centers, non-refrigerated warehouses and college/university buildings have a split between electricity and natural gas use. There are several buildings that use district steam and cooling, including municipal buildings, hotels and mixed use buildings. These different fuel mixes affect the total emissions associated with each building type.

Figure 3: Fuel Mix Distribution by Building Type

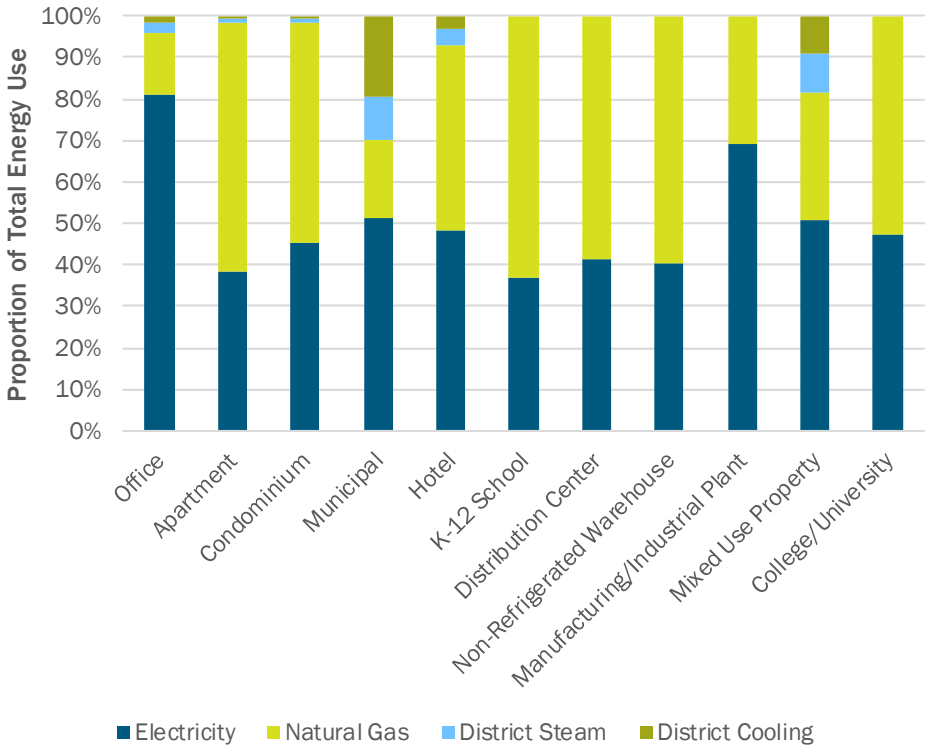

Figure 4 shows the total energy use and associated greenhouse gases for the various fuel types used in Denver. Grid-purchased electricity is the most commonly used fuel type in the City. Denver uses its own emission factors to understand the total emissions from buildings and this is based on the actual emissions from the energy sources powering its buildings. Emissions from electricity use are produced as a part of the electric generation process at the power plant. Natural gas has a lower emission factor than electricity and has less consumption in the City, so its associated emissions are much less than electricity. District cooling and district steam also have little consumption in comparison to electricity.

Figure 5 shows the emissions associated with the largest building types in Denver. The graph shows that the greatest emissions come from electricity use in all building types. Emissions from natural gas use are also significant in apartments, distribution centers, non-refrigerated warehouses and colleges/universities.

Figure 4: Energy Use and GHG Emissions by Fuel Type

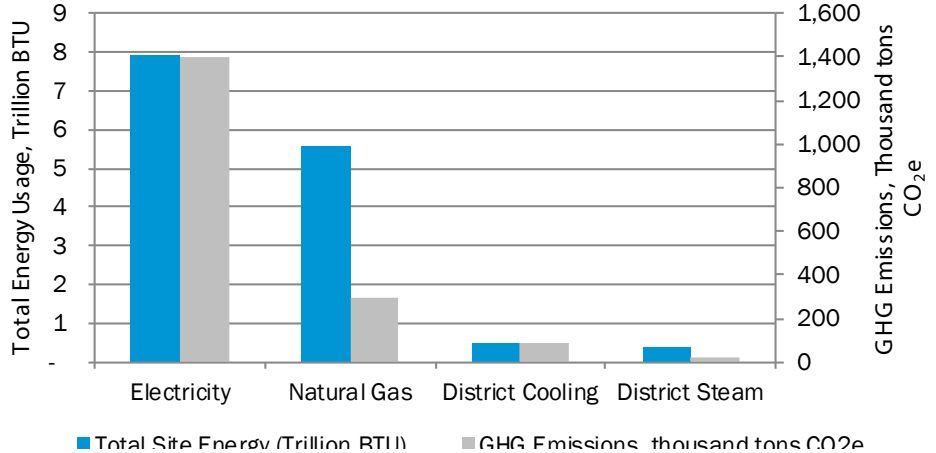

Figure 5: Emissions Distribution by Fuel and Building Type

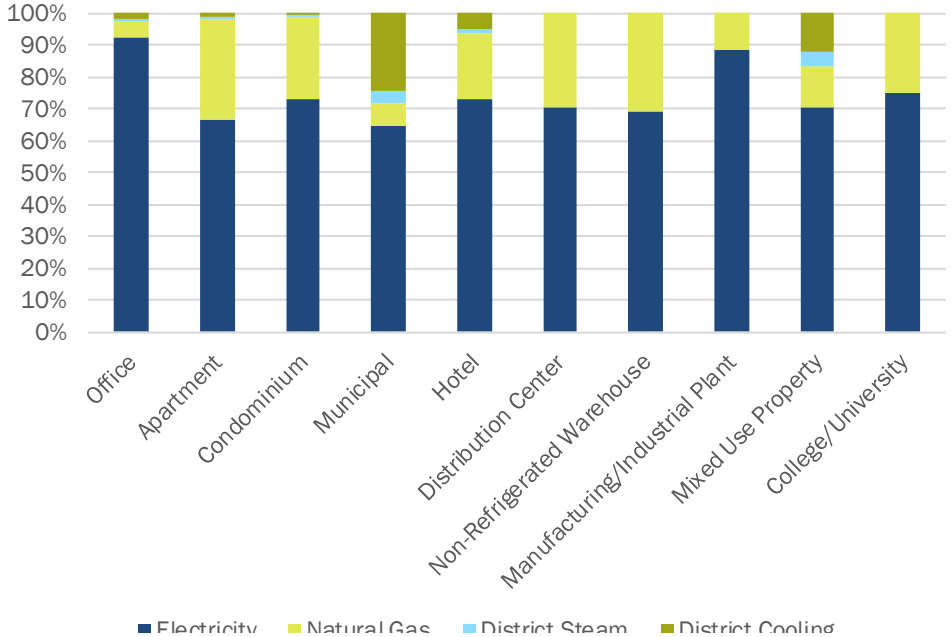

Figure 6 shows the average ENERGY STAR score distribution by construction year in Denver. Similarly to the EUI and construction year comparison, there is no clear relationship between ENERGY STAR score and construction year. For example, the group of buildings constructed between 1945 and 1960 have an average score of 75, while the newer group of buildings constructed between 2000 and 2010 have an average score of 63, the lowest of any time period.

Figure 6: ENERGY STAR Score by Construction Year

Figures 7 and 8 show the square footage distribution for all buildings included in the energy analysis according to their weather normalized site EUI and ENERGY STAR scores, respectively. The WN site EUI distribution shows that most buildings are less than 1 million square feet with EUIs less than 100. There are more smaller buildings with high EUIs than large buildings with high EUIs. The ENERGY STAR distribution has a smaller number of buildings at the lower score end and generally increases towards the higher score end. There are more buildings that are better performing than the 50 median in Denver than worse-performing.

Figure 7: Weather Normalized Site EUI and Square Footage Distribution`

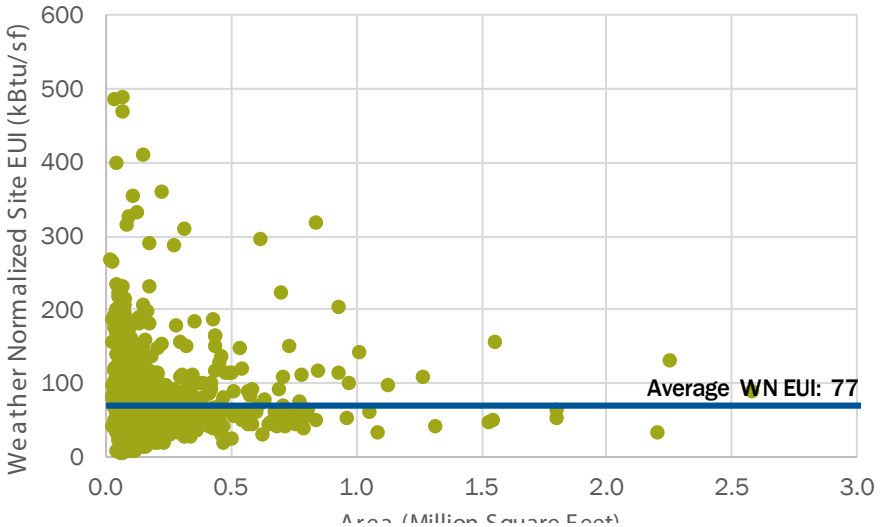

Figure 8: ENERGY STAR Score and Square Footage Distribution