Guide to the 2021
Building Energy Performance Standards

Version 1.0

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Chapter 1 – Introduction

Title III of the [Clean Energy DC Omnibus Amendment Act of 2018](#) (CEDC Act) created the Building Energy Performance Standards (BEPS or Standard/s) Program. The CEDC Act requires that Standards be established for various property types to set a minimum threshold of energy performance that will be no lower than the District median score by property type (or equivalent metric). The purpose of the BEPS Program is to drive energy performance in existing buildings to help meet the energy and climate goals of the [Sustainable DC](#) plan — to reduce the District's greenhouse gas emissions and energy consumption by 50% by 2032.

The Department of Energy and Environment is required to establish Standards every six (6) years, creating BEPS Periods (BEPS Period 1, BEPS Period 2, etc.). DOEE and building owners measure whether a building meets Standards through the District's Energy Benchmarking program. Buildings that do not meet the Standards for a BEPS Period will be placed in a five-year Compliance Cycle (Figure 1). The building owner will have until the end of the Cycle for the building to meet energy performance requirements following one of the available Compliance Pathways, as outlined in the BEPS regulations. Additional guidance for Compliance Pathways can be found in the BEPS Compliance Guidebook, is available on [DOEE's website](#).

The 2021 Standards for BEPS Period 1 (2021 BEPS) can be found in 20 DCMR 3530.

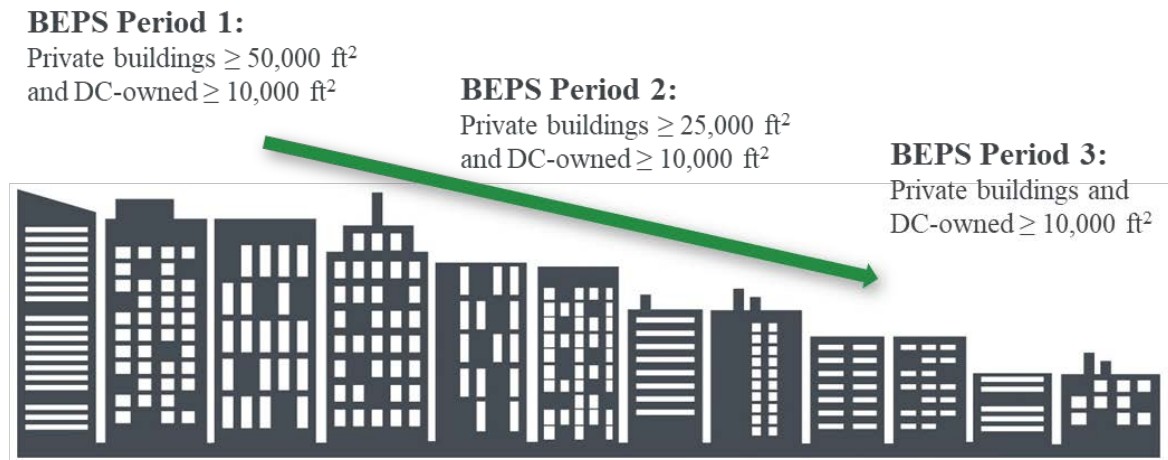*Figure 1 – Standard Evaluation Process*
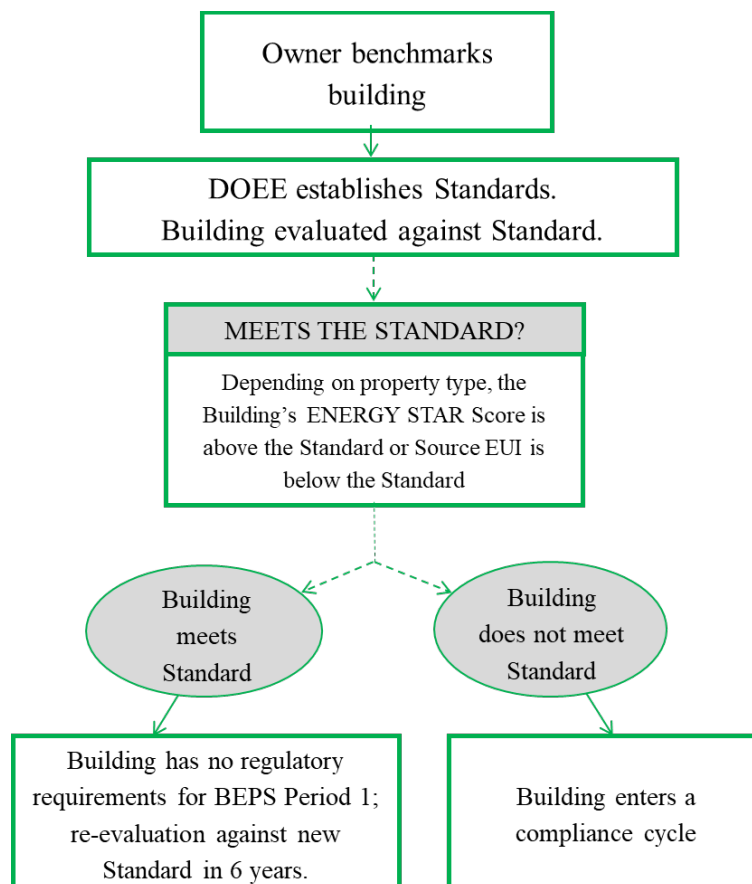
The 2021 BEPS will apply to all privately-owned buildings with at least 50,000 square feet of Gross Floor Area (GFA) and all District-owned or District instrumentality-owned buildings with at least 10,000 square feet of GFA.

BEPS Period 1 has the same square footage threshold requirements as the current Energy Benchmarking thresholds. Therefore, buildings required to benchmark in calendar year (CY) 2019 will be subject to the 2021 BEPS. If a building subject to the 2021 BEPS does not have a complete and accurate 2019 District Benchmark Results and Compliance Report on file, DOEE will assume that the building does not meet the Standard for BEPS Period 1.

Under the BEPS Program, square footage requirements decrease with each BEPS Period. Buildings will be required to meet the BEPS in the following Periods; eventually all buildings 10,000 square feet or more will be required to meet the Standards (Figure 2).

Figure 2 – BEPS Applicability

BEPS Period 1:
Private buildings $\geq$ 50,000 ft^2
and DC-owned $\geq$ 10,000 ft^2

BEPS Period 2:
Private buildings $\geq$ 25,000 ft^2
and DC-owned $\geq$ 10,000 ft^2

BEPS Period 3:
Private buildings and
DC-owned $\geq$ 10,000 ft^2

After stakeholder input and review of data, DOEE established the property type groups, metrics, and 2021 BEPS. DOEE has also set forth special considerations for hospital and post-secondary educational institutions in the District. For BEPS Period 1, DOEE calculated the Standards using CY2019 benchmarking data. The data used to calculate the Standards comes from the Benchmarking Public Disclosure. Detailed filters and methods for calculating the Standards are listed in Appendix A.

These program decisions were made with input from the BEPS Task Force. To see a full list of the Task Force recommendations, please see the BEPS Task Force Recommendations for Rulemaking report available on DOEE's website.

Chapter 2 – Property Type Groups

Standards are established by Primary Property Type as identified by the United States Environmental Protection Agency's (U.S. EPA) ENERGY STAR Portfolio Manager. Portfolio Manager uses the same method for calculating energy performance metrics for similar property types. For example, the ENERGY STAR Scores for Bank Branches, Financial Offices, Courthouses, and Offices are calculated using the same formula. Likewise, the ENERGY STAR Scores for Non-Refrigerated Warehouses and Distribution Centers are calculated using the same formula.

To ensure the Standard is as accurate as possible, DOEE uses data from all property types within a group to calculate one Standard for the group. Therefore, each property type within a group will have the same Standard. For example, Bank Branches, Financial Offices, Courthouses, and Offices all belong to the same group and have the same Standard. For a detailed list on how property types are grouped, and the metrics used, see Appendix B.

Chapter 3 – Metrics

The BEPS Program utilizes multiple metrics to evaluate energy performance. The CEDC Act requires that the Standards be measured by a building's ENERGY STAR Score (Score) or an equivalent metric for property types that cannot receive a Score. DOEE has determined that, as the Score is a source energy metric, the equivalent metric for most property types is Weather-Normalized Source Energy Use Intensity (Normalized Source EUI). Normalized Source EUI measures a building's total annual energy consumption divided by square feet, or for some property types, it measures total annual energy consumption divided by gallons per day. Because the national median cannot be weather-normalized, DOEE will use Source EUI as the metric for property type groups using the national median for their Standard (see Chapter 4).

The Score is a 1-100 percentile-based rating of a building's energy performance compared to the national body of similar buildings. For example, buildings with a Score of 50 perform better than 50% of their peers nationwide. The Score is designed to evaluate whole building energy performance, reflect actual metered energy use, equitably account for all fuel sources, normalize for building activity, and provide a peer group comparison. Source energy represents the total energy demand of a building traced back to the raw fuel input, accounting for any losses in production, transmission, and distribution. For more information on the ENERGY STAR Score and source energy, please refer to the following U.S. EPA technical reference documents:

- ENERGY STAR Score:
  https://portfoliomanager.energystar.gov/pdf/reference/ENERGY%20STAR%20Score.pdf
  Score technical references for each property type:
  https://www.energystar.gov/buildings/facility-owners-and-managers/existing-buildings/use-portfolio-manager/understand-metrics/energy-star
- Source Energy:
  https://portfoliomanager.energystar.gov/pdf/reference/Source%20Energy.pdf

If U.S. EPA updates or changes its ENERGY STAR metrics during the BEPS Period, DOEE will not reassess the BEPS or its determinations of whether a building meets the BEPS based on the revised U.S. EPA metrics.

Chapter 4 – Calculation of Building Energy Performance Standards for Period 1

The 2021 BEPS are established in 20 DCMR 3530. The Standards, which are effective on January 1, 2021, are based primarily on the District of Columbia (local) median for each property type. As discussed below, for property type groups with fewer than 10 buildings in the District, the Standards are based on the national median.

4.1 – 2021 Standards for BEPS Period 1

The data used to calculate the 2021 BEPS comes from the [Benchmarking Public Disclosure](#) as of December 2, 2020. A copy of the disclosure from that day can be found on [DOEE's website](#). The 2021 BEPS were calculated by identifying the local median Score or Normalized Source EUI for each property type using CY2019 benchmarking data. For property type groups with fewer than 10 buildings, there is not a sufficiently robust local dataset to derive an appropriate local median. Therefore, the Standards for those property types is based on the national median and just Source EUI. Detailed filters and methods for calculating the Standards can be found in Appendix A. Additionally, Appendix B describes which property types use the local median (Score or Normalized Source EUI) and which property types use the national median (Source EUI).

4.2 – 2021 Standards for Hospitals and University Campuses

Due to specific language in the CEDC Act listed below, DOEE engaged with representatives from the hospital sector and post-secondary educational institutions (Colleges/Universities) in 2019 and 2020 to gain feedback on how to establish the Standards. Recommendations were then discussed with the BEPS Task Force, which voiced its approval of the final structure.

The CEDC Act states:

> DOEE shall establish campus-wide energy performance standards for post-secondary educational institutions and hospitals with multiple buildings in a single location that are owned by a single entity. In establishing specific performance standards, DOEE shall consider:
>
> a) The existence of any historic buildings and any restrictions related to the treatment of historic buildings or districts;
> b) The diversity of building uses and requirements for the campus and its operations; and
> c) The impact on any zoning regulation or campus plan requirement.

Through discussions with representatives from the Hospitals and College/University campuses DOEE determined that the establishment of the BEPS is not significantly impacted by the existence of historic buildings, zoning regulations or campus plan requirements. As a result, DOEE only accounted for the diversity of building uses in the establishment the BEPS for these campuses. However, DOEE recognizes that all three of these factors could impact how campuses comply with the energy performance requirements of the BEPS Program. Thus, DOEE has built in flexibility into the Compliance Pathways available to campuses. More information about these pathways can be found in 20 DCMR 3518 and the BEPS Compliance Guidebook, both of which can be found on DOEE's website.

For hospitals, it was necessary to establish Standards using two types of metrics: one for hospitals that can receive a Score and one for hospitals that cannot. For those hospitals that cannot receive a Score, DOEE used Source EUI as the equivalent metric. In both cases, the Standard was set at the national median rather than the local. This was necessary given that there were too few hospitals in the District to establish an appropriate local median.

For the College/University Campus property type, there is no Score available. After lengthy discussion with the Consortium of Universities of the Washington Metropolitan Area, it was agreed that Source EUI is not an adequate equivalent metric because it does not account for the diverse property type uses that might be present on a university campus (e.g. laboratories, dorms, dining halls, offices, restaurants). Additionally, using the national or local median metrics would not serve as a fair or accurate comparison for energy performance due to the differences between the District's local institutions. As a result, DOEE developed customized Standards for the College/University Campus property type using the local median Source EUI adjusted for the square footage percentage of high-intensity space present on each a campus. A detailed methodology for calculating these custom Standards can be found in Appendix C.

Appendices

Appendix A – Method for Establishment of Standards

All Standards were calculated using the District's Benchmarking Public Disclosure for calendar year 2019 (CY2019). The data used to calculate the 2021 BEPS comes from the Benchmarking Public Disclosure as of December 2, 2020. A copy of the disclosure from that day can be found on DOEE's website. A list of data filters can be found in Table 1. For Property Types that use the National Median as their Standard, DOEE pulled relevant EUI numbers from U.S. EPA's U.S. National Median Technical Reference.

Methodology:
1. Start with the Benchmarking Public Disclosure dataset.
2. Assigned property type groups to each record found in Appendix B.
3. For ENERGY STAR Score local median:
   a. Filter dataset for the desired year.
   b. Remove property types that cannot receive a Score.
   c. Group dataset by property type.
   d. Apply primary data filters for each property type.
   e. Calculate the Score for each property type group.
4. For median Source EUI figures:
   a. Filter dataset for the desired year.
   b. Group dataset by property type.
   c. Apply primary data filters for each property type group.
   d. Calculate the EUI values for each property type group.

Table 1 – Primary Data Filters (Based on Disclosure Fields)

Filter Name	Field	Filter Description
Is Compliant?	REPORTSTATUS	Remove all observations without the value "In Compliance" or "Data Under Review by DOEE"
Filter out non-standard setting years	REPORTINGYEAR	Must equal 2019
Has Electricity Consumption data	ELECTRICITYUSE_KWH	Remove all observations equal to 0 or blank
Has a Weather Normalized Site EUI	WEATHERNORMALIZEDSITEEUI_KBTUFT	Remove all observations equal to 0 or blank
Is a standalone property or is the parent property for a campus	PARENTPROPERTYID	Remove all observations where PARENTPROPERTYID does not equal PMPROPERTYID or PARENTPROPERTYID does not equal "Not Applicable: Standalone Property" or BLANK
Outliers	WEATHERNORMALIZEDSITEEUI_KBTUFT	By property type: Remove observations outside of 2 standard deviations from the mean of the natural log of WEATHERNORMALIZEDSITEEUI_KBTUFT

Appendix B – Method for Grouping Property Types

DOEE created a property type grouping scheme based initially on a property's primary property type in Portfolio Manager, and then on whether they can receive the ENERGY STAR Score. Table 2 lists the property type groupings and Table 3 lists the type of median used by the property type group.

- Methodology:
    - Level 1 - Buildings are grouped by their "Primary Property" type from ENERGY STAR Portfolio Manager
    - Level 2 – Buildings that can receive the Score are grouped by their same "ENERGY STAR Scoring Model"
    - Level 3 - Buildings that cannot receive the Score are grouped by their "National Median Reference Type"

Table 2 – Property Type Groupings

Portfolio Manager Property Type	BEPS Property Type Group
Residential Care Facility	ALFA/Industry Survey
Bar/Nightclub	Bar/Nightclub
Veterinary Office	Clinic/other outpatient health
College/University	College/University
Data Center	Data Center
Adult Education	Education
Other - Education	
Vocational School	
Enclosed Mall	Enclosed mall
Fast Food Restaurant	Fast food
Fire Station	Fire station/police station
Police Station	
Convenience Store with Gas Station	Food sales
Convenience Store without Gas Station	
Food Sales	
Food Service	Food service
Ambulatory Surgical Center	Hospital/Healthcare
Hospital (General Medical & Surgical)	
Other - Specialty Hospital	
Outpatient Rehabilitation/Physical Therapy	
Urgent Care/Clinic/Other Outpatient	
Hotel	Hotel
K-12 School	K-12 School
Laboratory	Laboratory
Library	Library
Other - Lodging/Residential	Lodging
Other - Mall	Mall

Medical Office	Medical Office
Multifamily Housing	Multifamily Housing
Self-Storage Facility	Nonrefrigerated warehouse (Self-Storage Facility)
Distribution Center	Non-Refrigerated Warehouse/Distribution Center/Refrigerated Warehouse
Non-Refrigerated Warehouse	
Refrigerated Warehouse	
Bank Branch	Office/Bank/Financial Office/Courthouse
Courthouse	
Financial Office	
Office	
Energy/Power Station	Other
Mixed Use Property	
Other	
Other - Public Services	
Other - Technology/Science	
Other - Utility	
Pre-school/Daycare	Preschool/daycare
Aquarium	Public assembly
Casino	
Indoor Arena	
Movie Theater	
Museum	
Other - Entertainment/Public Assembly	
Other - Stadium	
Performing Arts	
Race Track	
Stadium (Closed)	
Stadium (Open)	
Transportation Terminal/Station	
Zoo	
Prison/Incarceration	Public order and safety
Bowling Alley	Recreation
Fitness Center/Health Club/Gym	
Ice/Curling Rink	
Other - Recreation	
Roller Rink	
Swimming Pool	
Barracks	Residence Hall/Dormitory/Barracks
Residence Hall/Dormitory	
Other - Restaurant/Bar	Restaurant/cafeteria
Restaurant	
Automobile Dealership	Retail other than mall

Retail Store	Retail Store/Wholesale Club/Supercenter/Supermarket/Grocery Store
Supermarket/Grocery Store	
Wholesale Club/Supercenter	
Senior Care Community	Senior Care Community
Mailing Center/Post Office	Service
Other - Services	
Personal Services (Health/Beauty, Dry Cleaning, etc.)	
Repair Services (Vehicle, Shoe, Locksmith, etc.)	
Convention Center	Social/meeting
Social/Meeting Hall	
Lifestyle Center	Strip shopping mall
Strip Mall	
Wastewater Treatment Plant	Wastewater/Drinking Water Treatment Plant
Drinking Water Treatment & Distribution	Water (Energy per flow)
Worship Facility	Worship Facility

Table 3 – Property Groups and Median Types

BEPS Property Type Group[1]	# of Buildings	Median Type
Education[2]	6	National
Enclosed mall[2]	2	National
Fire station/police station	35	Local
Hotel	97	Local
K-12 School	138	Local
Library	16	Local
Lodging[2]	9	National
Medical Office	10	Local
Multifamily Housing	647	Local
Nonrefrigerated warehouse (Self-Storage Facility)	13	Local
Non-Refrigerated Warehouse/Distribution Center/Refrigerated Warehouse	21	Local
Office/Bank/Financial Office/Courthouse	488	Local
Other	45	Local
Public assembly	10	Local
Recreation	32	Local
Residence Hall/Dormitory/Barracks	15	Local
Retail Store/Wholesale Club/Supercenter/Supermarket/Grocery Store	18	Local
Senior Care Community[2]	8	National
Service	14	Local
Social/meeting	15	Local
Strip shopping mall[2]	6	National

Water (Energy per flow) [2]	2	National
Worship Facility	15	Local

[1] Some BEPS Property Type Groups are not listed here because there are not buildings that fall within those groups in the District benchmarking data. DOEE is still establishing standards for all property types to ensure every property over 50,000 square feet has a standard.

[2] National Median ENERGY STAR Score and/or Source EUI were used as there is no appropriate District median given the small number of buildings in the District of this particular property type.

Appendix C – Method for Establishment of College and University Standards

All Standards were calculated using the District's energy benchmarking data for CY2019; however, the square footage assigned to each property use type used to account for high-intensity spaces are not part of the Benchmarking Public Disclosure. For more information on the metrics used to adjust for high-intensity property types, contact DOEE. Adjustment values were determined based on the same methods and filters as the Standards. The adjustment factors can be found in Table 4.

Methodology:
1. Calculate the square foot percentage (or "percent breakdown") of each property use type compared to total campus GFA. (GFA of a property use type / total GFA = "percent breakdown")
2. For all high-intensity spaces, multiply the "percent breakdown" by the appropriate adjustment factor to get the adjusted Source EUI value for that space type.
3. Sum all adjusted Source EUI values for each high-intensity space to get the adjusted Source EUI value for high-intensity space.
4. For all non-high-intensity spaces, sum the percent breakdown and multiply it by the College and University Adjustment Factor to get the adjusted Source EUI value for non-high-intensity space.
5. Sum the Blended Custom Source EUI value for high-intensity space and the Blended Custom Source EUI value for non-high intensity space to get the final custom Standard for the College and University Campus.

Table 4 – College and University Adjustment Factors for High-intensity Space

Space Type	Source EUI of Factor	Adjustment Factor Source[1]
Adult Education	110.4	National Median
Ambulatory Surgical Center	138.3	National Median
Aquarium	240.2	Local 2019 Median
Automobile Dealership	124.1	National Median
Bank Branch	209.9	National Median
Bar/Nightclub	297	National Median
Barracks	107.5	National Median
Bowling Alley	206.6	Local 2019 Median
Casino	240.2	Local 2019 Median
College/University	180.6	National Median
Convenience Store with Gas Station	592.6	National Median
Convenience Store without Gas Station	592.6	National Median
Convention Center	192	Local 2019 Median
Courthouse	211.4	National Median
Data Center	2000	US EPA Data Center Estimate2
Distribution Center	52.9	National Median
Enclosed Mall	170.7	National Median

Energy/Power Station	229.4	Local 2019 Median
Fast Food Restaurant	886.4	National Median
Financial Office	116.4	National Median
Fire Station	185.5	Local 2019 Median
Fitness Center/Health Club/Gym	206.6	Local 2019 Median
Food Sales	592.6	National Median
Food Service	527.7	National Median
Hospital (General Medical & Surgical)	426.9	National Median
Hotel	183.9	Local 2019 Median
Ice/Curling Rink	206.6	Local 2019 Median
Indoor Arena	112	National Median
K-12 School	104.4	National Median
Laboratory	601	Lab Benchmarking Tool3
Library	206.4	Local 2019 Median
Lifestyle Center	228.8	National Median
Mailing Center/Post Office	242.6	Local 2019 Median
Medical Office	121.7	National Median
Mixed Use Property	229.4	Local 2019 Median
Movie Theater	240.2	Local 2019 Median
Multifamily Housing	118.1	National Median
Museum	240.2	Local 2019 Median
Non-Refrigerated Warehouse	52.9	National Median
Office	116.4	National Median
Other	229.4	Local 2019 Median
Other - Education	110.4	National Median
Other - Entertainment/Public Assembly	240.2	Local 2019 Median
Other - Lodging/Residential	143.6	National Median
Other - Mall	225.3	National Median
Other - Public Services	229.4	Local 2019 Median
Other - Recreation	206.6	Local 2019 Median
Other - Restaurant/Bar	573.7	National Median
Other - Services	242.6	Local 2019 Median
Other - Specialty Hospital	433.9	National Median
Other - Stadium	240.2	Local 2019 Median
Other - Technology/Science	229.4	Local 2019 Median
Other - Utility	229.4	Local 2019 Median
Outpatient Rehabilitation/Physical Therapy	138.3	National Median
Performing Arts	240.2	Local 2019 Median
Personal Services (Health/Beauty, Dry Cleaning, etc)	242.6	Local 2019 Median
Police Station	185.5	Local 2019 Median
Pre-school/Daycare	131.5	National Median
Prison/Incarceration	156.4	National Median

Race Track	240.2	Local 2019 Median
Refrigerated Warehouse	235.6	National Median
Repair Services (Vehicle, Shoe, Locksmith, etc)	96.9	National Median
Residence Hall/Dormitory	107.5	National Median
Residential Care Facility	213.2	National Median
Restaurant	573.7	National Median
Retail Store	401.2	Local 2019 Median
Roller Rink	206.6	Local 2019 Median
Self-Storage Facility	47.8	National Median
Senior Care Community	213.2	National Median
Social/Meeting Hall	109.6	National Median
Stadium (Closed)	240.2	Local 2019 Median
Stadium (Open)	240.2	Local 2019 Median
Strip Mall	228.8	National Median
Supermarket/Grocery Store	401.2	Local 2019 Median
Swimming Pool	112	National Median
Transportation Terminal/Station	240.2	Local 2019 Median
Urgent Care/Clinic/Other Outpatient	145.8	National Median
Veterinary Office	145.8	National Median
Vocational School	110.4	National Median
Wholesale Club/Supercenter	401.2	Local 2019 Median
Worship Facility	58.4	National Median
Zoo	240.2	Local 2019 Median

[1] All EUI values are kBtu/ft^2

[2] For more information on the U.S. EPA data center estimate please see this technical reference guide.

[3] This value was determined by calculating the median of peer labs in LNBL's Lab Benchmarking Tool. The exact data was pulled on December 3, 2020. A copy of the data from that day can be found on this page.

Appendix D – Acronyms

BEPS – Building Energy Performance Standards
CEDC Act – Clean Energy DC Omnibus Amendment Act of 2018
CY – Calendar year
DOEE – Department of Energy and Environment
EUI – Energy use intensity
GFA – Gross floor area
PUE - Power use effectiveness
U.S. EPA – United States Environmental Protection Agency