

## ENERGY PERFORMANCE

### GENERAL INFORMATION

- 1.1 The Energy Performance requirement establishes a unified approach to the University's energy and carbon goals. Design teams work with CPM and CU Energy & Engineering to identify a project specific approach and convey impacts and lessons learned.
- 1.2 Energy and water calculations shall be performed on each project. The calculations will be used to predict the energy and water usage of the project for University planning and budgeting purposes.
- 1.3 The goal is to achieve the best achievable energy performance in both design and operations.

### DESIGN REQUIREMENTS

- 2.1 All projects require a [Utility Data worksheet](#) and some others will require an Energy Model per the **Columbia Green Building Program** Whole Building Energy Performance Decision Tree.

A [Utility Data worksheet](#) shall be drafted in the project's Schematic phase and submitted to the Project Manager for distribution to the Operations team. A final version reflecting project changes will be submitted at 100% Construction Documents phase. A sample of the [Utility Data worksheet](#) is attached.

- a. Current Estimate

Where existing energy usage data is unavailable, projects shall estimate the current energy consumption.

- b. Proposed Usage

Anticipated consumption to be compared to the Target.

- c. Benchmarks

Benchmarks offer valuable insight into building performance by building size and use and provide a standard to compare to when assessing design energy models and reviewing operational data. All projects shall set a source energy use intensity (EUI) and/or carbon use intensity (CUI) per the references below.

1. Sources for EUI Benchmarks

- i. For all projects utilize the Current National Median from Energy Star Portfolio Manager.

## 2. Sources for CUI Benchmarks

- i. For buildings in NYC, projects shall use the LL97 emission factor (or an area-weighted average of factors) for the appropriate ESPM property type or types. Select emissions factors for the compliance period which corresponds to the project's substantial completion date.
- ii. For Non-NYC projects the engineering team shall develop a benchmark based on current CBECS data and the emissions data found in the [EPA Emissions Factor Hub](#).

*Benchmark Reference Table*

| PROJECT TYPES |              | SPACE USES                                                         |                                                          |
|---------------|--------------|--------------------------------------------------------------------|----------------------------------------------------------|
|               |              | ALL SPACE USES Academic/Office, Residential, Medical, Non-Lab, Lab |                                                          |
|               |              | Source EUI (kBtu/ft <sup>2</sup> /year) Energy                     | CUI (kgCO <sub>2</sub> /ft <sup>2</sup> /year) Emissions |
| NYC           | All Projects | <a href="#">Latest ESPM Median by Property Type</a>                | <a href="#">LL97 by Property Type</a>                    |
| Non-NYC       | All Projects | <a href="#">Latest ESPM Median by Property Type</a>                | TBD by Project Team                                      |

## d. Targets

Targets serve as an aspirational design case for energy and carbon performance. All projects shall set a Target Source EUI.

*Target Reference Table*

| PROJECT TYPES                         | SPACE USES                                                  |                                                      |                                                      |
|---------------------------------------|-------------------------------------------------------------|------------------------------------------------------|------------------------------------------------------|
|                                       | Academic/Office, Non-Lab/Medical, Undergraduate Dormitories | Residential                                          | Lab & Medical                                        |
|                                       | Source EUI (kBtu/ft <sup>2</sup> /year)                     | Source EUI (kBtu/ft <sup>2</sup> /year)              | Source EUI (kBtu/ft <sup>2</sup> /year)              |
| Projects that require an Energy Model | 45% below Baseline Model                                    | 35% below Baseline Model                             | 30% below Baseline Model                             |
| Select Renovations                    | 10% Improvement Over Current & Energy Code Compliant        | 10% Improvement Over Current & Energy Code Compliant | 15% Improvement Over Current & Energy Code Compliant |

## e. Emissions

### 1. NYC Projects

Projects in NYC shall comply with Local Law 97.

It is the responsibility of the energy modeling consultant to determine both the appropriate emissions limit and factors for a given project.

Projects must:

- i. Use the emissions limits for the compliance period which corresponds to the project's anticipated substantial completion date, AND
- ii. Model the project to determine compliance with the 2035-2050 period limits.

If the project is found to be out of compliance with the 2035-2050 limits, the project team must define and document a pathway for future compliance.

The energy modeling consultant shall review their LL97 compliance approach with CU Energy & Engineering team. For projects served by the Morningside Central Plant, refer to the CU Electrification Plan Equipment Replacements requirement [23 00 01 - ELECTRIFICATION PLAN](#)

## 2. Non-NYC Projects

Projects outside of the NYC shall use the latest [EPA Emissions Factor Hub](#) to estimate emissions.

Emissions associated with electricity consumption shall be determined using the Total Output Emissions Factors.

## 2.2 Energy Model

An energy model is required for all applicable projects under the **Columbia Green Building Program** Whole Building Energy Performance Decision Tree.

The energy modeling consultant shall work with the mechanical and electrical design teams to build both a baseline model and a design model in accordance with the Energy Modeling Table. The energy modeling consultant shall review Modeling approach with CU Energy & Engineering team for additional guidance.

*Model Reference Table*

| MODEL PROVISIONS               | DETAILS                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            |
|--------------------------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Baseline Model                 | ASHRAE 90.1-2016 Appendix G (or the latest code-compliant version of ASHRAE 90.1) modeled Baseline Building performance, as identified in Table G3.1.                                                                                                                                                                                                                                                                                                                                                                              |
| Design Model                   | <ul style="list-style-type: none"> <li>▪ ASHRAE 90.1-2016 Appendix G (or the latest code-compliant version of ASHRAE 90.1) modeled Proposed Building performance, as identified in Table G3.1.</li> <li>▪ Target design percent improvement shall be calculated as in ASHRAE 90.1 Section G1.2.2.2 with source EUI used in lieu of building source energy.</li> </ul>                                                                                                                                                              |
| Design ECMs                    | Design teams are encouraged to identify Cost-effective energy conservation measures (ECMs) that are in alignment with the project budget and energy goals. Coordinate with the CU Energy & Engineering Team for access to recent energy audits reports. If a report is available, it may contain ECM's that are relevant to the project                                                                                                                                                                                            |
| Design Additional Requirements | <ul style="list-style-type: none"> <li>▪ At minimum, comply with all mandatory and prescriptive provision of Sections 5 through 10 of ASHRAE 90.1-2016 with Errata, or the latest code-compliant version of ASHRAE 90.1.</li> <li>▪ Electricity generated from on-site renewable energy sources can be used to support the project energy and carbon goals if those sources are dedicated to the project.</li> <li>▪ For projects receiving utilities from Campus Central Plants, refer to the Energy Sourcing Chapter.</li> </ul> |

**CONSTRUCTION REQUIREMENTS**

- 3.1 The University will audit select projects with metering data. If actual energy use is greater or less than 15% of that modeled, the consultant shall provide a written report to reconcile the discrepancy.

**END OF SECTION**

## PROJECT INFORMATION

|                     |                        |                        |                 |
|---------------------|------------------------|------------------------|-----------------|
| Project Name:       | PROJECT NAME           | Building Name:         | SELECT BUILDING |
| CU Project No.      | CP#####                | Current Occupancy Use  | CURRENT USE     |
| CU Project Manager  | PROJECT MANAGER'S NAME | Proposed Occupancy Use | PROPOSED USE    |
| Funding Client      | SCHOOL NAME            | Project Size (Sq. Ft.) | #,### SQ. FT.   |
|                     |                        | Architect:             | AOR             |
| Project Start date: | 00/00/2025             | Engineer:              | EOR             |

| UTILITY                            | LOAD TYPE                                                 | CURRENT USAGE | CODE USAGE | PROPOSED USAGE | REDUCTION | UNITS             |
|------------------------------------|-----------------------------------------------------------|---------------|------------|----------------|-----------|-------------------|
| Campus Chilled Water               | Peak Design Load                                          | 0.0           | 0.0        | 0.0            | 0.0       | Tons              |
|                                    | Annual Consumption                                        | 0.0           | 0.0        | 0.0            | 0.0       | Ton-Hours/Year    |
| Campus Steam                       | Peak Design Load                                          | 0.0           | 0.0        | 0.0            | 0.0       | MBH               |
|                                    | Annual Consumption                                        | 0.0           | 0.0        | 0.0            | 0.0       | MBtu/ Year        |
| Electricity                        | Peak Design Demand                                        | 0.0           | 0.0        | 0.0            | 0.0       | kW                |
|                                    | Annual Consumption                                        | 0.0           | 0.0        | 0.0            | 0.0       | kWh/year          |
| Natural Gas                        | Peak Consumption                                          | 0.0           | 0.0        | 0.0            | 0.0       | SCFM              |
|                                    | Annual Consumption                                        | 0.0           | 0.0        | 0.0            | 0.0       | CCF               |
| Project Source EUI                 |                                                           |               |            |                |           | Btu/SqFt/Year     |
| Benchmark Source EUI (ESPM Median) |                                                           |               |            |                |           | Btu/SqFt/Year     |
| Target Source EUI                  |                                                           |               |            |                |           | Btu/SqFt/Year     |
| Municipal Cold Water               | Peak Consumption                                          | 0.0           | 0.0        | 0.0            | 0.0       | GPM               |
|                                    | Annual Consumption                                        | 0.0           | 0.0        | 0.0            | 0.0       | Gal/Year          |
|                                    | Estimated Annual Consumption not diverted to Sewer System | 0.0           | 0.0        | 0.0            | 0.0       | Gal/Year          |
| Emissions                          | Annual                                                    | 0.0           | 0.0        | 0.0            | 0.0       | kg_CO2e/SqFt/Year |
| NYC Benchmark CUI (LL97)           |                                                           |               |            |                |           | kg_CO2e/SqFt/Year |
| Non-NYC Benchmark CUI              |                                                           |               |            |                |           | kg_CO2e/SqFt/Year |

Comments / other systems requiring utility consumption (such as liquid fuel system):

Description here...