CLF WBLCA Benchmark Study (v2)

Data Collection User Guide

Version   1.0

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*This document was developed to support data collection for the [CLF WBLCA Benchmark Study (v2)](#). It is not intended to serve as a template, set of requirements, guidance document, or recommendations for other LCA modeling, reporting, or data collection efforts.

About the Carbon Leadership Forum

The Carbon Leadership Forum accelerates the transformation of the building sector to radically reduce the greenhouse gas emissions attributed to materials (also known as embodied carbon) used in buildings and infrastructure. We research, educate, and foster cross-collaboration to bring embodied carbon of buildings and infrastructure down to zero.

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Introduction

The goal of this Data Collection User Guide is to provide instructions and assistance for data contributors seeking to submit building project data and whole-building life cycle assessment results to the CLF WBLCA Benchmark Study (v2). It is not intended to serve as a template, set of requirements, guidance document, or recommendations for other LCA modeling, reporting, or data collection efforts. This user guide provides detailed requirements and descriptions of the types of data that will be collected for this research project and should be accompanied by the *CLF WBLCA Benchmark Study (v2) Data Entry Template v1.0* in Appendix B.

Project overview

The CLF Whole Building Life Cycle Assessment (WBLCA) Benchmark Study (v2) aims to deepen our understanding of the environmental impacts of buildings over their full life cycle from the extraction and manufacturing of materials, to a project's end-of-life to better define what constitutes a "low-carbon building" and to better set goals on individual projects and policies. This multi-year project will collect data from professional firms to create a database of building materials, quantities, and environmental impacts for current and future research such as exploring building benchmarking and embodied carbon policy implications. This database will be stripped of features that could identify specific buildings or building design and construction companies. The project will explore the variability of carbon impacts of buildings and also explore how designers are using WBLCA models in practice.

This research project consists of three different, but related phases:

1. **Phase 1 - Pilot Study (Fall/Winter 2022):** The pilot phase of this project aimed to develop and test the infrastructure for robust data collection, database development, analysis processes, and other research methods. The project team established a small group of pilot partners and collected several projects from each while gathering feedback from the participants. Many of the methods tested in the pilot phase are now being used in phases 2 and 3.

2. **Phase 2 - California Whole Life Carbon Study (2023):** This phase will focus on whole-life carbon impacts of buildings in California, including both operational and embodied carbon emissions. The dataset will be compiled from a discrete set of real-world projects and will be used to produce a case study report examining the relationship between embodied and operational carbon over time when considering future grid decarbonization projections. Publications from this study will provide designers, policymakers, and other AEC stakeholders with timely data and analysis on the relative carbon impacts of new buildings constructed in California to inform policy.

3. **Phase 3 - Initial North American Benchmarks and Dashboard (2023-2024+):** This project involves developing a dataset of 200+ high-quality and harmonized WBLCA models of real-world building projects from which to conduct analysis. Data collection was substantially completed in early 2024 with extensive support from industry design practitioners. Moving forward, this dataset will be used to conduct statistical analysis on the embodied carbon impacts of buildings and improve current estimates of typical, low, and high values for buildings in North America. Anticipated outcomes of this study include WBLCA modeling and reporting guidance, findings from our background research and literature reviews, exploratory data analysis and preliminary baseline figures, a data visualization dashboard, open-access data for the buildings collected, and other publications.

Structure of this document

This user guide is broken down into four primary sections:

1. **Project Requirements**
   - Minimum eligibility requirements that _projects_ must meet in order to be submitted to the study
2. **Embodied Carbon Modeling & Reporting Requirements**
   - Minimum WBLCA modeling and reporting requirements that must be followed in order for WBLCA _results_ of projects to be submitted to the study
3. **Operational Energy Use Requirements**
   - Minimum requirements for (optionally) reporting a project's operational energy use
4. **Data Entry Guidance**
   - Specific definitions, references, and guidance for filling out individual fields in the CLF Benchmark Data Entry Template that accompanies this user guide.

From surveying potential data contributors, it is presumed that the majority of projects received for this study will be located in the United States. Accordingly, multiple database field descriptions are based on the most recent versions of predominantly United States-based and/or North American standards. While it is still encouraged that non-U.S. projects are submitted to the study, it may require users to determine appropriate equivalency to these data fields.

For questions regarding the CLF Benchmark Study (v2), or this specific document, please reach out to clfbenchmark@uw.edu.

1. Project Requirements

This section contains the minimum eligibility requirements that projects must meet in order to be submitted to the CLF WBLCA Benchmark Study (v2). These requirements were established to ensure that projects collected for this study will be categorically comparable and enable meaningful data analysis and research results.

1.1 Minimum project criteria

For projects to be submitted to the study they must:

1. Be real building projects (not hypothetical design exercises)
2. Be located in North America
3. Be new construction projects or renovations. Tenant improvement (T.I.) projects will be accepted, but they are not a priority for this project.
4. Be any building use, size, or type, *except* single-family residential
5. Include at least one WBLCA report that aligns with the criteria of section 2. WBLCA Modeling & Reporting Requirements
6. *Optionally* include energy use data that meets the criteria of section 3. Operational Energy Use Requirements. For California-based projects, the inclusion of Operational Energy Use Data is heavily encouraged which will allow us to meet the needs of Phase 2 of the project "The California Total Carbon Report".

While this criterion represents the minimum for projects to be submitted to the study, the CLF will be prioritizing the collection and analysis of certain types of projects throughout the duration of the study. Project-type priorities will be communicated with participants prior to the transfer of any data. This process is intended to ensure that a diverse and representative sample of projects is collected and that the research outcomes of the study will be fulfilled.

2. Embodied Carbon Modeling & Reporting Requirements

This section contains the minimum WBLCA modeling and reporting requirements that must be followed in order for WBLCA results of projects to be submitted to the study. The methods used to conduct WBLCAs can have significant ramifications for their corresponding results. The requirements below cover the exact modeling methodologies that should be followed when conducting WBLCAs to ensure that the results from those analyses meet a minimum level of quality, harmonization, and comparability for this study.

2.1 Minimum WBLCA modeling criteria

WBLCAs must be conducted in alignment with the following criteria:

Design phase: at least one WBLCA report for the project must be submitted that represents a "final report". A final report is a WBLCA that most accurately reflects the final as-designed, or as-built building condition. Final reports must be from the construction documentation phase or later. (See Final Report for additional guidance and definition).

- Multiple reports: In addition to the final report, WBLCAs of the project that were conducted earlier in the design process such as early studies or other iterations of the design will also be accepted. For projects that are submitting multiple WBLCAs, a final report must always be included and should represent the best quality and most complete WBLCA in the set. (See 2.2.2 Reporting separate or additional WBLCA scope results for details)

LCA Tools: WBLCAs must be conducted using either Tally, Oneclick LCA, or Athena software. (See Section 2.3 for additional LCA Software-specific requirements)

Life Cycle Stages: within the capabilities of the selected LCA software, impacts for all life cycle stages should be included in the analysis and reported with the exceptions A5 (optional), and B6 (exclude). For projects seeking to submit operational energy use (B6), please see Section 3. Operational Energy Use Reporting Requirements.

Biogenic carbon: users must indicate whether biogenic carbon is included in their WBLCA. All three approved LCA software have different methods for dealing with biogenic carbon. See Section 2.3 LCA software-specific requirements for details and guidance.

Reference study period: must be set to 60 years. (See Reference Study Period for guidance and definitions)

Minimum physical scope included: the physical scope of the building (elements, assemblies, materials, and products) should be modeled and included in the analysis to the maximum extent possible within the capabilities of the selected LCA software. It is recommended that any building element representing over 1% of a project's mass should be modeled. At a minimum, the following primary physical scopes must be included:

- Substructure (refer to Substructure for definition and guidance)
- Shell - Superstructure (refer to Shell - Superstructure for definition and guidance)
- Shell - Exterior Envelope (refer to Shell - Exterior Enclosure for definition and guidance)
- Attached Parking either above or below-grade parking garages or "parkades" that share a structural system with the building, must be included in the WBLCA if they are part of the project. (refer to Attached Parking Type for guidance and definitions)
- Interiors - Construction and Interiors - Finishes are not required to be included for a project to be submitted. However, including these scopes is strongly encouraged. (refer to Interiors - Construction and Interiors - Finishes for definition and guidance)

Physical scope that must be reported separately or excluded:

The following must be either excluded from the WBLCA results or reported separately from the building's minimum physical scope:

- Sitework (See Sitework for guidance and definition)
  - Non-attached, independent parking garages, structures, and/or surface parking lots may be included in sitework if they are part of the project.
- Services (MEP) (See Services (MEP) for guidance and definition)
- Equipment and Furnishings (See Equipment and Furnishings for guidance and definition)

  See section 2.2.2 Reporting separate or additional WBLCA scope results for guidance on this process.

2.2 WBLCA reporting criteria

WBLCAs results must be submitted in alignment with the following criteria:

2.2.1 Minimum reporting requirements

- The project meta-data fields, as described in Section 4. Data Entry Requirements, should be filled out in correspondence with each WBLCA being submitted.
- For each WBLCA, a full Excel spreadsheet report of the LCA, exported directly from the LCA software, must be submitted without any post-processing of the Excel results.
  - Post-processed reports (such as swapping out emissions factors, adjusting material quantities, or manually editing the report's quantitative results in any way) will only be accepted as additional information, and only if a non-post-processed version is also submitted. Removing confidential firm or project information from the report is acceptable, and not considered post-processing.
- The filename of the LCA report must be unique. See LCA Report Name.
- Optionally, participants are also encouraged to submit:
  - Supplemental project information of the WBLCA being submitted such as BIM models, project drawings, material quantity estimates, renderings, or other project information (optional).
  - Additional PDF summaries or other graphic outputs from selected LCA software (optional).

2.2.2 Reporting separate or additional WBLCA scope results

Due to the inconsistent physical scope data available in each LCA software, and in order to accurately compare and analyze projects with similar types of physical scope, it is required that LCA results for the following physical scopes be submitted separately from the main building's results:
- Sitework
- Services (MEP)
- Equipment and Furnishing

For each separate scope category that a participant wants to include, an individual LCA report must be uploaded that includes only that physical scope. The corresponding filenames should be entered in the Data Entry Template under the Additional LCA Report Name(s) field.

2.3 LCA software-specific requirements

2.3.1 Tally-specific requirements

- <u>Analysis type:</u> WBLCAs conducted with Tally must be of a "Full Building Study." Design option comparisons or template files will not be accepted.
- <u>Software Version:</u> WBLCAs must be conducted using Tally version 2018.09.27.01 or later (to include biogenic carbon). However, we highly encourage submitting reports that were conducted using versions 2020.02.28.01 and later (which include Omniclass "building element" mapping).
- <u>Biogenic carbon:</u> Tally users should include biogenic carbon in their WBLCAs. For older projects that used a version of Tally that did not have this option, users are encouraged to re-run those models in a new version of Tally (2018.09.27.01 or later). WBLCAs with biogenic carbon *not included* will still be accepted, but may not be included in the analysis phase of this study.
- <u>LCA Reports:</u> Users are required to submit the Excel file that gets generated by Tally. Optionally, users are also encouraged to submit the PDF results.

2.3.2 Oneclick LCA-specific requirements

- <u>Software Version:</u> WBLCAs conducted in Oneclick must be done using one of the following Oneclick calculation tools:
  - LCA for LEED, US (TRACI)
  - LCA for LEED, Canada (TRACI)
- <u>Material Quantity Generation:</u> There are multiple methods that Oneclick users may utilize when generating the material inventory from which to calculate impacts. Four common methods are described below with specific guidance provided for each. While the exact method chosen is up to the user, **options 3 or 4 are strongly encouraged** for submitting data to this study.
  1. <u>Manual inputs:</u> involves manually creating materials and entering their exact quantities in the Oneclick tool itself. Users following this method should be referencing other bills of materials or information to ensure the physical scope and material quantities accurately reflect the design being submitted. This method is not advised for submitting data to this study.
  2. <u>Revit Plugin Direct Export:</u> involves using a plugin for Revit that allows the direct exporting of a Revit model to Oneclick LCA. The plugin will help to create material quantities that are readable in Oneclick, and suggest the mapping of some material definitions where possible. Users should be aware that this method can unknowingly exclude large amounts of physical scope, vastly over or under-calculate material quantities, and improperly assign material definitions. This method is not advised for submitting data to this study.
  3. <u>Importing Bills of Materials:</u> involves formatting a bill of materials that the user has access to (e.g., from a contractor, cost estimator, or other sources) into a readable Oneclick format, importing it into the tool as the basis from which to assign materials. This is one of two preferred methods to follow for submitting data to this study.
  4. <u>Hybrid: Revit + Bills of Materials:</u> involves using Revit to generate material quantity schedules, transposing those schedules into a bill of materials that are readable in Oneclick, and importing them into the tool as a basis from which to assign materials.
- <u>Biogenic carbon:</u> Oneclick users do not need to do anything for biogenic carbon. Total carbon storage will be reported automatically using any of the calculation tools above.

- <u>LCA Reports</u> from Oneclick should be generated by using the "Oneclick LCA Results Report" feature. Users should:
  - Navigate to the results tab of the design being submitted
  - click on "More Options"
  - click on "Oneclick LCA result report"
  - When the results window opens, click on "Download Excel"
  - This Excel file is what should be submitted as the LCA Report

2.3.3 Athena-specific requirements

The CLF is still determining what potential harmonization issues should be addressed for Athena users and will provide specific requirements when available.

3. Operational Energy Use Reporting Requirements

Users may elect to share operational energy use data for the projects they are submitting. For California-based projects, submitting operational energy use data is strongly encouraged to support Phase 2 of this research project. This phase of the study seeks to analyze the whole-life carbon impacts of a sample of building projects in the State of California.

3.1 Energy use reporting requirements

For each project providing operational energy use data, users must be able to provide either *measured* or *modeled* energy use data using one of the following options. Data contributors who have energy-use data for more than one option on a project are encouraged to submit data for as many options as possible. These options are:

Option 1: Measured Utility Energy Use: actual *measured* energy use of the building's primary fuel sources from utility bills covering a full calendar year.

> Refer to Option 1: Measured Utility Data Fields

Option 2: Modeled Hourly Energy Use: modeled results from a predictive energy model report by fuel source, in hourly format, and covering a full calendar year. This option is for submitting "8760 results tables" which are hour-by-hour analyses that simulate a building's performance for all 8,760 hours in a given 12-month period. These tables are typically produced by energy modelers (MEP engineers or other energy consultants) as part of professional energy modeling services for projects. Users will be required to upload the tables.

> Refer to Option 2: Modeled Hourly Energy Use Data Fields

Option 3: Modeled Annual Energy Use: modeled energy use impacts from a predictive energy model report by fuel source, in yearly format.

> Refer to Option 3: Modeled Annual Energy Use Data Fields

Option 4: Modeled Site pEUI: modeled total site EUI from a predictive energy model report

> Refer to Option 4: Modeled Site pEUI

4. Data Entry Requirements

4.1 Data entry template

Collecting WBLCA results and project meta-data is a key component of this study. In order to facilitate accurate and harmonized comparisons of WBLCA results and design parameters, the CLF has created the CLF WBLCA Benchmark Study (v2) Data Entry Template v1.0 (Excel spreadsheet) to collect different data types from users submitting to this study that is available in Appendix B. The data entry template contains tabs that correspond to the following data types:

1. **Participant Data:** basic information about the participant and their contact information (e.g. company name, company type, primary contact, email address, etc.).
2. **Project Data:** general descriptions and physical characteristics of designed or constructed building projects (e.g. project location, construction type, building use, floor area, height, parking type, structural system, building code cycle, etc.), as well as attributes of the WBLCA analysis (e.g. date of analysis, the physical scope included, reference study period, etc.).
3. **Energy Data:** measured and/or modeled energy consumption data of the building project's mechanical, electrical, and plumbing systems (e.g. total energy use intensity, energy loads per end-use, fuel sources, on-site renewable energy generation, etc.).

Each of the data types in the template should be filled out in correspondence with each WBLCA being submitted.

4.2 Description of data fields

Each data type above contains specific fields that users are required to fill out and each is described in this section. The following field descriptions will contain the same format below, if applicable:

Definition: As defined by CLF

Units: Specified unit of measure for the input (all applicable dimensional measurements should be reported in imperial units)

Reference: External documents that have been referred to or used as a basis for the definition of the input

Guidance: How to calculate the input, and possible choices for the input from a dropdown, if applicable

Building Elements: The parts of the building that the user should refer to in order to fill out the required field

Example Input: Preferred entry format

Optional: List of items that can be submitted in lieu of filling out the input. Assume all fields are mandatory unless noted otherwise. All project documents submitted to the CLF fall under the Data Transfer and Use Agreement.

Excel Tab 1. Participant data

Participant Data

Company Name

Definition: Name of the company providing WBLCA Report(s).

Company Type

Definition: Type of company providing the WBLCA Report(s).
Guidance: See Appendix A.1 Company Type for an acceptable list of inputs.

Company Size

Definition: Size of the company providing WBLCA Report(s).
Reference: AIA 2030
Guidance: See Appendix A.2 Company Size for an acceptable list of inputs.

Company State or Province

Definition: State/Province where the company is located.
Guidance: Companies with multiple offices should select the location of the office responsible for submitting the data to the CLF. See Appendix A.3 State for an acceptable list of inputs.

Company City

Definition: City where the company or company office is located.
Guidance: Companies with multiple offices should select the location of the office responsible for submitting the data to the CLF.

Primary Contact

Definition: Name of person submitting the data.
Guidance: This contact will be the point person for communication with CLF and should be able to direct any questions to the appropriate team or staff members of their company, if needed.

Primary Email Address

Definition: Email address of primary contact.

Excel Tab 2. Project data

General Project Data

Project Name

Definition: Name or abbreviation of project.
Guidance: Project names can be anonymous if desired, but they must be unique. File Naming conventions will be provided to participants prior to any data transfer.

LCA Report Name

Definition: Full file name of the Excel LCA results file exactly as it will be uploaded to the CLF.
Guidance: Because it is possible to submit multiple LCA reports of the same project, there must be a distinction between Project Name and LCA Report Name. File Naming conventions will be provided to participants prior to any data transfer.

Date of Entry

Definition: Date of data entry.

Project Description

Definition: Description of the project focusing on the use, function, and scope of work for the project. For renovation projects, please provide a detailed description of the project scope.
Guidance: The intent of this field is for users to provide more specific descriptions of the type and use of the building than what might otherwise be possible using the data entry template alone. For instance, a building's primary use might be "Healthcare", but a more specific project description could state: "*This is a healthcare building at the University of Washington that includes out-patient services, educational lecture spaces, laboratory research rooms, and a small cafeteria.*"

- **Renovation projects** should provide a detailed description of the project here, which may not otherwise be possible in this form. For instance, renovation projects might describe the physical scope of the project, whether the project included additions, how much area was demolished, or the level of work in various spaces and/or on various building elements.

Project State or Province

Definition: State/Province where the project is located.
Guidance: See Appendix A.3 State for an acceptable list of inputs.

Project City

Definition: City where the project is located.

Project Zip Code

Definition: 5-digit zip code where the project is located.

Project Climate Zone

Definition: Climate Zone where the project is located.
Reference: *2021 IECC* for United States projects and/or *2020 National Energy Code for Canadian Buildings* for Canadian projects; Koppen-Geiger Climate Classification may be used for all other project locations
Guidance: See Appendix A.4 Climate Zones for an acceptable list of inputs. Climate zones are set by building location and can affect the thermal performance of building envelopes and other energy-use-related design parameters.

Building Code

Definition: Governing building code where the project is located.
Guidance: The most localized building code should be reported (i.e., city, county, or state building code version, or IBC/IRC version if no local exists). The entry should provide the year of issuance first, followed by location and ending with "Building Code."
Example Input: *2018 Seattle Building Code*
Optional: This field is optional as long as the following documentation is submitted:
- Structural Project Documents with General Notes

Energy Code

Definition: Governing energy code where the project is located.
Guidance: The most localized energy code should be reported (i.e., city, county, or state energy code version, or IECC version if no local exists) The entry should provide the year of issuance first, followed by location and ending with "Energy Code."
Example Input: *2018 Seattle Energy Code*
Optional: This field is optional as long as the following documentation is submitted:
- Architectural Project Documents with General Notes

Completion Year

Definition: Year of project's actual construction completion, certificate of occupancy, or anticipated project completion year.
Guidance: When the project is still in the design stages or undergoing construction, the best estimate of completion year is appropriate.

Project Design Data

Project Type

Definition: Type of construction that details whether the project is new or a modification of an existing building
Guidance: See Appendix A.5 Project Type for an acceptable list of inputs. Building type is based on the following criteria:
- **New Construction**: Entirely new structures and site preparation.
- **Major Renovation**: Up to 50% of the original structure is retained.
- **Minor Renovation**: 75% or more of the original structure is retained.

- **Tenant Improvement:** Interior fit-outs, systems upgrades, or other interior-based improvements to leased spaces that involve little to no alterations of the building's original structure.

IBC Construction Type

Definition: Type of construction per IBC.
Reference: IBC 2021
Guidance: See Appendix A.6 IBC Construction Type for an acceptable list of inputs. IBC designates building construction types to classify building elements' combustibility and requirements for fire rating and design.
Optional: This field is optional as long as the following documentation is submitted:
- Architectural Project Documents with General Notes

Attached Parking Type

Definition: Type of attached parking structure or "parkade".
Guidance: See Appendix A.7 Attached Parking Type for an acceptable list of inputs. This selection is for **attached parking only.** Parking structures, garages, or surface lots that are separate and independent from the primary building should either be excluded from the LCA results or reported separately as part of Sitework. Figure 1 shows the attached parking types.
Optional: This field is optional as long as one of the following documentation is submitted:
- Architectural Project Documents with General Notes
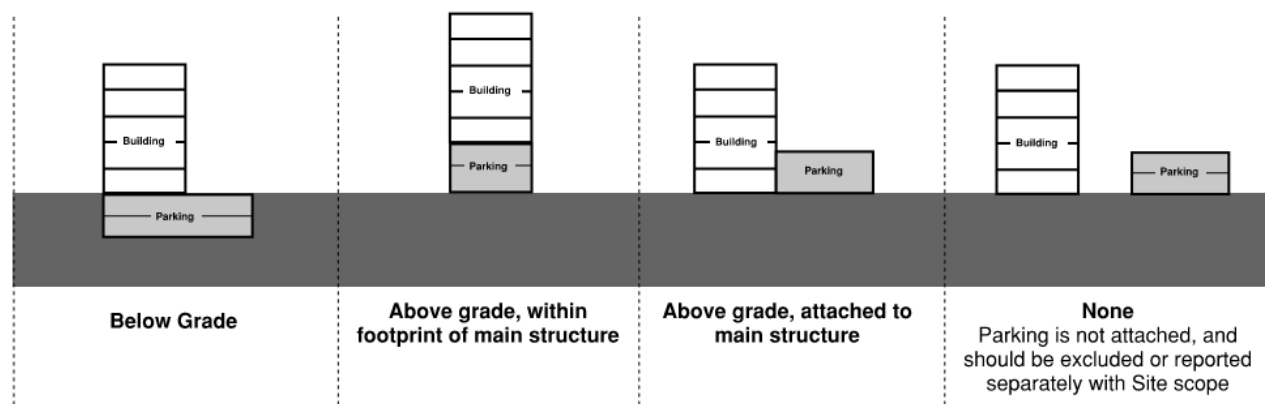- Architectural Revit Model

Figure 1: Attached Parking Types

Project Floor Area

Definition: The total horizontal area occupied by the building **including attached parking floor area**, if applicable, and **inclusive of the existing floor area**, if applicable, for renovation projects.
Units: Square Feet
Reference: IPMS

Guidance: CLF recommends the use of the International Property Measurement Standards (IPMS) for area calculations. Specifically, for floor area calculations, IPMS 2 shall be used. IPMS 2 is analogous to most versions of "Gross Internal Area," and whose main parameters and recommendations have been reproduced below:

- External boundaries of the floor area are measured to the Internal Dominant Face of the building, which is the inside surface of the finished surface of the exterior wall. Put another way, the area between the external wall boundary and the internal dominant face are excluded.
- Areas occupied by walls and columns are included in the floor area
- Voided areas such as atria are excluded
- Stairs and elevator areas are included
- External horizontal structures at any floor level that are outside of the Internal Dominant Face of the building (i.e. balconies, rooftop terraces, etc.) are to be included in External Floor Area
- Sheltered areas not within the structural construction of the building are to be included in External Floor Area
- Enclosed walkways or passages connecting separate buildings are to be included in External Floor Area
- Enclosed rooftop mechanical, electrical, and elevator equipment/machine rooms are excluded

Renovated Floor Area

Definition: The total horizontal area where the existing building was renovated.
Units: Square Feet
Guidance: See Project Floor Area for guidance. The total floor area that was impacted by a renovation should be included here, regardless of the extent of work for the renovation. To help clarify the scope of work for the renovation, users should provide detailed descriptions of the renovation project as outlined in Project Description. If the building is classified in Project Type as "New Construction", then leave this field blank or enter "0".

Added Floor Area

Definition: The total horizontal area where new floor area was added to an existing building (i.e., the floor area of an addition).
Units: Square Feet
Guidance: See Project Floor Area for guidance. To help clarify the scope of work for the renovation and/or addition, users should provide detailed descriptions of the renovation project as outlined in Project Description. If the building is classified in Project Type as "New Construction", then leave this field blank or enter "0".

External Floor Area

Definition: The total horizontal area occupied by external horizontal structures, sheltered areas not within the structural construction of the building, and enclosed walkways or passages separating buildings.
Units: Square Feet
Reference: IPMS
Optional: This field is optional. External floor areas should only be reported if the horizontal structure was modeled and included in the LCA results (e.g., the LCA included the balconies of a building, and thus the balcony floor areas should be reported here). If there is no external floor area to be reported, then leave this field blank or enter "0".

Attached Parking Floor Area

Definition: The total horizontal area occupied by the attached parking.

Units: Square feet

Reference: IPMS

Guidance: See Project Floor Area for guidance. Ignore guidance related to the external floor area for this entry only. All attached parking floor areas should be reported in this entry. If there is no parking floor area to be reported, then leave this field blank or enter "0".

Primary Building Use

Definition: Primary classification of the building by principal activity.

Reference: Commercial Buildings Energy Consumption Survey (CBECS) Classification and Residential Buildings Energy Consumption Survey (RECS) Classifications.

Guidance: See Appendix A.8 Building Use Type for an acceptable list of inputs. For multi-use buildings, the primary building use should correspond to the largest area occupied by a single building use. Other non-majority building use types should be entered as secondary.

- "Laboratory" and "Stadium" use types, although not reflected in CBECS, were added to this list due to their unique design requirements.

Primary Use Floor Area

Definition: The total horizontal area occupied by the primary use of the building.

Units: Square feet

Reference: IPMS

Guidance: See Project Floor Area for guidance. Both internal and external areas with the primary building use should be reported in this entry.

Secondary Building Use

Definition: Secondary classification of building by principal activity.

Reference: Commercial Buildings Energy Consumption Survey (CBECS) Classification and Residential Buildings Energy Consumption Survey (RECS) Classification

Guidance: See Appendix A.8 Building Use Type for an acceptable list of inputs. For multi-use buildings, the primary building use should correspond to the largest area occupied by a single building use. Other non-majority building use types should be entered as secondary.

Secondary Use Floor Area

Definition: The total horizontal area occupied by the secondary use of the building.

Units: Square feet

Reference: IPMS

Guidance: See Project Floor Area for guidance. Both internal and external areas with secondary building use should be reported in this entry.

Occupant Load

Definition: the total number of occupants for whom egress facilities are provided.

Reference: IBC 2021

Optional: This field is optional as long as the following documentation is submitted:

- Architectural Project Documents with General Notes

Residential Units

Definition: Number of units designated for residential use.

Guidance: For non-residential buildings, leave this field blank or enter "0"

Optional: This field is optional as long as the following documentation is submitted:

- Architectural Project Documents with General Notes

Stories Above Grade

Definition: Number of stories above finished ground level.

Reference: ASCE 7

Guidance: Any story above grade is defined in ASCE 7-16 as *"A story in which the floor or roof surface at the top of the story is more than 6 ft (1,828 mm) above grade plane or is more than 12 ft (3,658 mm) above the finished ground level at any point on the perimeter of the structure."*

Stories Below Grade

Definition: Number of stories below finished ground level.

Reference: ASCE 7

Guidance: Stories that do not conform to the guidelines set forth in [Stories Above Grade](#) (stories below the grade plane) should be enumerated here. For buildings with no below-grade stories, leave this field blank or enter "0".

Building Height

Definition: Total height of the building above finished ground level.

Units: Feet

Reference: ASCE 7-16, SE 2050

Guidance: Building height should be calculated as the distance from the finished ground level to the top of the building, excluding parapets and other roof appendages. For sloped roof structures, the average elevation of the roof can be used to calculate the height.

Optional: This field is optional as long as the following documentation is submitted:

- Architectural Project Documents with General Notes

Thermal Envelope Area

Definition: Total combined area of the building's thermal envelope.

Units: Square feet

Reference: IECC 2021

Guidance: IECC 2021 defines this as: *"The basement walls, exterior walls, floor, ceilings, roofs, and any other building element assemblies that enclose conditioned space or provide a boundary between conditioned space and exempt or unconditioned space."* Figure 2 below indicates the thermal envelope of a hypothetical building. Typically, the thermal envelope area is calculated for energy analysis purposes and is shown on project energy modeling reports or energy code compliance forms.

Optional: This field is optional as long as the following documentation is submitted:
- Architectural Project Documents with General Notes
- Architectural Revit Model
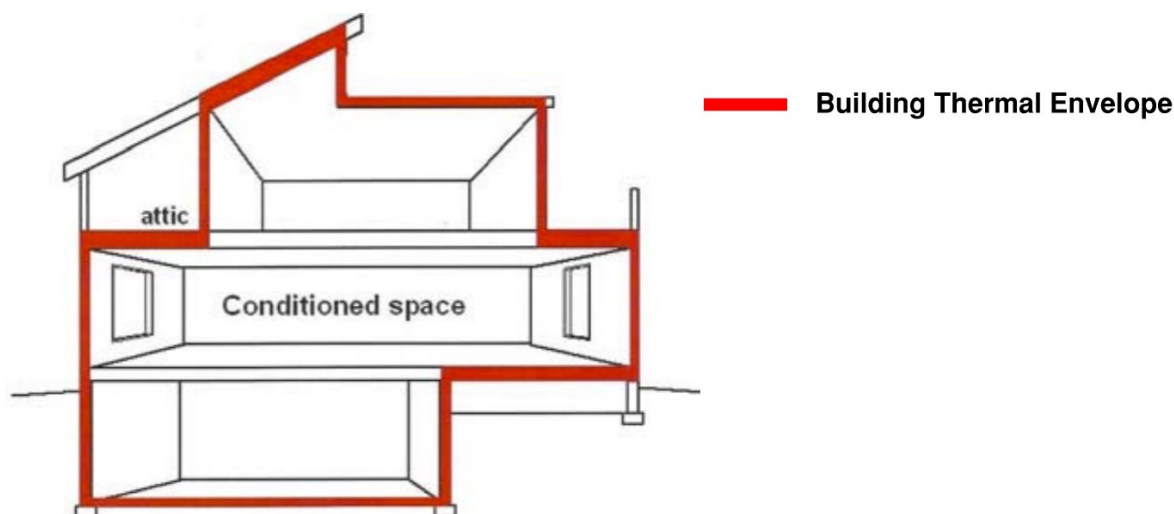
Figure 2: Building Thermal Envelope (adapted from IECC)

Window Wall Ratio

Definition: The ratio of total vertical fenestration area to total above-grade wall area calculated as *Vertical fenestration area / Gross above-grade wall area.*
Reference: IECC 2021
Guidance: IECC 2021 defines above-grade walls and vertical fenestration as:
- *Above-grade wall: a wall associated with the building thermal envelope that is more than 15 percent above grade and is on the exterior of the building.*
- *Vertical fenestration: Windows that are fixed or operable, opaque doors, glazed doors, glazed block and combination opaque and glazed doors composed of glass or other transparent or translucent glazing materials and installed at a slope of not less than 60 degrees from horizontal.*
  - Calculating vertical fenestration area should include the frames of any window or door openings.

Optional: This field is optional as long as the following documentation is submitted:
- Architectural Project Documents with General Notes
- Architectural Revit Model

Average R-Value Walls

Definition: Average nominal R-value of building's above-grade walls.
Guidance: Nominal R-value is the rating assigned to a product or material by a manufacturer (i.e., the total R-value of an insulation product per inch) which can be summed to create the total nominal R-value for an assembly. This does not equate to the actual performance or *effective R-value* of the assembly, which is not required to be reported. Where multiple wall types occur with different nominal R-values, please calculate the total weighted average, or input the most predominant R-value found.
Optional: This field is optional as long as the following documentation is submitted:

- Architectural Project Documents with General Notes

Average R-Value Roofs

Definition: Average nominal R-value of building's roofs.

Guidance: Nominal R-value is the rating assigned to a product or material by a manufacturer (i.e., the total R-value of an insulation product per inch) which can be summed to create the total nominal R-value for an assembly. This does not equate to the actual performance or *effective R-value* of the assembly, which is not required to be reported. Where multiple roof types occur with different nominal R-values, please calculate the total weighted average, or input the most predominant R-value found.

Optional: This field is optional as long as the following documentation is submitted:

- Architectural Project Documents with General Notes

Certifications

Definition: Green building certifications that the project is pursuing or has attained.

Guidance: Entries should include the specific certification version and level of achievement in the rating system.

Structural Design Data

Seismic Site Class

Definition: Classification of the site for seismic design based on its soil and engineering properties.

Reference: ASCE 7-16

Guidance: Site class influences the geotechnical and seismic design of a building. It can typically be found in the general notes of the structural engineer's project documents. The structural engineer will typically specify Site Class in the geotechnical assumptions or seismic design portions of the general notes.

Optional: This field is optional as long as the following documentation is submitted:

- Structural Project Documents with General Notes

Seismic Design Category

Definition: Categorization of required seismic design based on risk category and site location.

Reference: ASCE 7-16

Guidance: Seismic Design Category is an important metric in the seismic design of buildings. It can typically be found in the general notes of structural engineers' project documents. The structural engineer will typically specify the Seismic Design Category.

Optional: This field is optional as long as the following documentation is submitted:

- Structural Project Documents with General Notes

Ultimate Wind Speed

Definition: Ultimate wind speed used for ultimate wind design based on location.

Units: Miles Per Hour (mph)

Reference: ASCE 7-16, SE 2050

Guidance: Ultimate wind speed, defined as V in ASCE 7, is a calculated value used to calculate wind pressures for structural design. It can typically be found in the general notes of the structural engineer's project documents.

The structural engineer will typically specify the ultimate wind speed. It should not be confused with the serviceability wind speed, which is typically lower. Sometimes, local building codes require ultimate wind speeds above ASCE requirements; in this case, the reported value shall be the actual value used for the project.
Optional: This field is optional as long as the following documentation is submitted:

● Structural Project Documents with General Notes

Primary Horizontal Gravity System

Definition: Structural floor construction system that supports at least ⅔ of the combined floor and roof area of the superstructure.
Reference: SE 2050 Database User Guide
Building Elements: Structural Floors, Beams, Girders, Joists
Guidance: See Appendix A.9 Primary Horizontal Gravity System for an acceptable list of inputs. Slab on grade is not considered part of the superstructure, and therefore should not be considered in the designation of the primary horizontal gravity system. Typically, the primary horizontal gravity system is shown on the structural engineer's project documents. Review the plans of the project documents for information on system types, or consult the structural engineer for information. Further guidance is based on the description of the primary horizontal gravity system provided by SE 2050, reproduced here:

For a one-story building with a concrete slab at grade and a steel frame with bare metal deck roof:
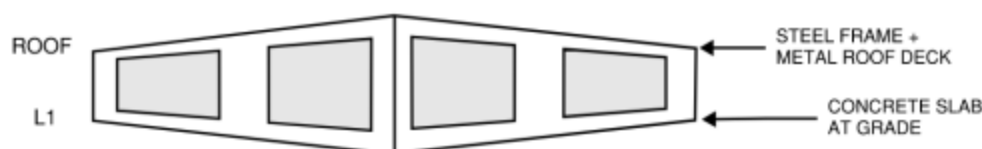
Figure 3: One Story Building for Horizontal Gravity System, courtesy SE 2050

Select "Steel: Frame + Bare Metal Deck Roof" regardless of the type of slab at grade.

For a two-story building with a concrete slab at grade, steel frame with concrete-filled metal deck floor at Level 2, and steel frame with metal deck roof:

Figure 4: Two Story Building for Horizontal Gravity System, courtesy SE 2050

Select "Steel: Other" because approximately 50% of the combined elevated floor and roof area

is concrete filled metal deck and 50% is bare metal deck.

For a three-story building with a concrete slab at grade, steel frame with concrete filled metal deck floor at Levels 2 and 3, and steel frame with metal deck roof:

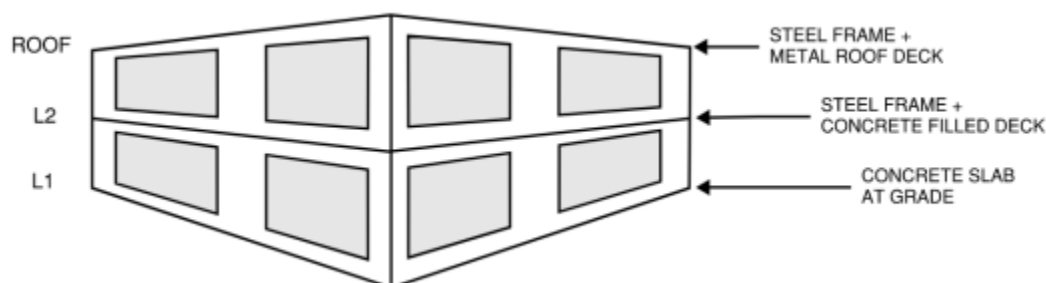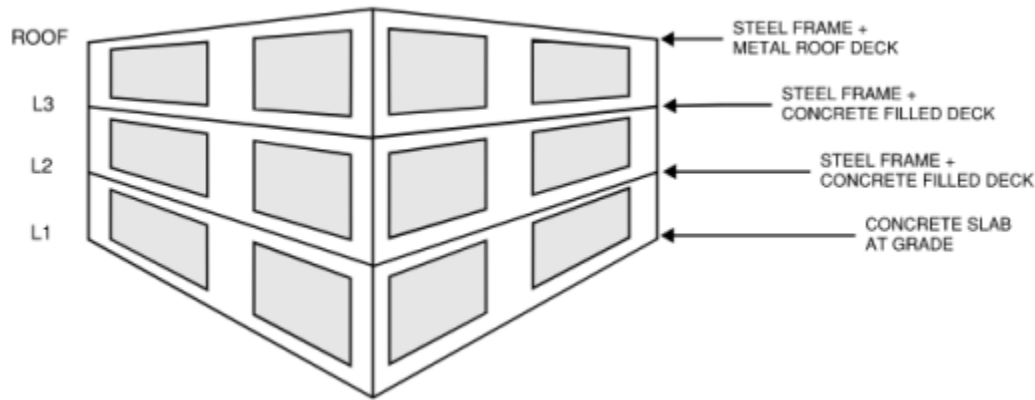*Figure 5: Three Story Building for Horizontal Gravity System, courtesy SE 2050*

Select "Steel: Frame + Concrete on Metal Deck" because approximately ⅔ of the combined elevated floor and roof area is concrete filled metal deck, and this meets the ⅔ threshold.

For a structure that includes multiple materials, with no system making up more than ⅔ of the superstructure floor area:
Select the "Other" category associated with the material that makes up the most superstructure floor area.
Optional: This field is optional as long as one of the following documentation is submitted:
  ● Structural Project Documents with General Notes
  ● Structural Revit Model

Primary Vertical Gravity System

Definition: System that transfers gravity loads to the foundation of the building.
Reference: SE 2050 Database User Guide
Building Elements: Columns, Structural (load bearing) Walls
Guidance: See Appendix A.10 Primary Vertical Gravity System for an acceptable list of inputs. Typically, the primary vertical gravity system is shown indicatively on the structural engineer's project documents. Review the plans or column schedules of the project documents for information on system types, or consult the structural engineer for information. For mixed vertical systems, use the guidelines presented in Primary Horizontal Gravity System.
Optional: This field is optional as long as one of the following documentation is submitted:
  ● Structural Project Documents with General Notes
  ● Structural Revit Model

Primary Lateral Force Resisting System

Definition: System that resists lateral loads of the building.

Reference: SE 2050 Database User Guide

Building Elements: Columns, Beams, Structural (load-bearing) Walls, Vertical Braces

Guidance: See Appendix A.11 Primary Lateral Force Resisting System for an acceptable list of inputs. Typically, the primary lateral load-resisting system is shown on the structural engineer's project documents. Review the plans and building elevations of the project documents for information on system types, or consult the structural engineer for information. For mixed lateral systems, use the guidelines presented in Primary Horizontal Gravity System.

Optional: This field is optional as long as one of the following documentation is submitted:
- Structural Project Documents with General Notes
- Structural Revit Model

Podium

Definition: Designate whether the project is a podium building – a building with two distinct zones with two different structural materials and systems

Reference: SE 2050 Database User Guide

Guidance: See Appendix A.12 Podium for an acceptable list of inputs. Use the graphic below, provided by SE 2050, to help designate whether the building can be classified as one with a podium.

Not a Podium Building   Primary System Defined Above is On a Podium   Primary System Defined Above is a Podium
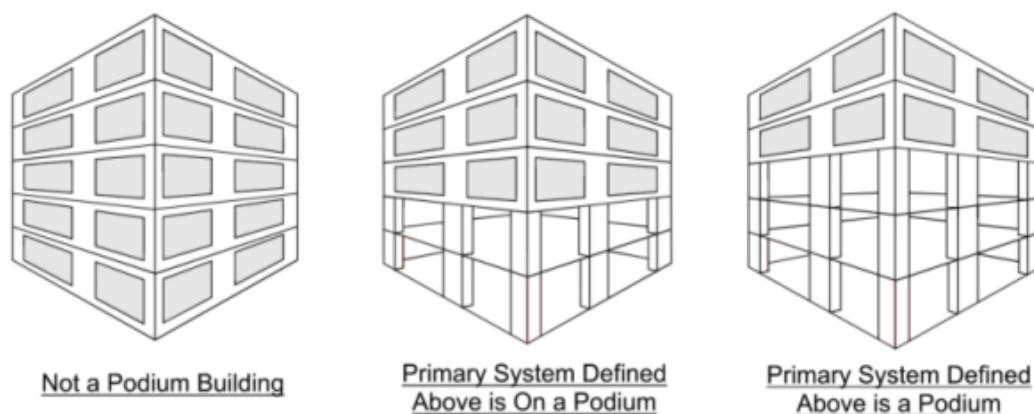
Figure 6: Podium Building Designations, courtesy SE 2050

The user should select as the primary structural system whichever system is used for the majority of superstructure floors. If there are the same number of podium and non-podium superstructure floors, then define the non-podium superstructure floors as the Primary Horizontal Gravity System and Primary Vertical Gravity System.

Optional: This field is optional as long as one of the following documentation is submitted:
- Structural Project Documents with General Notes
- Structural Revit Model

Secondary Horizontal Gravity System

Definition: The horizontal gravity system (as defined in Primary Horizontal Gravity System) for the podium portion of the building.

Guidance: See Appendix A.9 Horizontal Gravity System for an acceptable list of inputs. Only applicable if the user selects either "Primary System Defined Above is On a Podium" or "Primary System Defined Above is a Podium.". If the project is not a podium building, select "N/A."

Optional: This field is optional as long as one of the following documentation is submitted:
- Structural Project Documents with General Notes
- Structural Revit Model

Secondary Vertical Gravity System

Definition: The vertical gravity system (as defined in Primary Vertical Gravity System) for the podium portion of the building

Guidance: See Appendix A.10 Vertical Gravity System for an acceptable list of inputs. Only applicable if the user selects either "Primary System Defined Above is On a Podium" or "Primary System Defined Above is a Podium." If the project is not a podium building, select "N/A."

Optional: This field is optional as long as one of the following documentation is submitted:
- Structural Project Documents with General Notes
- Structural Revit Model

Typical Column Grid, Long Direction

Definition: Center to center spacing of longer typical project column grid.

Units: Feet

Reference: SE 2050 Database User Guide

Guidance: It is advantageous to collect typical column grid information to understand the impacts of column spacing on embodied carbon on a project. Whenever possible, submit a value that is closest to the most representative spacing throughout the building. Average span values can be utilized with buildings that have irregular column layouts. Typically, the column grid spacing is shown on the architect's or structural engineer's project documents. Review the structural or architectural plans of the project documents for information on column spacing, or consult the structural engineer/architect for information.

Optional: This field is optional as long as one of the following documentation is submitted:
- Architectural Project Documents with General Notes
- Architectural Revit Model
- Structural Project Documents with General Notes
- Structural Revit Model

Typical Column Grid, Short Direction

Definition: Center to center spacing of shorter typical project column grid.

Units: Feet

Reference: SE 2050 Database User Guide

Guidance: See guidance in Typical Column Grid, Long Direction.

Optional: This field is optional as long as one of the following documentation is submitted:
- Architectural Project Documents with General Notes
- Architectural Revit Model
- Structural Project Documents with General Notes
- Structural Revit Model

Foundation Type

Definition: Type of foundation used to support gravity and lateral loads of project.
Reference: SE 2050 Database User Guide
Guidance: See Appendix A.13 Foundation Type for an acceptable list of inputs. Typically, the foundation type is shown indicatively on the structural engineer's project documents. Review the structural foundation plans of the project documents for information on foundation type, or consult the structural engineer for information.
Optional: This field is optional as long as one of the following documentation is submitted:
- Structural Project Documents with General Notes
- Structural Revit Model

Project Analysis Data

Final Report

Definition: A final report is a WBLCA that most accurately reflects the final as-designed, or as-built building condition.
Guidance: Final reports must be from the design development phase or later. For projects that are submitting multiple WBLCAs, the final report should represent the best quality and most complete WBLCA in the set. Select "yes" if the specific WBLCA represents the Final Report. Select "no" for all other WBLCA iterations of the project that are being submitted.

Date of Analysis

Definition: Date that analysis was conducted.

Design Phase

Definition: Design phase of the building for which the model is conducted.
Guidance: See Appendix A.14 Design Phase for an acceptable list of inputs.

Reference Study Period

Definition: The lifespan of the building defined in the LCA modeling tool.
Guidance: Per Section 2.1 Minimum WBLCA Modeling Criteria, the reference study period **must be set to 60 years**. For projects with study periods other than 60 years, users are encouraged to re-run those models with a 60 year study period. WBLCAs with reference study periods other than 60 years will still be accepted, but may not be included in the analysis phase of this study.

Biogenic Carbon Included

Definition: Yes/No designation to indicate if biogenic carbon is included in the WBLCA Model.
Guidance: See Section 2.3 LCA software-specific requirements for guidance on biogenic carbon for each approved WBLCA tool.

Software Version

Definition: Version of software used for the WBLCA assessment.
Guidance: See Appendix A.15 Software Version for an acceptable list of inputs.

Purpose of Assessment

Definition: Primary reason that the WBLCA was undertaken.
Guidance: See Appendix A.16 Purpose of Assessment for an acceptable list of inputs.

Operational Energy Included

Definition: Yes/No designation to indicate if operational energy is being reported for the LCA report being entered.

Additional LCA Report Name(s)

Definition: Full file name of the additional Excel LCA results file exactly as it will be uploaded to the CLF.
Guidance: Additional LCA Reports shall be submitted based on criteria set forth in Section 2.2.2 Reporting separate or additional WBLCA scope results. The names of the LCA results file must be appended with the physical scope that they contain. If multiple additional LCA reports are being added, each of the Additional LCA Report Names should be added here.
Example Input: Sample LCA Result_Sitework.xlsx

Project Scope Data

Substructure

Definition: Yes/No designation to indicate if Substructure has been included in the WBLCA Model.
Reference: Omniclass Table 21
Guidance: In addition to designating the inclusion of Substructure in the WBLCA Model, the users may also designate whether or not the following subcategories of substructure are included in the analysis:
- Standard Foundations
- Walls for Subgrade Enclosures
- Slabs-on-Grade

Shell - Superstructure

Definition: Yes/No designation to indicate if Superstructure has been included in the WBLCA Model.
Reference: Omniclass Table 21
Guidance: In addition to designating the inclusion of Superstructure in the WBLCA Model, the users may also designate whether or not the following subcategories of superstructure are included in the analysis:
- Floor Construction
- Roof Construction
- Stairs

Shell - Exterior Enclosure

Definition: Yes/No designation to indicate if Exterior Enclosure has been included in the WBLCA Model.
Reference: Omniclass Table 21
Guidance: In addition to designating the inclusion of Exterior Enclosure in the WBLCA Model, the user may also designate whether or not the following subcategories of exterior exclosures are included in the analysis:
- Exterior Walls

- Exterior Windows
- Exterior Doors and Grilles
- Exterior Louvers and Vents
- Exterior Wall Appurtenances
- Roof Appurtenances
- Horizontal Openings
- Overhead Exterior Enclosures

Interiors - Construction

Definition: Yes/No designation to indicate if Interiors - Construction have been included in the WBLCA Model.
Reference: Omniclass Table 21
Guidance: In addition to designating the inclusion of Interiors - Construction in the WBLCA Model, users may also designate whether or not the following subcategories of Interiors - Construction are included in the analysis:
- Interior Partitions
- Interior Windows
- Interior Doors
- Interior Grilles and Gates
- Raised Floor Construction
- Suspended Ceiling Construction
- Interior Specialties

Interiors - Finishes

Definition: Yes/No designation to indicate if Interiors - Finishes have been included in the WBLCA Model.
Reference: Omniclass Table 21
Guidance: In addition to designating the inclusion of Interiors - Finishes in the WBLCA Model, users may also designate whether or not the following subcategories of finishes are included in the analysis:
- Wall finishes
- Floor / Floor Finishes
- Stair Finishes
- Ceiling Finishes

Sitework

Definition: Yes/No designation to indicate if Sitework has been included in the WBLCA Model.
Reference: Omniclass Table 21
Guidance: In addition to designating the inclusion of Sitework in the WBLCA Model, the users may also designate whether or not the following subcategories of sitework are included in the analysis:
- Roadways
- Surface Parking Lots
- Structured Site Parking
- Plazas and Walkways
- Landscaping
- Tunnels
- MEP Utilities

Services (MEP)

Definition: Yes/No designation to indicate if Services (MEP) have been included in the WBLCA Model.
Reference: Omniclass Table 21
Guidance: In addition to designating the inclusion of Services (MEP) in the WBLCA Model, users may also designate whether or not the following subcategories of Services (MEP) are included in the analysis:

- Conveying Systems
- Domestic Water Distribution
- Sanitary Drainage
- Building Support Plumbing
- Process Support Plumbing
- Facility Fuel Systems
- Heating Systems
- Cooling Systems
- HVAC Distribution Systems
- Ventilation
- Fire Suppression System
- Facility Power Generation
- Electrical Service Distribution
- General Purpose Electrical Power
- Lighting
- Data Communication Systems
- Electronic Safety Systems
- Integrated Automation Systems

Equipment & Furnishings

Definition: Yes/No designation to indicate if Equipment & Furnishings have been included in the WBLCA Model.
Reference: Omniclass Table 21
Guidance: In addition to designating the inclusion of Equipment & Furnishings in the WBLCA Model, users may also designate whether or not the following subcategories of equipment & furnishings are included in the analysis:

- Commercial Equipment
- Institutional Equipment
- Residential Equipment
- Fixed Furnishings (Casework)
- Movable Furnishings

QA User Notes

Definition: Optional field for users to add additional information about the content, quality, or methodology of the WBLCA.
Guidance: The intent of this field is for users to describe any specific project or modeling nuances that may be helpful for the CLF when conducting quality assurance on the dataset. Examples may include details about the methods used for generating material quantity takeoffs, level of model development, notable LCA tool-specific overrides and workarounds, etc.

Project Embodied Carbon Reduction Data

Embodied Carbon Reductions Pursued

Definition: Yes/No designation to indicate if the WBLCA results reflect any embodied carbon reductions that were implemented during design, procurement, and/or construction of the building.
Guidance: It is equally important to this project to collect buildings *with* reduction strategies implemented and those *without* reduction strategies implemented to help evaluate the effects of those decisions. Users are encouraged to submit any project, regardless of its design intent or embodied carbon performance.

Embodied Carbon Percent Reduction

Definition: Approximate reduction of embodied carbon compared to a baseline model, if applicable.
Guidance: Applicable only to projects where a baseline model was made for comparison-making. If a baseline comparison model was not created, leave this field blank, or input "0".

Building Reuse

Definition: Yes/No designation to indicate if the WBLCA results reflect any building reuse strategies that were implemented for embodied carbon reductions on the project
Guidance: Building reuse is the in situ preservation, repurposing, and/or renovation of entire existing buildings, or portions thereof, to avoid the environmental burdens of new construction. Typical building reuse strategies include retrofitting entire buildings, but may also include smaller strategies such as preserving individual components of existing buildings like foundations, structural systems, or building enclosures.

Material Reuse

Definition: Yes/No designation to indicate if the WBLCA results reflect any material reuse strategies that were implemented for embodied carbon reductions on the project
Guidance: Material reuse is meant to include the reuse of any structural, enclosure, or architectural materials that have been salvaged from deconstructed or demolished projects and repurposed for new projects. Some typical material reuse strategies include salvaged beams, doors, windows, or interior finishes.

Alternate Structural System

Definition: Yes/No designation to indicate if the WBLCA results reflect an alternate structural system that was implemented for embodied carbon reductions on the project
Guidance: Using an alternate structural system would include evaluating, through WBLCA, the impacts of various structural systems and selecting the one with lower embodied carbon (e.g., running two design options, one with a concrete structural system and one with a mass timber/steel hybrid system, and selecting the system with lower impacts).

Structural Biobased Materials

Definition: Yes/No designation to indicate if the WBLCA results reflect any structural biobased materials that were implemented for embodied carbon reductions on the project.
Guidance: Structural Biobased Materials is meant to include the use of any structural materials that are derived from living matter. Typical Structural Biobased Materials include mass timber, wood framing, hempcrete, etc.

Non-structural Biobased Materials

Definition: Yes/No designation to indicate if the WBLCA results reflect any non-structural biobased materials that were implemented for embodied carbon reductions on the project.

Guidance: Non-structural Biobased Materials is meant to include the use of any enclosure, architectural, or interior materials that are derived from living matter. Typical Non-structural Biobased Materials include wood cladding, bio-based insulations, or other bio-based finish materials.

Structural Element Optimization

Definition: Yes/No designation to indicate if the WBLCA results reflect any structural element design optimizations that were implemented for embodied carbon reductions on the project.

Guidance: Structural Element Optimization is meant to include the use of structural elements whose size or layout were adjusted to reduce the embodied carbon of the project. Typical Structural Element Optimization includes increasing design capacity ratios or reducing column spacing.

Concrete Mix Design Optimization

Definition: Yes/No designation to indicate if the WBLCA results reflect any concrete mix design optimizations that were implemented for embodied carbon reductions on the project.

Guidance: Concrete Mix Design Optimization is meant to include the use of concrete whose cement, aggregate, or additive content has been reduced and/or optimized to reduce the embodied carbon of the concrete. Typical Concrete Mix Design Optimization includes the use of fly ash or slag to replace Portland cement.

Exterior Envelope Optimization

Definition: Yes/No designation to indicate if the WBLCA results reflect any exterior envelope optimizations that were implemented for embodied carbon reductions on the project.

Guidance: Exterior Envelope Optimization is meant to include the use of exterior envelopes whose size, layout, or materiality were adjusted to reduce the embodied carbon of the project. Typical Exterior Envelope Optimizations include selecting envelope products or materials with lower embodied carbon than the industry average, reducing materiality through efficient wall framing, and/or reducing the amount of high-impact facade types.

Interior Finishes Optimization

Definition: Yes/No designation to indicate if the WBLCA results reflect any interior finish optimizations that were implemented for embodied carbon reductions on the project.

Guidance: Interior Finishes Optimization is meant to include the use of finishes whose design was adjusted to reduce the embodied carbon of the project. Typical Interior Finishes Optimizations include reducing materiality (using minimal finishes) and/or selecting lower embodied carbon materials or products.

Other Reductions

Definition: describe any other reduction strategies that were implemented for embodied carbon reductions on the project and that are reflected in the WBLCA results.

Excel Tab 3. Energy data

Energy Use Description

Definition: Description of the type, quality, and methods used to determine the energy use data being submitted.

Guidance: This may include the sourcers of data from measured utilities, methods used to conduct the energy model, the type of energy model that was run (shoebox, code compliance, etc.) or specific building loads and/or building areas that are included or excluded from the energy use data being reported.

Option 1: Measured Utility Data Fields

Measured Grid Electricity

Definition: Total purchased grid electricity covering a full calendar year as determined from actual utility bills.
Unit: kWH/yr

Measured Natural Gas

Definition: Total purchased natural gas covering a full calendar year as determined from actual utility bills.
Unit: Therms/yr

Measured District

Definition: Total purchased, or allocated, district heating/cooling energy use covering a full calendar year as determined from actual utility bills or contracts.
Unit: kBtu/yr

Measured Other Fossil

Definition: Total purchased other fossil fuel usage covering a full calendar year as determined from utility bills or other purchase receipts.
Unit: kBtu/yr

Measured On-site Renewables

Definition: Total measured on-site renewable electricity generation covering a full calendar year as determined from utility bills, building management software, or other reporting of actual on-site renewable performance.
Unit: KWh/yr

Option 2: Modeled Hourly Energy Use Data Fields

8760 File Name

Definition: Full file name of the Excel 8760 table file exactly as it will be uploaded.
Guidance: 8760 tables should be exported directly from the energy modeling tool and contain breakdowns of each load type and fuel source. These tables are typically produced by energy modelers (MEP engineers or other energy consultants) as part of professional energy modeling services for projects. However, these files are not

always directly shared with the full design team and may require outreach with the energy modeling party to obtain.

On-site Renewables Included

Definition: Selection of whether the 8760 table includes on-site renewable energy production or not.
Guidance: If on-site renewable energy sources were included in the project, users are encouraged to include them in the 8760 results. If necessary, uploading two 8760 tables (one with renewables, and one without), is acceptable.

Energy Modeling Tool

Definition: The energy modeling tool used to conduct the energy model.
Reference: AIA DDX Bulk Import Guide

Energy Modeling Party

Definition: The energy modeling party that conducted the energy model.
Reference: AIA DDX Bulk Import Guide

Option 3: Modeled Annual Energy Use Data Fields

Modeled Grid Electricity

Definition: Annual grid electricity needed for the project as determined from an energy model.
Reference: AIA DDX Bulk Import Guide
Unit: kWH/yr

Modeled Natural Gas

Definition: Annual natural or "fossil" gas needed for the project as determined from an energy model.
Reference: AIA DDX Bulk Import Guide
Unit: Therms/yr

Modeled District

Definition: Annual district heating or cooling fuel usage needed for the project as determined from an energy model.
Reference: AIA DDX Bulk Import Guide
Unit: kBtu/yr

Modeled Other Fossil

Definition: Annual other fossil fuel usage needed for the project as determined from an energy model.
Reference: AIA DDX Bulk Import Guide
Unit: kBtu/yr

Modeled On-site Renewables

Definition: Annual on-site renewable electricity generation of the project as determined from an energy model.
Reference: AIA DDX Bulk Import Guide
Unit: KWh/yr

Energy Modeling Tool

Definition: The energy modeling tool used to conduct the energy model.
Reference: AIA DDX Bulk Import Guide

Energy Modeling Party

Definition: The energy modeling party that conducted the energy model.
Reference: AIA DDX Bulk Import Guide

Option 4: Modeled Site pEUI

Site pEUI

Definition: Net predicted site energy use intensity of the project as determined through an energy model inclusive of renewable energy, if applicable, and calculated as *net site energy use / gross conditioned floor area*.
Reference: AIA DDX Bulk Import Guide, IECC 2021
Unit: kBTU/sf/yr
Guidance: Per AIA DDX guidance, *"Renewables can offset the pEUI electrical fuel source usage to any amount including to zero "Zero Net pEUI" or even negative numbers if the renewables are producing more energy per year than the project's electrical usage. The renewables cannot offset fossil fuel usage and purchased off-site renewables do not factor into this calculation."*

Energy Modeling Tool

Definition: The energy modeling tool used to conduct the energy model.
Reference: AIA DDX Bulk Import Guide

Energy Modeling Party

Definition: The energy modeling party that conducted the energy model.
Reference: AIA DDX Bulk Import Guide

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Appendix A

This section tabulates the accepted values for specific fields in the CLF Benchmarking Study (v2).

A.1 Company Type

For use with entry Company Type

Architect	Structural Engineer	MEP Engineer
Consultant	General Contractor	Subcontractor
Multi-discipline Arch/Eng	Other	

A.2 Company Size

For use with entry Company Size

1	2-4	5-9
10-19	20-49	50-99
100-499	500-599	1,000+

A.3 State

For use with entries Company State or Province and Project State or Province

Aguascalientes	Alabama	Alaska
Alberta	Arizona	Arkansas
Baja California	Baja California Sur	British Columbia
California	Campeche	Chiapas
Chihuahua	Coahuila	Colima
Colorado	Connecticut	Delaware
District of Columbia	Durango	Florida
Georgia	Guanajuato	Hawaii
Hidalgo	Idaho	Illinois

Indiana	Iowa	Jalisco
Kansas	Kentucky	Louisiana
Maine	Manitoba	Maryland
Massachusetts	México	México City
Michigan	Michoacán	Minnesota
Mississippi	Missouri	Montana
Morelos	Nayarit	Nebraska
Nevada	New Brunswick	New Hampshire
New Jersey	New Mexico	New York
Newfoundland and Labrador	North Carolina	North Dakota
Nuevo León	Oaxaca	Ohio
Oklahoma	Ontario	Oregon
Pennsylvania	Prince Edward Island	Puebla
Quebec	Querétaro	Quintana Roo
Rhode Island	San Luis Potosí	Saskatchewan
Sinaloa	Sonora	South Carolina
South Dakota	Tabasco	Tamaulipas
Tennessee	Texas	Tlaxcala
Utah	Veracruz	Vermont
Virginia	Washington	West Virginia
Wisconsin	Wyoming	Yucatán
Zacatecas		

A.4 Climate Zones

For use with entry Project Climate Zone

Zone 0A (Extremely Hot Humid)	Zone 0B (Extremely Hot Dry)	Zone 1A (Very Hot Humid)

Zone 1B (Very Hot Dry)	Zone 2A (Hot Humid)	Zone 2B (Hot Dry)
Zone 3A (Warm Humid)	Zone 3B (Warm Dry)	Zone 3C (Warm Marine)
Zone 4A (Mixed Humid)	Zone 4B (Mixed Dry)	Zone 4C (Mixed Marine)
Zone 5A (Cool Humid)	Zone 5B (Cool Dry)	Zone 5C (Cool Marine)
Zone 6A (Cold Humid)	Zone 6B (Cold Dry)	Zone 7 (Very Cold)
Zone 8 (Subarctic/Arctic)	Can. 4 (<3000 HDD)	Can. 5 (3000-3999 HDD)
Can. 6 (4000-4999 HDD)	Can. 7A (5000-5999 HDD)	Can 7B (6000-6999 HDD)
Can. 8 (>7000 HDD)	Outside of Canada/United States	

A.5 Project Type

For use with entry Project Type

New Construction	Major Renovation	Minor Renovation
Tenant Improvement (T.I.)		

A.6 IBC Construction Type

For use with entry IBC Construction Type

Type I-A	Type I-B	Type II-A
Type II-B	Type III-A	Type III-B
Type IV-A	Type IV-B	Type IV-C
Type IV-HT	Type V-A	Type V-B

A.7 Attached Parking Type

For use with entry Attached Parking Type

None	Below Grade	Above grade, within footprint of main structure

Above grade, attached to main structure		

A.8 Building Use

For use with entries Primary Building Use Type and Secondary Building Use Type

Aquarium	Education	Food Sales
Food Service	Health Care (Inpatient)	Health Care (Outpatient)
Laboratory - Dry	Laboratory - Wet	Lodging
Mercantile (Retail other than Mall)	Mercantile (Enclosed and Strip Malls)	Office
Parking	Public Assembly	Public Order and Safety
Religious Worship	Service	Warehouse and Storage
Residential: Multifamily (2-4 units)	Residential: Multifamily (5 or more units)	Stadium
Transportation Hub/Infrastructure	Vacant	Other

A.9 Horizontal Gravity System

For use with entries Primary Horizontal Gravity System and Secondary Horizontal Gravity System

Input Options	Description
Concrete: PT Framing	Concrete framing with PT tendons and mild reinforcing bars. Includes 2-way slab and 1-way with beams.
Concrete: Non-PT Framing	Cast-in-place concrete system with only mild reinforcing. Includes 2-way slab and 1-way with beams.
Concrete: Precast	System of precast elements. The system may be prestressed and may include a concrete topping.
Concrete: Other	2/3 of the floor area is composed of a concrete framing system not listed above or a combination of different concrete framing systems.
Steel: Frame + Concrete on Metal Deck	Concrete or Composite slab on metal deck with steel supports, such as wide-flange beams or open web steel joists (OWSJ).

Steel: Frame + Bare Metal Deck	Steel framing members with bare metal deck. This system should be selected when a majority of the horizontal framing in the structure is a metal roof deck.
Steel: Other	2/3 of the floor area is composed of a steel framing system not listed above or a combination of different steel framing systems.
Wood: Joists and Sheathing	Plywood or OSB decking supported by wood joists. Joists may be standard wood or engineered wood.
Wood: Engineered Panels	CLT, DLT, NLT, GLT or other engineered wood panels. May include concrete topping.
Wood: Other	2/3 of the floor area is composed of a wood framing system not listed above or a combination of different wood framing systems.
Other Material	2/3 of the floor area is composed of a framing system not listed above.
N/A	Only applicable if the project is not a podium building

A.10 Vertical Gravity System

For use with entries Primary Vertical Gravity System and Secondary Vertical Gravity System

Input Options	Description
Concrete: Cast in Place	Cast-in-place concrete columns and walls
Concrete: Precast	Precast concrete columns and walls
Concrete: Other	Other Concrete Vertical Gravity System
Steel: Columns	Steel wide flange or rectangular, square, or round hollow structural section columns
Steel: Cold-Formed	Cold-formed steel columns and/or Light-frame cold-formed steel bearing walls
Steel: Other	Other Steel Vertical Gravity System
Wood: Mass Timber	Mass or heavy timber columns, e.g. Glulam
Wood: Light Frame	Light-Frame wood bearing walls
Wood: Other	Other Wood Vertical Gravity System
Masonry	Masonry columns and/or bearing walls

N/A	Only applicable if the project is not a podium building

A.11 Primary Lateral Force Resisting System

For use with entry Primary Lateral Force Resisting System

Input Options	Description
Concrete: Shear Walls	CIP or Precast Shear Walls
Concrete: Moment Frames	CIP or Precast Concrete Moment Frames
Concrete: Other	Other, including concrete cantilevered columns, or multiple steel systems including all-steel dual systems
Steel: Braced Frames	Steel braced frame, including buckling restrained braces (BRB)
Steel: Moment Frames	Steel moment frames
Steel: Other	Other, including steel plate shear walls, steel cantilevered columns, or multiple steel systems including all-steel dual systems
Light Frame Shear Panels	Wood or cold formed walls with shear panels such as plywood or OSB
Masonry: Shear Walls	Masonry Shear Walls
Wood: Shear Panels	Engineered wood shear panels, including CLT
Wood: Other	Other, including wood cantilevered columns or light-framed walls with shear panels of non-wood materials
Other	Material not listed above, or no single material predominates (includes Dual Systems with multiple materials)

A.12 Podium

For use with entry Podium

Input Options	Description
Not a podium building	Select this if the building does not have a podium
Primary System Defined Above is On a Podium	Select this when the majority of floors in the superstructure (excluding slab at grade) are above the podium
Primary System Defined Above is a Podium	Select this when the majority of floors in the superstructure (excluding slab at grade) are a part of the podium

A.13 Foundation Type

For use with entry Foundation Type

Input Options	Description
Shallow Foundations	Spread footings, strip foundations, mat foundations, or raft foundations
Deep Foundations < 50ft/15m	Foundation systems with overall depth (e.g. piles) < 50 feet or 15m
Deep Foundations > 50ft/15m	Foundation systems with overall depth (e.g. piles) > 50 feet or 15m
Other Foundation System	Other foundations not listed above

A.14 Design Phase

For use with entry Design Phase

Pre-design	Schematic	Design Development
Construction Documents	Construction	Completed

A.15 Software Version

For use with entry Software Version

Tally 2022.04.08.01	Tally 2021.11.01.01	Tally 2020.06.09.01
Tally 2020.02.28.01	Tally 2020.01.15.01	Tally 2022.04.08.01
Tally 2021.11.01.01	Tally 2020.01.15.01	Tally 2019.12.20.01
Tally 2019.11.14.01	Tally 2019.06.27.01	Tally 2018.09.27.01
Oneclick - LCA for LEED, US (TRACI)	Oneclick - LCA for LEED, Canada (TRACI)	Athena Version 4.0
Athena Version 4.1	Athena Version 4.2	Athena Version 4.5
Athena Version 5.0	Athena Version 5.1	Athena Version 5.2
Athena Version 5.3	Athena Version 5.4	

A.16 Purpose of Assessment

For use with entry Purpose of Assessment

Required: Client Directive	Required: Governing Policy	Required: LEED Baseline
Required: LEED Proposed	Required: ILFI Baseline	Required: ILFI Proposed
Required: Other	Voluntary: Design Iteration Analysis	Voluntary: Design Milestone Tracking
Voluntary: Hot Spot Analysis	Voluntary: Internal Benchmarking	Voluntary: Performance Declaration
Voluntary: Other		

Appendix B

This data collection user guide is intended to be used in conjunction with the *CLF WBLCA Benchmark Study (v2) Data Entry Template v1.0* which can be downloaded at: https://carbonleadershipforum.org/clf-wblca-v2/