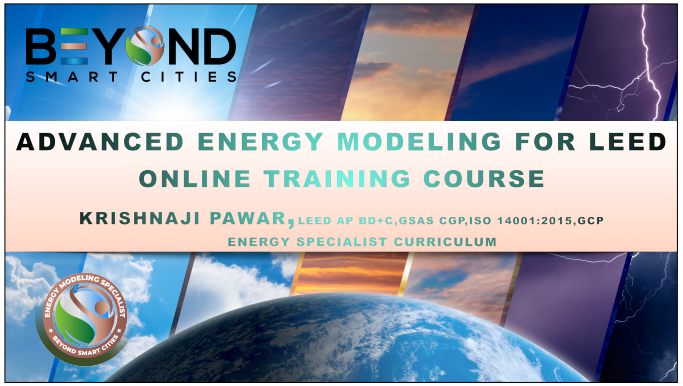
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WHAT SHOULD YOU LEARN
Energy Performance Compliance Path: submittal documentation
Energy Performance Compliance Path: documentation Checklist

ENERGY EFFICIENCY COMPLIANCE PATH

This section helps LEED project teams document the energy modeling compliance path, focusing on documentation requirements for EA Credit 1. It offers detailed technical and procedural guidance on the quality control process for verifying energy savings, and it describes common errors made in EA Credit 1 applications.

The flow diagram in Figure 3.1 indicates the critical steps recommended to verify the energy savings proposed in the application. These are explained in more detail in the sections and tables that follow.

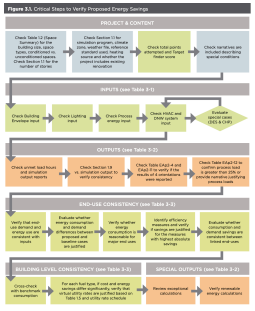
ENERGY PERFORMANCE COMPLIANCE PATH: SUBMITTAL DOCUMENTATION

LEED Credit form : The LEED credit form is the primary document required for EA Prerequisite 2 and EA Credit 1.The form must be completed with the required information and a sufficient level of detail.

This expectation for LEED EA Credit 1 applications is further described below, , where an annotated sample credit form includes descriptions of the required content. The sample form assumes that applicants are using ASHRAE 90.1–2016+ but is an example of the level of information required for projects using other referenced standards or energy codes.

Supporting documentation : In addition to the credit form, applicants must provide building-level simulation output reports and utility rate schedules, as shown in previous lectures. The required building-level reports for representative types of simulation software were introduced in Chapter 2. For example, BEPS, BEPU, and ES-D reports are required for projects using DOE-2–based software.The reviewer may request additional simulation input and/or output reports during the preliminary review for clarification when results are questionable. However, providing entire output files for both models with the LEED application is not recommended.

FIGURE 3.1. CRITICAL STEPS TO VERIFY PROPOSED ENERGY SAVINGS



ENERGY PERFORMANCE COMPLIANCE PATH: DOCUMENTATION CHECKLIST

Most of the problems in EA Credit 1 applications that follow the simulation compliance path come from the incorrect use of referenced standards, inconsistencies between the energy model inputs and outputs, and lack of validation of energy savings demonstrated.This section includes three checklists to help both applicant and reviewer determine whether the energy modeling accurately demonstrates the project's potential energy savings.

Input quality Control Checklist

The first step in verifying the accuracy of the energy savings is to confirm that the modeling inputs comply with the requirements of the referenced standard.Table 3.1 presents a checklist for reviewing the energy modeling inputs and identifies the common errors found in LEED applications. Projects following ASHRAE 90.1–2016+ can use the table as a guide to perform quality assurance for completeness and accuracy.The inputs are found in the LEED Online credit form and energy modeling summary reports.

The most common errors are for projects using ASHRAE 90.1–2016+, Appendix G. For projects using California Title 24, the baseline input is automatically generated by the simulation software and is therefore not separately included in this section.

OUTPUT QUALITY CONTROL CHECKLIST

The next step is to determine whether the outputs comply with the referenced standard's requirements and LEED requirements, such as unmet load hours, process energy use, and exceptional calculations.Table 3.2 presents a checklist to help teams and reviewers confirm that the requirements have been met and the output values reported in the LEED credit form are consistent with the simulation output reports. The checklist applies to projects using ASHRAE 90.1– 2016+ and California Title 24–2005, Part 6.

Output-Input Consistency Checklist

The last step for verifying the accuracy of the energy savings is to check for consistency between outputs and inputs. Table 3.3 is a checklist for reviewing the consistency of energy modeling outputs and inputs and provides calculation methods and rules of thumb to predict rough order-of-magnitude results. It can assist with quality assurance on projects using ASHRAE 90.1–2016+ and California Title 24.

Table 3.1. Input Quality Control Checklist

General Information

TOPIC	CHECK	ERRORS	RESOURCES
Simulation program	Verify that approved energy simulation software has been used.	☐ Using unqualified simulation software, e.g. using Energy-10 for buildings with more than 2 thermal zones or larger than 10,000 sf.	ASHRAE 90.1–2016, Section G2.2
Weather file and climate zone	Verify that weather file and climate zone are correct.	NA	NA
Referenced standard	Verify that approved referenced standard has been used.	☐ Using referenced standard other than ASHRAE 90.1–2016 for project not located in California.	NA
Target Finder score	Confirm that Target Finder score is provided. If not, check Section 1.2 of EA Prerequisite 2 form to verify project's primary occupancy.	☐ Not providing Target Finder score even though project has Target Finder standard occupancy type. ☐ Target Finder "Design" score has been confused with Target Finder "Target Rating." ☐ Target Finder score is very low but percentage of energy savings reported is high.	Target Finder Web site

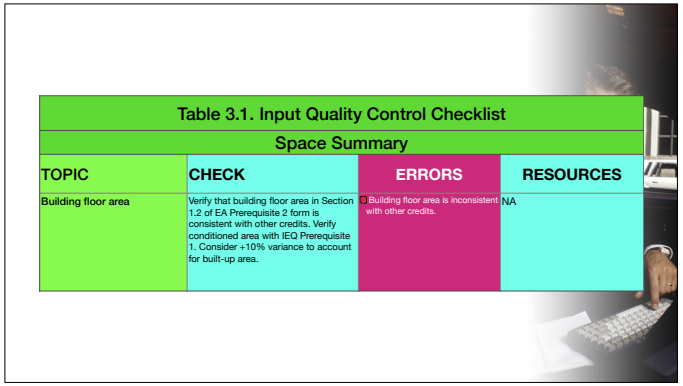


Table 3.1. Input Quality Control Checklist

Space Summary

TOPIC	CHECK	ERRORS	RESOURCES
Building floor area	Verify that building floor area in Section 1.2 of EA Prerequisite 2 form is consistent with other credits. Verify conditioned area with IEQ Prerequisite 1. Consider +10% variance to account for built-up area.	☐ Building floor area is inconsistent with other credits.	NA

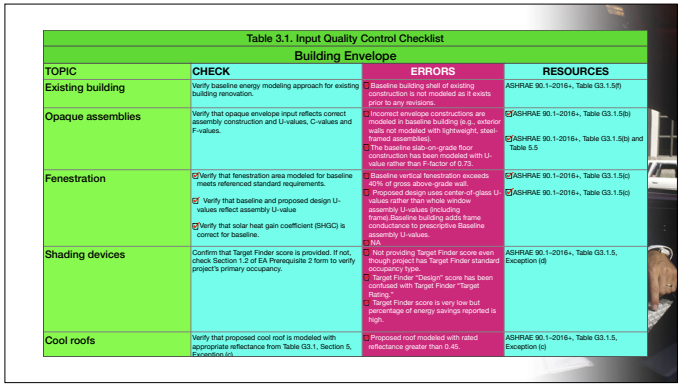


Table 3.1. Input Quality Control Checklist

Building Envelope

TOPIC	CHECK	ERRORS	RESOURCES
Existing building	Verify baseline energy modeling approach for existing building renovation.	☐ Baseline building shell of existing construction is not modeled as it exists prior to any revisions.	ASHRAE 90.1–2016+, Table G3.1.5(f)
Opaque assemblies	Verify that opaque envelope input reflects correct assembly construction and U-values, C-values and F-values.	☐ Incorrect envelope constructions are modeled in baseline building (e.g., exterior walls not modeled with lightweight, steel-framed assemblies). ☐ The baseline slab-on-grade floor construction has been modeled with U-value rather than F-factor of 0.73.	☑ASHRAE 90.1–2016+, Table G3.1.5(b) ☑ASHRAE 90.1–2016+, Table G3.1.5(b) and Table 5.5
Fenestration	☑Verify that fenestration area modeled for baseline meets referenced standard requirements. ☑ Verify that baseline and proposed design U-values reflect assembly U-value ☑Verify that solar heat gain coefficient (SHGC) is correct for baseline.	☐ Baseline vertical fenestration exceeds 40% of gross above-grade wall. ☐ Proposed design uses center-of-glass U-values rather than whole window assembly U-values (including frame).Baseline building adds frame conductance to prescriptive Baseline assembly U-values. ☐ NA	☑ASHRAE 90.1–2016+, Table G3.1.5(c) ☑ASHRAE 90.1–2016+, Table G3.1.5(c)
Shading devices	Confirm that Target Finder score is provided. If not, check Section 1.2 of EA Prerequisite 2 form to verify project's primary occupancy.	☐ Not providing Target Finder score even though project has Target Finder standard occupancy type. ☐ Target Finder "Design" score has been confused with Target Finder "Target Rating." ☐ Target Finder score is very low but percentage of energy savings reported is high.	ASHRAE 90.1–2016+, Table G3.1.5, Exception (d)
Cool roofs	Verify that proposed cool roof is modeled with appropriate reflectance from Table G3.1, Section 5, Exception (c).	☐ Proposed roof modeled with rated reflectance greater than 0.45.	ASHRAE 90.1–2016+, Table G3.1.5, Exception (c)

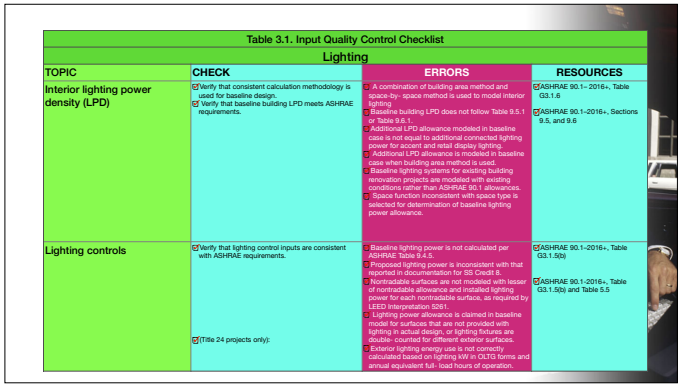


Table 3.1. Input Quality Control Checklist

Lighting

TOPIC	CHECK	ERRORS	RESOURCES
Interior lighting power density (LPD)	☑Verify that consistent calculation methodology is used for baseline design. ☑ Verify that baseline building LPD meets ASHRAE requirements.	☐ A combination of building area method and space-by- space method is used to model interior lighting. ☐ Baseline building LPD does not follow Table 9.5.1 or Table 9.6.1. ☐ Additional LPD allowance modeled in baseline case is not equal to additional connected lighting power for accent and retail display lighting. ☐ Additional LPD allowance is modeled in baseline case when building area method is used. ☐ Baseline lighting systems for existing building renovation projects are modeled with existing conditions rather than ASHRAE 90.1 allowances. ☐ Space function inconsistent with space type is selected for determination of baseline lighting power allowance.	☑ASHRAE 90.1– 2016+, Table G3.1.6 ☑ASHRAE 90.1–2016+, Sections 9.5, and 9.6
Lighting controls	☑Verify that lighting control inputs are consistent with ASHRAE requirements. ☑(Title 24 projects only):	☐ Baseline lighting power is not calculated per ASHRAE Table 9.4.5. ☐ Proposed lighting power is inconsistent with that reported in documentation for SS Credit 8. ☐ Nontradable surfaces are not modeled with lesser of nontradable allowance and installed lighting power for each nontradable surface, as required by LEED Interpretation 5261. ☐ Lighting power allowance is claimed in baseline model for surfaces that are not provided with lighting in actual design, or lighting fixtures are double- counted for different exterior surfaces. ☐ Exterior lighting energy use is not correctly calculated based on lighting kW in OLTG forms and annual equivalent full- load hours of operation.	☑ASHRAE 90.1–2016+, Table G3.1.5(b) ☑ASHRAE 90.1–2016+, Table G3.1.5(b) and Table 5.5

Table 3.1. Input Quality Control Checklist			
Process Loads			
TOPIC	CHECK	ERRORS	RESOURCES
Process lighting	☑ Verify that qualified process lighting is reported.	☐ Regulated lighting use is incorrectly reported as process lighting.	☑ ASHRAE 90.1–2016+, Exceptions to Section 9.2.2.3
Other process loads	☑ Verify that all process loads are reported identically for baseline and proposed buildings and that all end-use load components within and associated with project are modeled.	☐ Receptacle and other miscellaneous loads are different in baseline and proposed cases. ☐ Process loads, such as cooking equipment and elevator, are omitted from baseline and proposed case models.	☑ ASHRAE 90.1–2016+, Table G3.1.12