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INFORMATION

LEED-NC, LEED-CS and California Title 24-2005 Guideline posted November 19, 2007

Throughout this document, references to LEED-NC v2.2 also apply to LEED-CS v2.0.

The technical standard referenced as the basis for LEED-NC v2.1 energy performance credits has been updated for version 2.2. While previous versions of LEED-NC referenced ASHRAE/IESNA 90.1-1999 for energy credits, LEED-NC v2.2 references ASHRAE/IESNA 90.1-2004. Since the California Title 24 energy standard has also been updated, a reevaluation of the equivalency that currently exists between ASHRAE 90.1 and Title 24 for LEED-NC v2.2 registered projects was necessary and has been completed. The following has been approved by both the Energy and Atmosphere Technical Advisory Group and the LEED Steering Committee effective for all LEED-NC v2.2 projects.

USGBC deems Title 24-2005 to be directly equivalent to ASHRAE 90.1-2004 for projects within the state of California. Projects within California may still elect to use ASHRAE 90.1-2004 instead of Title 24-2005. However, once the Title24 or ASHRAE path is chosen, it must be used consistently.

This equivalency is for the purpose of certification of the following LEED-NC v2.2 credits:

- Minimum Energy Performance - EAp2
- Optimize Energy Performance - EAc1
- On-Site Renewable Energy - EAc2
- Green Power – EAc6

LEED credit will be awarded based on established LEED-NC v2.2 performance thresholds for EAc1, EAc2, and EAc6, as in the spreadsheets below. The LEED-NC v2.2 Reference Guide incorrectly states that there are no Exemplary Performance points available for EA-c1, c2 and c6. The table below identifies the levels needed to achieve ID credits.

LEED-NC v2.2 - Energy and Atmosphere
California Title 24-2005 and ASHRAE 90.1-2004

	EAp1*		New Construction				EAc6**	
	90.1-2004	Title 24 2005	90.1-2004	Title 24 2005	90.1-2004	Title 24 2005	90.1-2004	Title 24 2005
Pass	Y	Y						
1 Point			10.5%	10.5%	2.5%	2.5%	35.0%	35.0%
2 Points			14.0%	14.0%	7.5%	7.5%	70.0%	70.0%
3 Points			17.5%	17.5%		12.5%		
4 Points			21.0%	21.0%	17.5%	17.5%		
5 Points			24.5%	24.5%				
6 Points			28.0%	28.0%				
7 Points			31.5%	31.5%				
8 Points			35.0%	35.0%				
9 Points			38.5%	38.5%				
10 Points			42.0%	42.0%				
ID								
Credit			45.5%	45.5%				

	EAp1*		Existing Building with major renovations				EAc6**	
	90.1-2004	Title 24 2005	90.1-2004	Title 24 2005	90.1-2004	Title 24 2005	90.1-2004	Title 24 2005
Pass	Y	Y						
1 Point			3.5%	3.5%	2.5%	2.5%	35.0%	35.0%
2 Points			7.0%	7.0%	7.5%	7.5%	70.0%	70.0%
3 Points			10.5%	10.5%	12.5%	12.5%		
4 Points			14.0%	14.0%	17.5%	17.5%		
5 Points			17.5%	17.5%				
6 Points			21.0%	21.0%				
7 Points			24.5%	24.5%				
8 Points			28.0%	28.0%				
9 Points			31.5%	31.5%				
10 Points			35.0%	35.0%				
ID								
Credit			38.5%	38.5%				

* Projects earning EAc1 points use EAc1 documentation to document EAp1

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Based on Design Energy Cost from EAc1

Bold Red Text is exemplary performance threshold

Please note that the LEED performance thresholds for EAc1 and EAc2 are based on energy cost. When using Title 24-2005, project teams will need to use the appropriate energy rates to determine the energy cost savings of their project, as discussed below.

California LEED-NC v2.2 projects do not need to provide justification or support of Title 24-2005 equivalence when applying for LEED-NC v2.2 certification. Furthermore, project teams documenting achievement of any EAc1 points using Title 24-2005 are assumed to be in compliance with EAp2 and need only reference this fact in their EAp2 submittal.

Instructions for completing LEED-NCv2.2 or LEED-CSv2.0 documentation for EAc1 when using Title 24-2005

1. ENERGY COST AS THE BASIS FOR CALCULATIONS

Energy use (kBtu/sf-yr) must be converted to cost (\$) in order to calculate LEED points. Projects may use either the energy rates referenced in the LEED Reference Guide, or actual rates may be entered into the Title 24 certified energy model. However, the same source and year must be used for both gas and electric.

To enter actual energy rates into EnergyPro, select the main building icon, then select the tab for each energy type (Fuel #1, Fuel #2, etc.), select the source fuel type, and select the utility rate that applies for your project, or enter a new utility rate based on utility tariffs. View the bottom of the ECON-1 report or the ES-D DOE-2 simulation output report to see the Virtual Rate.

To enter the actual energy rates in eQUEST, select the appropriate utility rate from the appropriate wizard screen, or enter a custom rate if the appropriate utility rate is not listed.

2. METHODOLOGY FOR COMPLETING LEED EAC1 TEMPLATE

To identify the Baseline building envelope inputs for Table 1.4, please reference the Title-24 2005 Building Energy Efficiency Standards, Table 143-A, B or C for all envelope inputs. Reference Title-24 2005 Building Energy Efficiency Standards, Tables 112-A through 112-M for equipment efficiencies. Reference the 2005 Non-Residential ACM Manual Table N2-10 for HVAC System Types and efficiencies.

To fill out section 1.8.1, complete only the Baseline 0 deg. rotation column with the Title-24 standard results, leaving the other columns (i.e. Baseline 90 deg., Baseline 270 deg., etc.) blank. Fill in the data for Energy Consumption only (energy demand is not required).

If the Standard Case virtual electric energy rate exceeds the Proposed Case virtual electric energy rate by more than 10%, you must complete the narrative at the end of the EAc1 template to describe the factors that impacted the virtual electric rate (i.e. thermal energy storage, low lighting power densities, etc. resulting in lower demand charges). The narrative must also reference the total peak electric demand for the standard versus the proposed case as defined in the UTIL-1 EnergyPro report or the ES-E DOE-2 Simulation file report generated by EnergyPro or eQUEST.

3. BACKUP DOCUMENTATION REQUIRED FOR UPLOAD WITH LEED SUBMITTAL

A. Option 1: EnergyPro Reports

Upload the PERF-1, UTIL-1, and ECON-1 reports as backup documentation. On the UTIL-1, Step 3 Annual Site Energy Use, identify the KWH and therms used for each energy component, and input this data in Table 1.8.1 (for the Title-24 Standard Case) and Table 1.8.2 (for the Proposed Case). From the EIA tables in the LEED Reference Guide, or calculated from the ECON-1 form, identify the energy cost per energy type (electricity and natural gas), and input this data in Table 1.8.1 and 1.8.2

Note: The UTIL-1 and ECON-1 reports may ONLY be used when the model is run in compliance mode. If the model is run in Non-Compliance mode, the baseline HVAC System type used may be inconsistent with Title-24 requirements, and the data will not match LEED modeling protocol. If the project is run in non-compliance mode, the user must provide a narrative with sufficient supporting documentation to verify that the budget case HVAC system type and parameters match the Title-24 ACM Manual requirements.

Note: PERF-1, UTIL-1, and ECON-1 reports should not be used with eQUEST, since the eQUEST Savings by Design runs are completed using actual building schedules, versus Title-24 default schedules.

B. Option 2: DOE-2 Reports

DOE-2 outputs may be used in order to complete the LEED EAc1 Template, and as backup documentation uploaded onto LEED on-line.

To generate DOE-2 output files from EnergyPro, click on CalcManager → Options → Win/DOE, and deselect the box for “Delete DOE Files After Run”. In the same tab, click on Reports → Plant, and select the PS-E and BEPU reports. When you run the simulation, the DOE-2 output reports will be in the EnergyPro Program directory in the WinDOE folder (i.e. C:/EP4/WinDOE). The simulation outputs have *.SIM extensions.

To generate detailed DOE-2 output files in eQUEST, click on “PROJECT & SITE” → “PROJECT” → “Energy & Code Compliance: “Simulation Output”, and select “All Reports”. The reports that will be generated for the project are listed under “PROJECT & SITE” → “Simulation Outputs” → “Energy & Code Compliance: “Simulation Output/”

For both eQUEST and EnergyPro: In Tables 1.8.1 and 1.8.2, enter the values for energy consumption from the PS-E, BEPS, or BEPU reports. Enter the values for energy cost as reported in the ES-D report (be sure to add any extra energy costs not calculated in the energy model for Process energy and/or Exterior lighting).

Note for Residential Buildings, Options A & B: In EnergyPro, residential domestic water heating is calculated separately from the DOE-2 simulation. Therefore, both the ECON-1 report and DOE-2 reports (ES-D) will incorrectly report domestic water heating energy costs. To correct this, multiply the Domestic water

heating energy consumption (reported on the UTIL-1 report) by the virtual energy rate (i.e. average dollars per therm), and add this value to the total regulated energy costs from the ECON-1 EnergyPro form or the ES-D DOE-2 form.

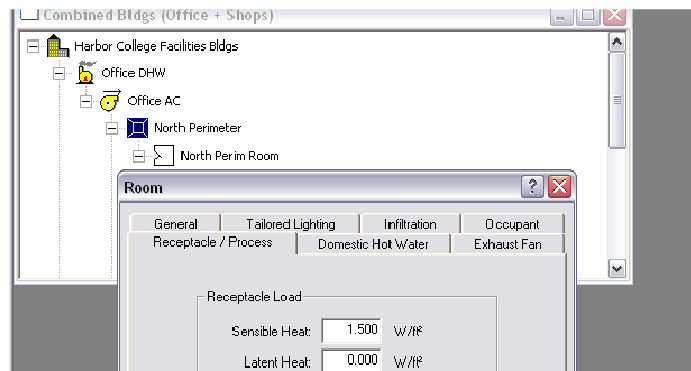
4. **PROCESS ENERGY**

Process energy costs must account for at least 25% of the total standard building energy cost OR a narrative must be provided justifying the low process energy consumption for the building.

All end-use load components within and associated with the building shall be modeled, including, but not limited to, receptacle energy usage (which is defaulted in Title 24, based on the occupancy type), exhaust fans, parking garage ventilation fans, exterior lighting, swimming pool heaters and pumps, elevators and escalators, refrigeration, and cooking. If the energy modeling software used for documenting compliance is capable of including these end-uses, the end-uses shall be included in the energy model. Otherwise, the end-uses shall be calculated using a spreadsheet or specialized simulation package, and added on to the total energy consumption. In this case energy cost for the end-use should be calculated by multiply the calculated energy consumption by the “Virtual Rate” for the given energy rate, as shown in the DOE-2 Simulation file ES-D report, or the ECON-1 report.

Methodology for including Process Energy in Conditioned Spaces in EnergyPro:

For process loads located in conditioned spaces that are NOT included in the default receptacle load calculations for Title-24 (such as elevator equipment, compressors, data center equipment, cooking equipment, etc.), the process load may be added in EnergyPro at the Room level under the Receptacle / Process tab. Schedules should be entered to approximate the energy consumption of the process load.



Methodology for including Process Energy in Conditioned Spaces in eQUEST:

Process loads entered into the wizard or detailed interface of eQUEST will be calculated as part of the total energy and cost in the Title-24 calculations.

Methodology for reporting Process Energy in EAc1 LEED Template

For process loads that cannot be modeled in the energy simulation software (such as garage ventilation, pool heating, etc.), calculate the energy consumption using a spreadsheet or other specialized simulation package. Calculate the energy cost for these end-uses using the virtual utility rates described above. Upload a summary of these calculations to LEED Online as backup documentation. Input the energy consumption as a separate end-use in the LEED EAc1 Template, Tables 1.8.1 and 1.8.2. Add the additional cost for these end-uses to the total energy cost, and include the combined costs in Tables 1.8.1b and 1.8.2b

5. EXTERIOR & UNCONDITIONED SPACE LIGHTING

All exterior and unconditioned space lighting shall be included in the energy calculations.

The codes provide Lighting Power Allowances for two kinds of Exterior Lighting. The first is General Site Illuminance, per 2005 Building Energy Efficiency Standards (2005 BEES) Table 147-A. This is tradable within its own category, but is *not* tradable to any other energy use category. Credit may be taken for improved efficiency.

The second is for Specific Applications, as shown in 2005 BEES Table 147-B. This is a use-it-or-lose-it allowance for each individual application. Credit may *not* be taken for improved efficiency.

Methodology for reporting Exterior Lighting Energy in EAc1 LEED Template:

The Standard exterior lighting hours of use and the Proposed Exterior lighting hours of use, shall be modeled identically in the budget and proposed case.

For EnergyPro for General Site Illumination (Table 147-A):

For the Standard exterior lighting, identify the Total Allotted Watts, as defined in OLTG-2-C, Part 1 of 4. For the Proposed Exterior Lighting, identify the Total Installed Watts, as defined in OLTG-2-C, Part 1 of 4. Multiply the wattages by the Equivalent Full Load Hours of Operation, and divide by 1,000 to get annual electricity consumption in kWh/year (e.g. if the exterior lighting operates 12 hours daily, the equivalent full load hours is 365 days * 12 hours = 4,380 hours). Calculate the energy cost for exterior lighting by multiplying the annual electricity consumption by the virtual utility rate for electricity. Include the combined cost in Tables 1.8.1b and 1.8.2b. The electricity cost should be the same for the Baseline and Proposed cases.

For EnergyPro for Specific Applications (Table 147-B):

Identify the Allowed Watts from OLTG-2-C (Part 3 of 4) Column P. Use these watts for the both the Standard and the Proposed lighting power. Proceed as outlined in the paragraph above.

For eQUEST: eQUEST will correctly calculate the exterior lighting correctly if you input the exterior lighting power and the schedules in the wizard interface, or in the detailed interface as an exterior load under the Electric Meter (EM1).

Methodology for reporting Unconditioned Space Lighting Energy in EAc1 LEED Template:

Unconditioned space lighting, including parking garage lighting, may be modeled using the allowable lighting power density in the Title-24 Standard Case, and the installed lighting power density in the Proposed Case.

For EnergyPro: To calculate the lighting energy consumption for unconditioned spaces, input the unconditioned spaces in EnergyPro. Select the space category for the unconditioned space, and mark the space type as unconditioned. Input the lighting as you would for a conditioned space. After running the simulation, find the total allowed Watts for unconditioned spaces in LTG-5-C. Find the total installed Watts for unconditioned spaces in LTG-2-C. For the Title-24 standard case, multiply the unconditioned space allowed Watts by the Equivalent Full Load Hours of Operation (EFLH), and divide by 1,000 to get annual electricity consumption in kWh/year (e.g. if the unconditioned space lighting operates 40 hours per week, the EFLH is 52 weeks * 40 hours = 2,080 hours). For the Title-24 proposed case, multiply the unconditioned space installed Watts by the EFLH, and divide by 1,000 to get annual proposed electricity consumption in kWh/year (the EFLH should be the same as for the Title-24 standard case). Calculate the energy cost by multiplying the annual unconditioned space lighting consumption by the virtual rate for electricity

For eQUEST: To calculate the lighting energy consumption for unconditioned spaces, create a new electric submeter in the Detailed interface (i.e. EM2), assign the submeter to the main meter (EM1), and input the total unconditioned space lighting power, and the lighting schedules for unconditioned spaces under the electric submeter (EM2).

6. EXCEPTIONAL CALCULATION METHODOLOGY

Energy efficiency measures not accounted for within Title-24 compliance analyses may be modeled using the Exceptional Calculation Methodology, similarly to ASHRAE 90.1-2004 Appendix G buildings. For example, fan energy savings from underfloor air conditioning, electricity savings from EnergyStar appliances, Lighting in residential dwelling units, etc. may be modeled using the Exceptional Calculation Methodology. If the exceptional calculation methodology is used, a narrative should be provided describing the inputs for the standard and proposed case. The narrative should provide sufficient documentation to justify the standard case assumptions, and should describe the calculation methodology used to project the energy savings. Section 1.7 of the LEED EAc1 template should be used to report the energy savings.

7. SITE-GENERATED RENEWABLE ENERGY

Site-generated renewable energy may be added to the energy savings in the EAc1 documentation. Section 1.6 of the LEED Template should be used to document the energy offset by site-generated renewable energy.