| v3 - LEED 2009

Optimize energy performance

EAc1 | Possible 19 points

Glossary

Intent

To achieve levels of energy performance beyond those in the prerequisite standard to reduce environmental and economic impacts associated with excessive energy use.

Requirements

Select 1 of the 3 compliance path options described below. Project teams documenting achievement using any of the 3 options are assumed to be in compliance with EA Prerequisite 2: Minimum Energy Performance.

Option 1. Whole building energy simulation (1-19 points)

Demonstrate a percentage improvement in the proposed building performance rating compared with the baseline building performance rating. Calculate the baseline building performance according to Appendix G of ANSI/ASHRAE/IESNA Standard 90.1–2007 (with errata but without addenda[1]) using a computer simulation model for the whole building project. Projects outside the U.S. may use a USGBC approved equivalent standard[2]. The minimum energy cost savings percentage for each point threshold is as follows:

New Buildings	Existing Building Renovations	Points
12%	8%	1
14%	10%	2
16%	12%	3
18%	14%	4
20%	16%	5
22%	18%	6
24%	20%	7
26%	22%	8
28%	24%	9
30%	26%	10
32%	28%	11
34%	30%	12
36%	32%	13
38%	34%	14
40%	36%	15
42%	38%	16
44%	40%	17
46%	42%	18
48%	44%	19

All building energy uses associated with the project must be included in the energy simulation model. Improvements to process loads must be documented as described below. Nonprocess energy systems include HVAC (heating, cooling, fans, and pumps), service water heating, and lighting. Process loads for retail may include refrigeration equipment, cooking and food preparation, clothes washing, and other major support appliances. Merchandise for sale that is plugged in and small movable appliances are not candidates for improved energy performance.

Appendix G of Standard 90.1–2007 requires that the energy analysis done for the building performance rating method include all of the energy costs associated with the building project. To achieve points under this credit, the proposed design must meet the following criteria:

- Compliance with the mandatory provisions (Sections 5.4, 6.4, 7.4, 8.4, 9.4, and 10.4) in Standard 90.1–2007 (with errata but without addenda[1]) or USGBC approved equivalent.
- Inclusion of all the energy costs within and associated with the building project.
- Comparison against a baseline building that complies with Appendix G of Standard 90.1–2007 (with errata but without addenda[1]) or USGBC approved equivalent. There is no default process energy cost.

For the purpose of this analysis, process energy is considered to include, but is not limited to, office and general miscellaneous equipment, computers, elevators and escalators, kitchen cooking and refrigeration, laundry washing and drying, lighting

exempt from the lighting power allowance (e.g., lighting integral to medical equipment), and other (e.g., waterfall pumps).

Regulated (nonprocess) energy includes lighting (for the interior, parking garage, surface parking, façade, building grounds, etc., except as noted above), heating, ventilating, and air-conditioning (HVAC) (for space heating, space cooling, fans, pumps, toilet exhaust, parking garage ventilation, etc.), and service water heating (for domestic or space heating purposes).

For this credit, process loads must be identical both for the baseline building performance rating and for the proposed building performance rating. However, project teams may follow the exceptional calculation method (ANSI/ASHRAE/IESNA Standard 90.1–2007, G2.5) or USGBC approved equivalent to document measures that reduce process loads.
Documentation of process load energy savings must include a list of the assumptions made for both the base and the proposed design, and theoretical or empirical information supporting these assumptions.

Projects in California may use Title 24–2005, Part 6, in place of ANSI/ASHRAE/IESNA Standard 90.1–2007 for Option 1.

Many of the industry standard baseline conditions for commercial kitchen equipment and refrigeration have been defined in Tables 1–4. No additional documentation is necessary to substantiate these predefined baseline systems as industry standard.

For process loads, provide cutsheets or other documentation demonstrating proposed equipment and budget equipment not covered in Tables 1–4. A clear baseline must be described and documented to compare proposed improvements in process load categories. The baseline and design must be documented in the following ways:

- For appliances and equipment, provide cutsheets of proposed equipment and budget equipment not covered in Tables 1–4 that indicate hourly energy use. Provide a spreadsheet calculation estimating the daily use hours for each piece of equipment listed. Use the total estimated energy use in the energy simulation model as a plug load. Reduced use time (schedule change) is not a category of energy improvement in this credit. ENERGY STAR ratings and evaluations are a valid basis for performing this calculation.
- Spreadsheet calculation may also be utilized for calculation of commercial appliances energy consumption, and input into the Energy Cost Budget (ECB), in lieu of energy simulation modeling as a plug load.
- For display lighting, the space-by-space method of determining allowed lighting power under ANSI/ASHRAE/IESNA Standard 90.1–2007 must be used to determine the appropriate baseline for both the general building space and the display lighting. Installed lighting in the proposed building, including display lighting, is compared with this baseline in the simulation.
- For hard-wired refrigeration loads, the impact of energy performance improvements must be modeled with a simulation program specifically designed to account for refrigeration equipment. For example, eQUEST has a refrigeration module that can be used to simulate performance improvements in refrigeration equipment.

To establish the baseline and design conditions for the energy cost budget, use Tables 1 and 2.

OR

Option 2. Prescriptive compliance path: ASHRAE Advanced Energy Design Guide (1 point)

Comply with the prescriptive measures of the ASHRAE Advanced Energy Design Guide for Retail Buildings 2006.

Project teams must fully comply with all applicable criteria as established in the Advanced Energy Design Guide for the climate zone in which the building is located. Projects outside the U.S. may use ASHRAE/ASHRAE/IESNA Standard 90.1-2007 Appendices B and D to determine the appropriate climate zone.

The building must meet the following requirements:

- Less than 20,000 square feet (1,800 square meters).
- Retail occupancy.

AND

Projects must comply with the prescriptive measures on Tables 1–4 for 90% of total energy consumption for all process equipment.

OR

Option 3. Prescriptive compliance path: Advanced Buildings™ Core Performance™ Guide (1-3 points)

Comply with the prescriptive measures identified in the Advanced Buildings™ Core Performance™ Guide developed by the New Buildings Institute. The building must meet the following requirements:

- Less than 100,000 square feet (9,300 square meters).
- Comply with Section 1, Design Process Strategies, and Section 2, Core Performance Requirements.
- Health care, warehouse, or laboratory projects are ineligible for this path.

Points achieved under Option 3 (1 point):

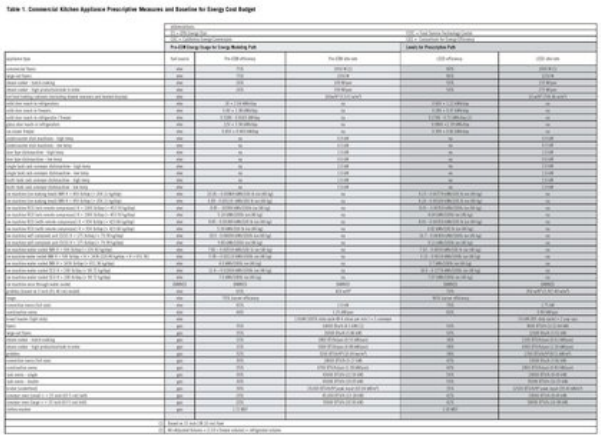
- 1 point is available for all office, school, public assembly, and retail projects less than 100,000 square feet (9,300 square meters) that comply with Sections 1 and 2 of the Core Performance Guide.
- Up to 2 additional points are available to projects that implement performance strategies listed in Section 3, Enhanced Performance. For every 3 strategies implemented from this section, 1 point is available.
- The following strategies are addressed by other aspects of LEED and are not eligible for additional points under EA Credit 1:
- 3.1—Cool Roofs
- 3.8—Night Venting
- 3.13—Additional Commissioning

Projects outside the U.S. may use ASHRAE/ASHRAE/IESNA Standard 90.1-2007 Appendices B and D to determine the appropriate climate zone.

AND

Projects must comply with the prescriptive measures in Tables 1–4 for 90% of total energy consumption for all process equipment.

Table 1. Commercial Kitchen Appliance Prescriptive Measures and Baseline for Energy Cost Budget



Commercial Kitchen Appliance Prescriptive Measures and Baseline for Energy Cost Budget (EAc1)

Table 2. Supermarket Refrigeration Prescriptive Measures and Baseline for Energy Cost Budget

Item	Attribute	Prescriptive Measures	Baseline
Evaporator	Evaporator fan speed control	Variable speed evaporator fan	Constant volume, constant operation
	Evaporator design approach temperature	10°F (-12.2°C)	10°F (-12.2°C)
Condenser	Air cooled condenser fan speed control	Variable Speed Condenser Fan (electronically commutated motors if single phase and less than 1 hp)	Cycling one speed fan
	Air cooled condenser design approach	Floating head pressure, min of 70°F (21.1°C), 5°F (-15°C) drybulb offset	10°F to 15°F (-12.2°C to -9.4°C) depending on suction temperature
	Air cooled condenser fan power	80 Btu/Watt-hr at 10°F (-12.2°C) approach temperature	53 Btu/Watt-hr at 10°F (-12.2°C) approach temperature
	Evaporative condenser fan speed control	Variable speed condenser fan (electronically commutated motors if single phase and less than 1 hp)	Cycling one speed fan
	Evaporative condenser design approach temperature	Floating head pressure, min of 70°F (21.1°C), 9°F (-12.8°C) wetbulb offset	18°F to 25°F (-7.8°C to -3.9°C) based on design wetbulb temperature
	Evaporative condenser fan and pump power	400 Btu/Watt-hr at 100°F (37.8°C) saturated condensing temperature and 70°F (21.1°C) wetbulb temperature	330 Btu/Watt-hr at 100°F (37.8°C) saturated condensing temperature and 70°F (21.1°C) wetbulb temperature
Refrigeration System	Suction pressure control	Not addressed	Not addressed
	Condensing temperature control	85°F (29.4°C) minimum condensing temperature, fixed setpoint	85°F (29.4°C) minimum condensing temperature, fixed setpoint
	Defrost control	No electrical defrost. Hot gas defrost only	Not addressed
Compressor	Compressor capacity modulation	Variable speed drive trim compressor	Slide valves on screw compressors, multiple compressor racks on reciprocating compressor plants

Table 3. Walk-in Coolers and Freezers Prescriptive Measures and Baseline for Energy Cost Budget

Item	Attribute	Prescriptive Measures	Baseline
Envelope	Freezer insulation	R-46	R-36
	Cooler insulation	R-36	R-20
	Automatic closer doors	Yes	No
	High efficiency low/no heat reach-in doors	40W/ft (13.12 W/mm) of door frame (low temperature) 17W/ft (5.58 W/mm) of door frame (medium temperature)	40W/ft (13.12 W/mm) of door frame (low temperature) 17W/ft (5.58 W/mm) of door frame (medium temperature)
Evaporator	Evaporator fan motor and control	Shaded pole and split phase motors are prohibited. Use PSC or EMC motors.	Constant speed fan
	Hot gas defrost	Yes, no electrical defrosting	Electric defrost

Condenser	Air cooled condenser fan motor and control	Shaded pole and split phase motors are prohibited. Use PSC or EMC motors. Add condenser fan controllers	Cycling one speed fan
	Air cooled condenser design approach	Floating head pressure controls or ambient sub-cooling	10°F to 15°F (-12.2°C to -9.4°C) dependent on suction temperature
Lighting	Lighting power density (W/sq.ft.) (W/m2)	0.6 W/sq.ft. (6.46 W/m2)	0.6 W/sq.ft. (6.46 W/m2)

Chart based on Final Report on Refrigerated Warehouses PG&E (Pacific Gas & Electric) Codes and standards enhancement initiative, February 2007; Analysis of Standards Options for Walk-In Coolers (Refrigerators) and Freezers PG&E (Pacific Gas & Electric) Codes and standards enhancement initiative prepared by Davis Energy Group Energy Solutions, May 2004; and the ASHRAE Refrigeration Handbook 2004.

Strategies	Prescriptive Measures	Baseline
Make-up air strategies	Dedicated make-up air system	Transfer air through dining area
Exhaust rate control	Demand control package	Constant volume

Pilot ACPs Available

The following pilot alternative compliance path is available for this credit. See the pilot credit library for more information.

EApc95: Alternative Energy Performance Metric ACP

Address
2101 L Street NW
Suite 500
Washington, DC 20037

Within the United States:
1-800-795-1747

Outside the United States:
1-202-742-3792

© 2012-2015 U.S. Green Building Council