



2008 LEED for Homes Rating System Addendum for California *for Single-Family and Low-Rise Multi-Family Buildings in California*

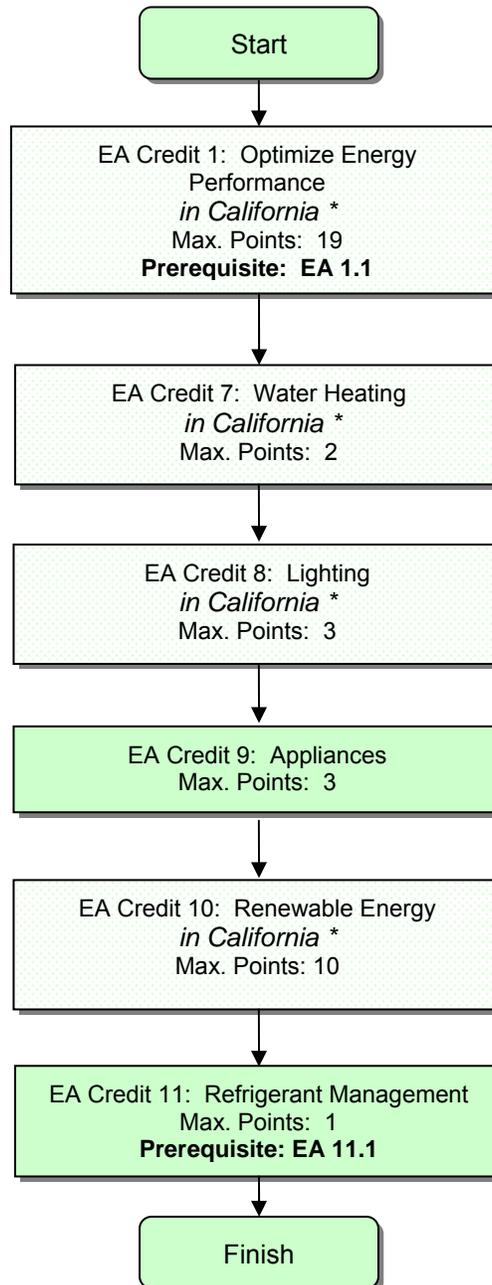
The following pages include revisions to the 2008 LEED for Homes Rating System that are only applicable to single-family and low-rise (1-3 story) multi-family buildings in the State of California.

The prerequisites and credits listed below should replace the comparable Energy and Atmosphere prerequisites and credits listed in the national 2008 LEED for Homes Rating System, which is available on the USGBC website.

All other guidance in the LEED for Homes Rating System must be followed, and all other prerequisites must be met. An accompanying project checklist that has been tailored for California is also available from USGBC.

Energy and Atmosphere in CA

Optional Pathways Through EA Credits *in California*



* Please see revised EA credits for California

EA 1. Optimize Energy Performance in California

Maximum Points: 19

Intent

Improve the overall energy performance of a home by meeting or exceeding the performance of an ENERGY STAR labeled home.

Requirements

Prerequisites

- 1.1 **Performance of ENERGY STAR for Homes.** Meet the performance requirements of ENERGY STAR for Homes, including third-party inspections.

Credits

- 1.2 **Exceptional Energy Performance** (maximum 19 Points). Exceed the performance of a home built to the Title-24 requirements in California. Use the equations below relating the home energy savings to the appropriate number of LEED points.

Equation:

$$\text{LEED Pts in CA} = 0.75 * \{ [\text{Log} (\% \text{ better than Title-24}) / 0.024] - 48.3 \}$$

NOTE: In the context of this rating system, % better than Title-24 refers to the percentage of heating, cooling, and DHW energy saved in a rated home when compared to a Standard Design home using Title-24 compliance software (e.g. MicroPas or EnergyPro). This information is provided on the CF-1R Form.

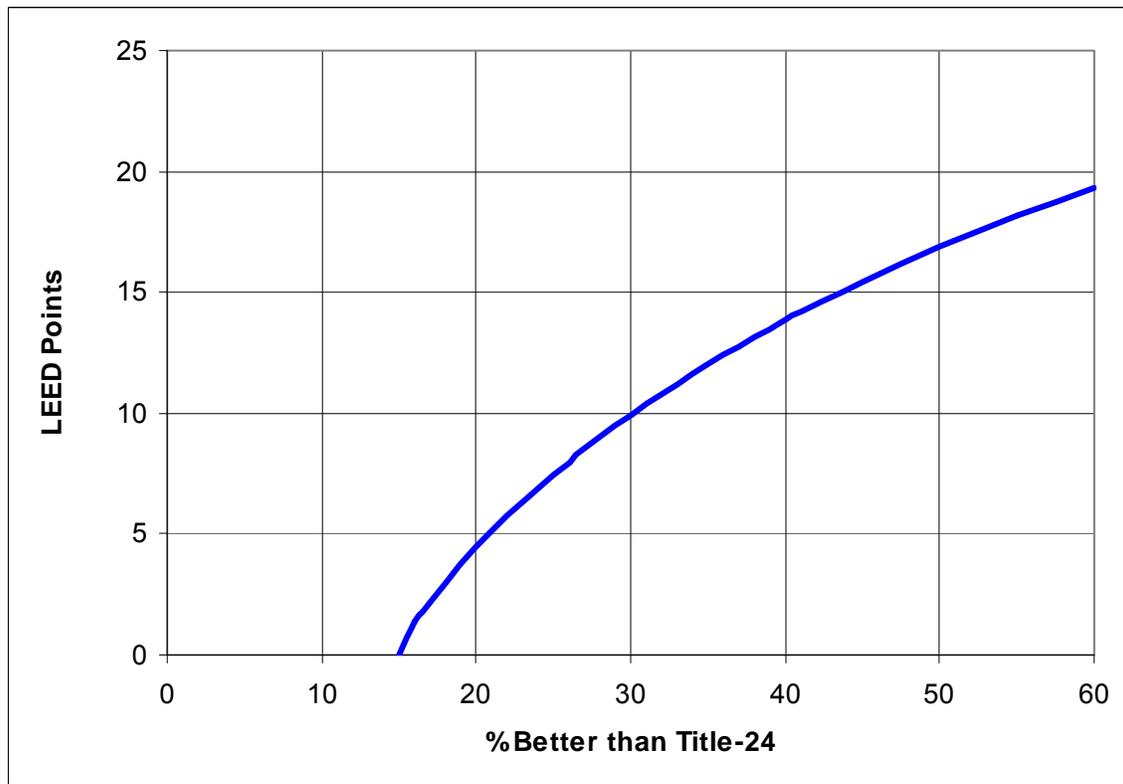
**Exhibit EA1-A
LEED for Homes points based on Title-24**

California	
Percent better than Title 24	LEED for Homes Points
0	
5	
10	
15	
16	1.0
17	2.0
18	3.0
19	4.0
20	4.5
21	5.0
22	6.0
23	6.5
24	7.0
25	7.5
26	8.0
27	8.5
28	9.0
29	9.5
30	10.0
31	10.5
32	11.0
33	11.0
34	11.5
35	12.0
36	12.5
37	13.0
38	13.0
39	13.5
40	14.0

California	
Percent better than Title 24	LEED for Homes Points
41	14.0
42	14.5
43	15.0
44	15.0
45	15.5
46	15.5
47	16.0
48	16.5
49	16.5
50	17.0
51	17.0
52	17.5
53	17.5
54	18.0
55	18.0
56	18.5
57	18.5
58	19.0
59	19.0
60	19.0
65	
70	
75	
80	
85	
90	
95	
100	

**Maximum
19 points
available**

Exhibit EA1-B
LEED for Homes points based Title-24



Synergies and Trade-Offs

Homes in California may not use the prescriptive energy pathway (EA 2-6) in the national LEED for Homes Rating System.

Shading and the reduction of local heat island effects (SS 3) can reduce energy demands for space cooling. Similarly, vegetated roofs (SS 4.3) can reduce both space heating and cooling loads.

High-efficiency appliances and fixtures (WE 3) can reduce hot water demand.

Reduced framing (MR 1) can allow for more insulation and fewer thermal bridges.

Proper design and verification of space heating and cooling distribution systems (EQ 6) can help provide thermal comfort with minimized waste. In hot and humid climates, effective dehumidification (EQ 3) can significantly reduce cooling loads.

EA 7. Water Heating

Maximum Points: 2

Intent

Reduce energy consumption associated with the domestic hot water system, including improving the efficiency of both the hot water system design and the layout of the fixtures in the home.

Requirements

Prerequisites

None.

Credits

- 7 **Efficient Hot Water Distribution** (2 Points) Design and install an energy-efficient hot water distribution system (see Exhibit EA 7-A). None of the branch length requirements below apply to cold water demand loads (e.g. toilets), washing machines, or tubs without showerheads. Select one of the following designs:
- a) Structured plumbing system. The system must meet all of the following:
 - i. The system must have a demand-controlled circulation loop that is insulated to at least R-4.
 - ii. The total length of the circulation loop must be less than 40 linear feet of plumbing in one-story homes. Add 2x the ceiling height for two-story homes, and add 4x the ceiling height for three- or four-story homes.
 - iii. Branch lines from the loop to each fixture must be ≤ 10 feet long and a maximum of $\frac{1}{2}$ -inch nominal diameter.
 - iv. The system must be designed with a push button control in each full bathroom and the kitchen and an automatic pump shut-off.
 - b) Central manifold distribution system. The system must meet all of the following:
 - i. The central manifold trunk must be no more than 6 feet in length.
 - ii. The central manifold trunk must be insulated to at least R-4.
 - iii. No branch line from the central manifold to any fixtures may exceed 20 feet in one-story homes. Add 1x the ceiling height for two-story homes, and add 2x the ceiling height for three- or four-story homes.
 - iv. Branch lines from the manifold must be a maximum of $\frac{1}{2}$ -inch nominal diameter.
 - c) Compact design of conventional system. The system must meet all of the following:
 - i. No branch line from the water heater to any fixtures may exceed 20 feet in one-story homes. Add 1x the ceiling height for two-story homes, and add 2x the ceiling height for three- or four-story homes.
 - ii. Branch lines from the central header to each fixture must be a maximum of $\frac{1}{2}$ -inch nominal diameter.

Exhibit EA7-A. Sample Schematic of a Structured Plumbing System

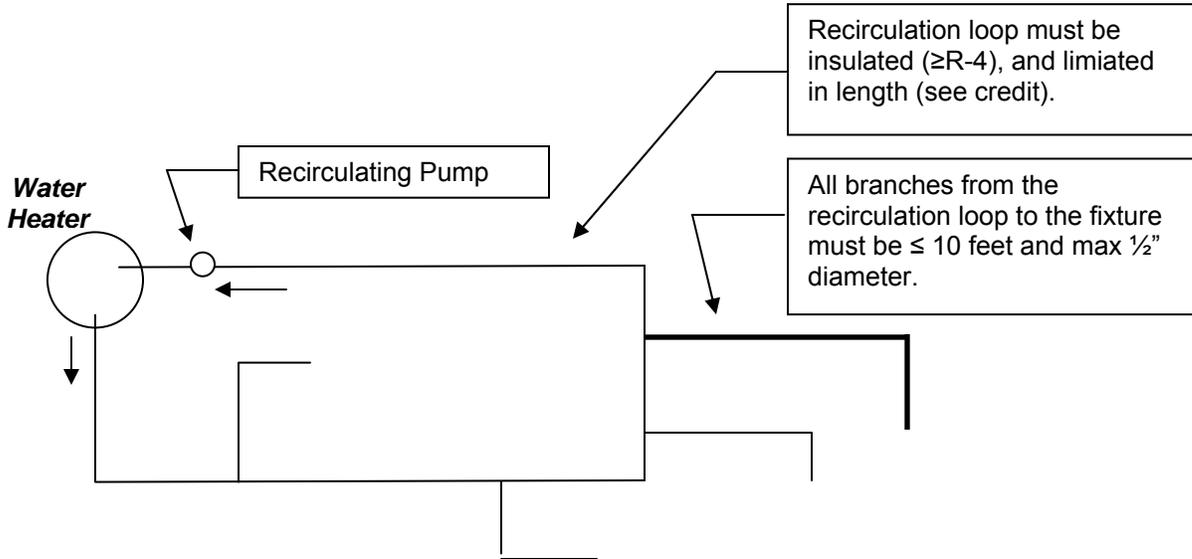


Exhibit EA7-A. Sample Schematic of a Central Manifold Distribution System

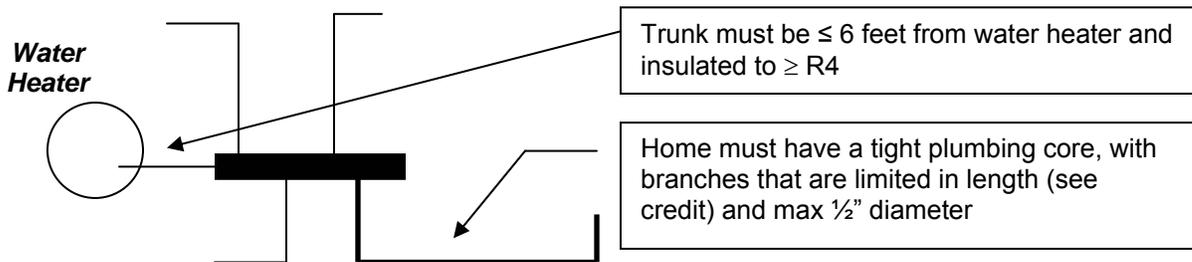
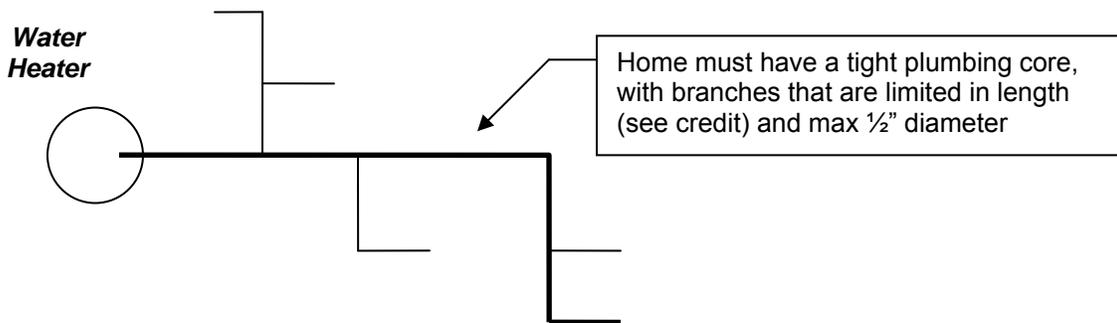


Exhibit EA7-A. Sample Schematic of a Compact Design



Synergies and Trade-Offs

A project receiving points for EA 1 is not eligible for EA 7.3, and vice versa. A project pursuing EA 7.3 must follow the prescriptive pathway and meet all of the prerequisites in EA 2–10. Prerequisite EA 1.1 should be skipped. See the pathway schematic at the beginning of the EA section. EA 7.1 and 7.2 are available to every project, whether the performance approach (EA 1) or the prescriptive approach (EA 2–10) is used.

Low-flow showerheads and faucets may also reduce demand for hot water and resulting energy use for water heating. Points for installing low-flow showerheads are available under WE 3. Additional reductions in hot water energy use achieved through efficient appliances are addressed in EA 9.

EA 8. Lighting in California

Maximum Points: 3

Intent

Reduce energy consumption associated with interior and exterior lighting.

Requirements

Prerequisites

8.1 Title-24 Lighting. Meet the lighting requirements of Title-24 in California.

Credits

- 8.2 Improved Lighting (1 point maximum).** Select and install one or both of the following measures:
- a) Indoor lighting (0.5 points). Install three ENERGY STAR labeled light fixtures or ENERGY STAR labeled compact fluorescent light bulbs (CFLs) in rooms other than the kitchen.
 - b) Exterior lighting (0.5 points). Install at least four light fixtures with integrated photovoltaic cells. All other exterior lighting must have motion sensor controls. The following lighting is exempt: emergency lighting; lighting required by code for health and safety purposes; and lighting used for eye adaptation near covered vehicle entrances or exits.

OR

- 8.3 Advanced Lighting (3 points).** Meet one of the following requirements:
- a) Install only high-efficacy lighting fixtures in the home, as described in Chapter 6 of the CEC 2005 Building Energy Efficiency Standards Compliance Manual;
 - b) Earn the ENERGY STAR Advanced Lighting Package. At least 60% of all fixtures must be ENERGY STAR labeled. ENERGY STAR labeled CFLs may not be used to satisfy this requirement.
 - c) At least 90% of all lamps must be ENERGY STAR labeled. ENERGY STAR labeled CFLs may be used to satisfy this requirement.

Synergies and Trade-Offs

Improving the lighting efficiency may also reduce cooling loads and the energy consumption associated with air-conditioning.

EA 10. Renewable Energy in California

Maximum Points: 10

Intent

Reduce consumption of nonrenewable energy sources by encouraging the installation and operation of renewable electric generation systems.

Requirements

Prerequisites

None

Credits

- 10 **Renewable Energy System (maximum 10 points).** Design and install a renewable electricity generation system. Use energy modeling to estimate both the electricity supplied by the renewable energy system and the annual reference electrical load. Receive 1 Point for every 3% of the annual reference electrical load met by the system.

Annual reference electric load is defined as the amount of electricity that a typical home (e.g. a Title-24 Standard Design home) would consume in a typical year. The annual reference electric load in the Standard Design home must be determined using the following procedure:

- Estimate electricity consumption associated with space heating, space cooling, and DHW using Title-24 compliance software (e.g. Micropas or EnergyPro).
- Estimate electricity consumption associated with lighting and appliances using the following formula:

$$\text{L\&A consumption} = 0.519 * [3940 + 5.273 * \text{CFA} - 568.7 * \text{FL\%} - \text{CFA} * \text{FL\%}]$$

Where CFA is conditioned floor area of the home and FL% is the fraction of overall lighting in the LEED home that is high-efficacy. A complete inventory of all the lighting in the home is not necessary; a 'best estimate' for FL% is acceptable.

- Total electricity consumption is equal to the sum of the space heating, space cooling, DHW, and lighting and appliance loads, as calculated in a) and b) above.

The following is a sample calculation for determining the number of LEED points:

Annual reference electric load	= 10,000 KWh
Annual electricity consumption in LEED home	= 7,000 KWh
Annual electricity supplied by renewable energy system	= 1,800 KWh
Percentage of annual reference electric load supplied by renewable energy system	= $1,800 \div 10,000$ = 18.0%
LEED points, under EA 10	= $18.0 \div 3 = 6 \text{ Points}$

Synergies and Trade-Offs

Passive solar designs must be modeled and can take credit using the approach laid out in EA 1.

Solar hot water heating systems are rewarded in EA 7.3.