

## CALGreen 2013 Tier Comparison to LEED v4

The following is a comparative analysis between the "2013 California Green Building Code" (CALGreen or CG-2013) and the third party rating system "Leadership in Energy and Environmental Design - Building Design & Construction, New Construction version 4" (LEED v4). The analysis compares CALGreen 2013 code mandatory & voluntary tier measures against LEED v4 prerequisites & credits with parallel intent. The purpose of the comparison is to identify the difficulty of achieving LEED credits when meeting the requirements of all CALGreen 2013 code mandatory, tier 1 and tier 2 measures respectively. In other words, if a project has met the requirements of the CALGreen measures listed, the colors below indicate how much additional effort is needed to comply with related LEED credits.

The comparison text and point allocations represent assumed results determined by industry-leading Green Building experts. Actual LEED v4 points achieved may vary depending on a multitude of project specific circumstances. The following comparison should only be used as a reference for evaluation purposes. All applicable CALGreen Mandatory and Tier Sub-Measures were evaluated in this comparison, although not all are listed below for legibility.

**KEY**

	CALGreen Mandatory Measure		LEED credit points can easily be achieved by meeting CALGreen measures.
	LEED Credit or Prerequisite		LEED credit(s) can be achieved with minimal changes. LEED standards are slightly different than CALGreen.
	CALGreen Tier 1 or 2 Measure		LEED credit(s) can be achieved with major changes. LEED standards are significantly different than CALGreen.
	CALGreen Measures for which there is no LEED overlap.		

Code/ Rating System	Reference Number	Measure / Credit Name	Comparison Results	Difficulty of achieving LEED points under:		
				Mandatory CALGreen Measures	CALGreen Tier 1 Measures	CALGreen Tier 2 Measures
CG-2013	A5.103.1	Community Connectivity	For this voluntary measure, CALGreen requires projects to be located on a previously developed site within a 1/2 radius of ten basic services. LEED LTc2 has two options, but Option 1 is applicable for the comparison. Under Option 1, projects can achieve 1 pt by locating their development footprint on a previously developed site. LEED LTc4 also has two options and projects can get up to 5 total possible points if both Options 1&2 are completed, but if only option is pursued, 2-3pts for are available for Option 1 (surrounding density); or 1-2pts for Option 2 (Diverse uses within a 1/2 mile radius; 4-7 uses = 1 pt & 8 or more uses = 2 pts.) LEED LTc4 also has additional compliance requirements beyond the CALGreen Community Connectivity requirements listed above.			
LEEDv4	LTc2	Sensitive land protection				
	LTc4	Surrounding density and diverse uses				

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				Mandatory CALGreen Measures	CALGreen Tier 1 Measures	CALGreen Tier 2 Measures
CG-2013	A5.103.2	Brownfield or greyfield site redevelopment or infill area	CALGreen requires projects to be located on either a Brownfield, greyfield redevelopment or infill area development site.  LEED LTc3 has 3 options. Under Option 1, projects can achieve 1 pt by locating the project on an infill location in a historic district. Option 2 is for a priority designation such as the EPA's National Priorities List which is not applicable to CALGreen. Choosing Option 3, projects can achieve 2pts by locating the project on a brownfield site and conducting remediation.			
LEEDv4	LTc3	High Priority Site: Location  High Priority Site: Remediation (option 3)				
CG-2013	A5.104.1	Reduce development footprint and optimize open space	CALGreen has different requirements depending on the zoning conditions for the project location. If local zoning requirements exist, projects must exceed the zoning's open space requirement for vegetated open space on the site by 25 percent. If no local zoning requirements exist, projects must provide vegetated open space area adjacent to the building equal to the building footprint area. If zoning exists but there is no open space requirement, projects must provide vegetated open space equal to 20 percent of the total project site area. LEED SSc3 Requires outdoor space for >= 30% total site area (including building footprint). Minimum of 25% of that outdoor space must be vegetated or overhead vegetated canopy.			
LEEDv4	SSc3	Open Space				
CG-2013	A5.105.1	Deconstruction and Reuse of Existing Structures	For the reuse of the existing structure under CALGreen, projects must maintain 75% of structural floor, roof decking and envelop. For the existing interior nonstructural elements, projects must reuse 50% of the walls, doors, floor coverings and ceiling systems. Projects must salvage other items in good condition and document the weight or quantity. LEED MRc1 offers 4 Options, but Option 3: Building and Material Reuse is comparable. Projects can achieve 2-4 points (25%, 50%, 75%) by reusing on-site or off-site materials. Must include structural, enclosure and permanently installed interior elements.			
LEEDv4	MRc1	Building life-cycle impact reduction				
CG-2013	5.106.1	Storm Water Soil Loss Prevention Plan	CALGreen and LEED have identical requirements.			
LEEDv4	SSp1	Construction Activity Pollution Prevention				
CG-2013	A5.106.2	Storm water design	CALGreen requires the development and implementation of a Storm Water Management Plan resulting in no net increase in rate and quantity. For storm water quality, use treatment control BMP's to mitigate 85% of runoff in the 24-hour runoff event. For LID's, employ at least two of the referenced methods or other BMP's. LEED SSc4 has two Options with multiple paths and Option 1, Path 1 (2pts) & 2 (3pts) require runoff mitigation to the 95th and 98th percentile 24-hour runoff event, respectively, by employing LID and green infrastructure strategies.			
	A5.106.2.1	Storm water runoff rate and quantity				
	A5.106.2.2	Storm water runoff quality				
	A5.106.3	Low impact development (LID)				
LEEDv4	SSc4	Rainwater management				

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CG-2013	5.106.4	Short-Term bicycle parking	<p>CALGreen mandatory measure requires permanently anchored bicycle parking and secure bike parking within 200 feet of entrance for 5% of both new visitor (one two-bike rack minimum) and tenant vehicular parking spaces (one space minimum). LEED requires secure bike storage within 100 feet of main entrance for 2.5% of all peak visitors (short-term) and 100 feet of any building entrance for 5% of non-residential FTE (long-term) and 30% of residential occupants.</p> <p>CALGreen Tiers requires buildings with over 10 tenant occupants to provide showers/changing room facilities with 2-tier personal effects lockers in accordance with the referenced table in the code. For 100-200 FTE, provide 1 shower stall per gender and 4 2-tier lockers. LEED requires at least one shower and changing facility for first 100 FTE and one additional shower for every 150 FTE occupants thereafter, CALGreen does not. LEED requires secure bike storage locations to be within walking (200 yds) or cycling distance of a bicycle network that connects to various defined destinations that are located with a 3-mile cycling distance of the project boundary.</p>			
		Long-Term bicycle parking				
	A5.106.4.3	Changing Rooms				
LEEDv4	LTC6	Bicycle Facilities				
CG-2013	A5.106.5.1.1	Designated Parking for fuel-efficient vehicles: Tier 1 - 10%	<p><u>Designated Parking:</u> CALGreen Mandatory Measure requires designated parking for any combination of low-emitting, fuel efficient, or carpool/van pool vehicles as referenced in table A5.106.5.1.1. The Mandatory Tiers require designated parking for 10% (Tier 1) and 12% (Tier 2) of total parking as referenced in the table in the code.</p> <p><u>Electric Vehicle Charging Stations:</u> CALGreen Tier 1 &amp; 2 require supporting future electric vehicle charging stations for at least 3% and 5% of total parking spaces, respectively.</p> <p>LEED LTC7 requires 5% designated carpool parking above and beyond the parking reduction requirements for any off street parking.</p> <p>LEED LTC8 has a mandatory "Preferred Parking" element (carpool/vanpool not included). LEED also gives options for EV Charging Stations, and Liquid, gas, or battery facilities (one must be chosen) which CALGreen mandatory measures do not address.</p> <p><u>Key Differences:</u></p> <ol style="list-style-type: none"> <li>The percentage of stalls preferred parking (7% LEED; 8% CALGreen Mandatory; 10% &amp; 12% CALGreen Tiers 1 &amp; 2). (LEED has defined vehicle types)</li> <li>The criteria for low-emitting and fuel efficient vehicles ("clean air/vanpool/ev" is not an accepted terminology in LEED). Carpools/vanpools and clean air vehicles fall under separate credits under LEED.</li> <li>Labeling requirements for preferred parking stalls (LEED requires signs, CALGreen requires painted stalls).</li> <li>LEED requires preferred parking to be located near entrances; CALGreen has no such restrictions.</li> </ol>			
	A5.106.5.1.2	Designated Parking for fuel-efficient vehicles: Tier 2 - 12%				
	5.106.5.2	Designated Parking				
	A5.106.5.3	Electric vehicle charging				
	A5.106.5.3.1	Single charging space requirements				
	A5.106.5.3.2	Multiple charging space requirements				
	A5.106.5.3.3	Tier 1 - 3% of total spaces (1 minimum)				
	A5.106.5.3.4	Tier 2 - 5% of total spaces (2 minimum)				
LEEDv4	LTC7	Reduced Parking Footprint				
	LTC8	Green Vehicles				

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CG-2013	A5.106.6	Parking capacity	<p>CALGreen requires projects to meet but not exceed local zoning requirements and allows for an option of reduced parking capacity via on street parking and programs aimed to reduce single occupant vehicle travel. LEED requires that projects do not exceed the minimum local code requirements for parking capacity and comply with either case 1 or case 2.</p> <p><u>Case 1. Baseline Location</u> Projects that have not earned points under LTc4 Surrounding Density and Diverse Uses or LTc5 Access to Quality Transit must achieve a 20% (1 point) or 40% (2 points ID&amp;C) reduction from the base ratios.</p> <p><u>Case 2. Dense and/or Transit-Served Location</u> Projects earning 1 or more points under either LTc4 Surrounding Density and Diverse Uses or LTc5 Access to Quality Transit must achieve a 40% (1 point) or 60% (2 points) reduction from the base ratios.</p> <p><u>For All Projects:</u> The credit calculations must include all existing and new off-street parking spaces that are leased or owned by the project, including parking that is outside the project boundary but is used by the project. On-street parking in public rights-of-way is excluded from these calculations. For projects that use pooled parking, calculate compliance using the project's share of the pooled parking. There are other requirements for this LEED credit which compare to other CALGreen Measures already referenced.</p>			
LEEDv4	LTc7	Reduced Parking Footprint				
CG-2013	A5.106.7	Exterior wall shading	No overlapping LEED Credit exists for comparison.	N/A		
LEEDv4	N/A	N/A				
CG-2013	5.106.8	Light Pollution Reduction	CALGreen uses IESNA 2011 BUG Ratings measure how much light is going toward uplighting, backlighting and glare on new construction projects only. LEED also allows BUG Ratings for compliance with its uplight and light trespass requirements.			
LEEDv4	SSc6	Light Pollution Reduction				
CG-2013	A5.106.9	Building Orientation	No overlapping LEED Credit exists for comparison.	N/A		
LEEDv4	N/A	N/A				
CG-2013	5.106.10	Grading and Paving	No overlapping LEED Credit exists for comparison.	N/A		
LEEDv4	N/A	N/A				

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CG-2013	A5.106.11	Heat island effect	<p>CALGreen requires heat island reduction for both nonroof (hardscape alternatives for 50% of site or 50% of parking underground) and roof (cool/vegetative roofs with minimum aged SRI and thermal emittance in compliance with Tables A5.106.11.2.1-A5-106.11.2.3).</p> <p>LEED SSc5 offers two Options. Option 1 requires both nonroof and roof strategies where the compliance percentage/sqf area is based off a calculation where area of nonroof measures (+) area of roof measure (+) area of vegetated roof is &gt;- Total Site paving area (+) Total Roof Area. Credit includes a compliance based reference table for aged SRI. Option 2 requires a minimum of 75% of parking to be located under cover with: (1) 3 yr aged SRI of at least 32 or initial installation SRI of 39, (2) vegetative roof or (3) covered by PV, Solar thermal and wind turbines.</p>			
LEEDv4	SSc5	Heat island reduction				
CG-2013	5.201.1	Energy Efficiency	<p>CALGreen Mandatory Measure requires projects to meet the 2013 California Energy Code (Title 24, Part 6, effective January 1, 2014). Tier 1 and Tier 2 have additional requirements for reduced outdoor lighting power and service water heating in restaurants. For building projects that include indoor lighting or mechanical systems, but not both, the calculated energy consumption must be no greater than 95% and 90% (Tier 1 and Tier 2, respectively) than a code compliant Title 24-2013 energy budget. For projects that include indoor lighting and mechanical systems the requirement is for 90% and 85% respectively.</p> <p>LEED requires a 5% energy cost reduction compared to ASHRAE 90.1-2010. Optional LEED credit allows for "whole building energy simulation modeling" to increase reduction percentages (1 point for 6%, up to 18 points for 50%).</p>	18 points are available but 2-5 should be most easily achievable.		
	A5.203.1.1	Performance Approach: Energy Efficiency				
	A5.203.1.1.1	Outdoor lighting				
	A5.203.1.1.2	Service water heating in restaurants				
	A5.203.1.1.3	Functional areas where compliance with				
	A5.203.1.2.1	Tier 1: < 95% or 90% T-24 Energy Budget for				
A5.203.1.2.2	Tier 2: < 90% or 85% T-24 Energy Budget for					
LEEDv4	EAp2	Minimum Energy Performance				
	*EAc1	*Optimize Energy Performance				
CG-2013	A5.211.1	On-site renewable energy	<p>CALGreen requires on-site renewable energy for at least 1% of the electric power or 1kW, in addition to the electrical demand required to meet 1% of the natural gas and propane use. LEED EAc5 requires renewable energy to offset the buildings annual energy cost for 1%, 5% &amp; 10% (1, 2, 3 pts respectively).</p>			
LEEDv4	EAc5	Renewable Energy Production				
CG-2013	A5.211.3	Green Power	<p>CALGreen requires projects to participate in local utility providers renewable energy portfolio program for 50% of the buildings electrical power. LEED EAc7 requires projects to engage in a minimum 5 year contract from qualified resources to provide at least 50% (1 pt) or 100% (2 pts) of the projects energy from green power, carbon offsets, or renewable energy certificates. Percent reduction is based on quantity of energy consumed, not cost.</p>			
LEEDv4	EAc7	Green Power and Carbon Offsets				
CG-2013	A5.211.4	Prewiring for future rooftop solar	No overlapping LEED Credit exists for comparison.	N/A		
LEEDv4	N/A	N/A				
CG-2013	A5.212.1	Elevators and escalators	No overlapping LEED Credit exists for comparison.	N/A		
LEEDv4	N/A	N/A				
CG-2013	A5.213.1	Energy Efficient Steel framing	No overlapping LEED Credit exists for comparison.	N/A		
LEEDv4	N/A	N/A				

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				Mandatory CALGreen Measures	CALGreen Tier 1 Measures	CALGreen Tier 2 Measures
CG-2013	5.303.1	5.303.1.1- Meters	<p>CALGreen requires water submetering on buildings over 50,000 square feet or where consumption is projected to be more than 1,000 gal/day.</p> <p>LEED WEp3 requires permanent water meters that measure the total potable water use for the building and associated grounds. Meter data must be compiled into monthly and annual summaries; meter readings can be manual or automated. Whole project water usage data must be shared with the USGBC for a five year period.</p> <p>LEED WEc4 requires permanent water meters for at least two of the following water subsystems, as applicable to the project: 1. Irrigation. 2. Indoor plumbing fixtures and fittings. 3. Domestic Hot Water. 4. Boiler(s). 5. Reclaimed water. 6. Other process water.</p>			
		5.303.1.2- Excessive Consumption				
LEEDv4	WEp3	Building Level Water Metering				
WEc4	Water Metering					
CG-2013	A5.303.2.3.1	Water Reduction: Tier 1 - 30% savings	<p>CALGreen sets maximum prescriptive flow rates for kitchen faucets, wash fountains, metering faucets and metering faucets for wash fountains. Further, CALGreen and LEED require 20% water use reduction on all applicable water use fixtures compared to basecase water consumption calculations. However, CALGreen builds off the 2013 California Plumbing Code updates which results in some baseline fixture flow rates are now more stringent in CALGreen than in LEED.</p> <p>CALGreen is more stringent than LEED at a fixture level in some cases, but LEED is a performance based calculation and projects could meet or exceed the reduction rates of CALGreen prescriptive rates on the following fixtures:</p> <ul style="list-style-type: none"> <li>- CALGreen water closet flush rate (1.28 gpf) &lt; LEED (1.6 gpf)</li> <li>- CALGreen urinal flush rate (0.5 gpf) &lt; LEED (1.0 gpf)</li> <li>- CALGreen showerhead flow rates (2.0 gpm) &lt; LEED (2.5 gpm).</li> </ul> <p>CALGreen limits the total flow from multiple showerheads in a single shower enclosure.</p> <p>CALGreen allows for water conserving wastewater conveyance systems and/or utilization of nonpotable water systems/sources. LEEDv4 has combined the previously known as "innovative wastewater treatment" credit into WEc2 Indoor Water Use Reduction.</p>			
	A5.303.2.3.2	Water Reduction: Tier 2 - 35% savings				
	A5.303.2.3.3	Water Reduction: 40% savings				
	A5.303.2.3.4	Nonpotable water systems for indoor use				
	A5.303.3	Appliances and fixtures for commercial application				
	A5.303.5	Dual plumbing				
	5.303.2	Water Reduction				
	5.303.3	Water conserving plumbing fixtures and fittings				
	5.303.4	Wastewater Reduction				
5.303.6	Standards for Plumbing Fixtures and Fittings					
LEEDv4	WEp2	Prerequisite: Indoor Water Use Reduction				
	WEc2	Indoor Water Use Reduction 25%-50%				

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				Mandatory CALGreen Measures	CALGreen Tier 1 Measures	CALGreen Tier 2 Measures
CG-2013	5.304.1	Water budget	<p><b>Outdoor Water - Irrigation Reduction</b></p> <p>Water consumption in landscape irrigation must meet local water efficient landscape ordinance or CA Model Water Efficient Landscape Ordinance (WELO or MLO). CALGreen requires at least a 20% reduction in water use, where LEED requires at least 30% reduction. Except where local ordinances may be more stringent, LEED requires deeper water conservation than CALGreen. CALGreen also requires an audit report to be filed from a certified landscape irrigation auditor.</p> <p>LEED's additional credit (WEc1) gives two options: Option 1. No Irrigation Required. Show that the landscape does not require a permanent irrigation system beyond a maximum two-year establishment period. OR Option 2. Reduced Irrigation. Reduce the project's landscape water requirement by at least 50% (WEc1) from the calculated baseline for the site's peak watering month. Reductions must be achieved through plant species selection and irrigation system efficiency, as calculated by the EPA WaterSense Water Budget Tool.</p> <p><b>Irrigation Meters</b></p> <p>Under CALGreen, landscaped areas of at least 1000 square feet but not more than 5000 square feet (the level at which Water Code §535 applies), require separate submeters to be installed for outdoor potable water use.</p> <p>LEED WEc4 requires permanent water meters for two or more water subsystems, of which irrigation is an option. No points are tallied here as they are reflected elsewhere.</p> <p><b>Irrigation Controllers</b></p> <p>New building sites with at least 1000 but not more than 2500 square feet of cumulative landscaped area (the level at which the MLO applies), install irrigation controllers and sensors. Controllers must be weather, or soil moisture-based controlled. Weather based controllers must include a rain sensor in the system.</p> <p>The LEED calculations for irrigation water use do not require controllers, but projects that seek the LEED credit and install a CALGreen compliant controller can meet the CALGreen requirement.</p>			
	5.304.2	Outdoor Potable Water Use				
	5.304.3	Irrigation Design				
	A5.304.2.1	Outdoor potable water use				
	A5.304.4	Potable water reduction				
	A5.304.4.1	Tier 1: < 60% reduction				
	A5.304.4.2	Tier 2: < 55% reduction				
	A5.304.5	Potable water elimination				
	A5.304.8	Graywater irrigation system				
	A5.305.1	Nonpotable water systems				
	A5.305.2	Irrigation systems				
LEEDv4	WEp1	Prerequisite: Outdoor Water Use Reduction				
	WEc1	Outdoor Water Use Reduction				

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CG-2013	A5.304.6	Restoration of areas disturbed by construction	<p>CALGreen requires local adaptive and/or noninvasive vegetation to be planted where construction has disturbed the site. Previously developed or graded sites require at least 50% of the site area (excluding the building footprint) to be restored or protected with adaptive and/or noninvasive vegetation. Projects complying with A5.106.3, Item 3 may apply vegetative roof surface to this calculation if the roof plants meet the definition of adaptive or noninvasive.</p> <p>LEED has two Options, but only Option 1 - On-site restoration (2pts) is applicable for this comparison. Restore 30% of the previously developed site (including the building footprint) using native or adaptive vegetation. Projects with a 1.5 floor-area ratio may include vegetated roof surfaces in this calculation if the plants are native or adapted, provide habitat, and promote biodiversity. There are multiple criteria requirements associated with Soils (imported, in-situ, topsoils, soil blends) in order to be properly restored.</p> <p>CALGreen and LEED are similar, but LEED is more stringent and involves more defined restoration criteria, although CALGreen requires a greater site area to be restored.</p>			
	A5.304.7	Previously developed sites				
LEEDv4	SSc2	Site Development, Protect or Restore Habitat				
CG-2013	A5.404	Efficient Framing Techniques	No overlapping LEED Credit exists for comparison	N/A		
LEEDv4	N/A	N/A				



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CG-2013	A5.405.1	Regional materials	<p>CALGreen offers many options for material sourcing measures. Those options (none of which by themselves are likely to achieve LEED points) are as follows:</p> <ul style="list-style-type: none"> <li>- Regional: Harvested &amp; Manufactured in California or 500 mile radius of project, low embodied energy, 10% of project cost based, based on localized weight for assemblies with non-compliant items</li> <li>- Bio-Based: At least 50% content</li> <li>- Certified Wood: No designation of certification standard established, but related to Bio-Based</li> <li>- Rapidly Renewable: 2.5% of total materials value</li> <li>- Reused: Minimum 5% of total value based on estimated cost</li> <li>- Recycled Content Tier 1 &amp; Tier 2: 10% and 15% RCV of total materials cost calculated based on the simplified or detail calculation methodologies referenced in the code.</li> <li>- Alternative Method for Concrete: RCV is calculated based on the cost of the cementitious materials</li> <li>- Cement: Various specification requirements for different types</li> <li>- Concrete: Must contain one or more SCMs conforming to various standards referenced in the code, which must comply with codes mixture design equation.</li> </ul> <p>Additional means of compliance: Cement and Concrete specifications and manufacturing processes as referenced in the code.</p> <p>LEED - MRc2 has two options (1 pt each): Option 1, EPD's and Option 2, Multi-attribute optimization.</p> <p>LEED - MRc3 has two options (1 pt each): Option 1: Raw material source and extraction reporting and Option 2: Leadership extraction practices.</p> <p>LEED - MRc4 has three options (1 pt each, up to 2 pts): Option 1: Material ingredient reporting, Option 2: Material ingredient optimization, and Option 3: Product manufacturer supply chain optimization</p>			
	A5.405.2	Bio-based materials				
	A5.405.2.1	Certified wood				
	A5.405.2.2	Rapidly renewable material				
	A5.405.3	Reused material				
	A5.405.4	Recycled Content: Tier 1 - 10%				
	A5.405.4	Recycled Content: Tier 2 - 15%				
	A5.405.4.1	Total Material Cost (simplified or detailed)				
A5.405.5	Cement and Concrete					
LEEDv4	MRc2	Building Product Disclosure & Optimization: Environmental Product Declarations				
	MRc3	Building Product Disclosure & Optimization: Sourcing				
	MRc4	Building Product Disclosure & Optimization: Ingredients				
CG-2013	A5.406	Enhanced Durability and Reduced	No overlapping LEED Credit exists for comparison		N/A	
LEEDv4	N/A	N/A				
CG-2013	5.407.1	Weather Protection	No overlapping LEED Credit exists for comparison		N/A	
LEEDv4	N/A	N/A				
CG-2013	5.407.2	Moisture Control	No overlapping LEED Credit exists for comparison		N/A	
LEEDv4	N/A	N/A				

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CG-2013	5.408.1	Construction Waste Management	<p>Both CALGreen and LEED require Construction and Demolition Waste Management Plan to be developed, but CALGreen requires the plan to identify a 50% Diversion goal, where LEED MRp2 requires an estimate. CALGreen requires the use of a waste management company to provide verifiable documentation and LEED does not.</p> <p>LEED MRc5 has two options. Option 1 Diversion - Path 1 minimum requirement, where 50% Diversion and Three Material Streams (1pt) must be achieved. For Path 2, 75% Diversion and Four Material Streams (2pts) must be achieved. CALGreen's diversion rates for Tiers are 65% and 85% for Tier 1 and Tier 2 respectively. Excavated soil, land clearing debris and alternative daily cover (ADC) must be excluded from diversion calculations for both CALGreen and LEED.</p> <p>Please note that in many cases, local recycling requirements are more stringent than both CALGreen and LEED.</p> <p>Both CALGreen 5.408.1.3 and LEED MRc5 Option 2 provide an alternative waste reduction strategy that allows the project to comply by not generating more than 2 lbs or 2.5 lbs of construction waste per square foot of building's floor area respectively.</p>			
	A5.408.3.1	Enhanced construction waste reduction: Tier 1 - 65%				
	A5.408.3.1.1	Enhanced construction waste reduction: Tier 2 - 80%				
LEEDv4	MRp2	Construction and Demolition Waste Management Planning				
	MRc5	Construction and Demolition Waste Management				
CG-2013	A5.409.1	Life Cycle Assessment	<p>For A5.409.1, CALGreen requires Life Cycle Assessments (LCA) to be ISO 14044 compliant and the building and materials to have a minimum 60 year service life. Whole Building LCA option (including operating energy and referenced building components) must prove a 10% improvement or LCA based for 50% of Materials and systems assemblies for at least three of the referenced impact categories (one must be Climate Change and compared to a similar conventional building).</p> <p>LEED MRc1 Option 4: Whole- Building life-cycle assessment (3 points) Requires LCA to be ISO 14044 compliant, a minimum 60 year service life, a 10% reduction compared to the baseline building and at least three of the referenced impact categories for reduction.</p>			
	A5.409.2	Whole building life cycle assessment				
	A5.409.3	Materials and systems assembly				
	A5.409.4	Substitution for prescriptive standards				
	A5.409.5	Verification of compliance				
LEEDv4	MRc1	Building Life Cycle Impact Reduction				
CG-2013	5.410.1	Recycling by occupants	<p>CALGreen and LEED have identical recycling requirements, but LEED also requires that projects take appropriate measures for the safe collection, storage, and disposal of two of the following: batteries, mercury-containing lamps, and electronic waste.</p>			
LEEDv4	MRp1	Storage and Collection of Recyclables				

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				Mandatory CALGreen Measures	CALGreen Tier 1 Measures	CALGreen Tier 2 Measures
CG-2013	5.410.2	Commissioning (Cx)	<p>Both CALGreen and LEED require commissioning of all energy-related systems. CALGreen requires that irrigation systems be commissioned. LEED requires that the OPR, BOD and peer review address the exterior envelope.</p> <p>Further, CALGreen requires:</p> <ol style="list-style-type: none"> <li>1) a systems manual, and</li> <li>2) training on systems being commissioned.</li> </ol> <p>So long as these two requirements and irrigation systems are included in the LEED project commissioning scope of work, CALGreen requirements have been met.</p> <p>Additionally, LEED specifies that the Commissioning Agent (CxA) be well qualified, and, for projects &gt;20,000 s.f., the CxA must be independent of the design team. CALGreen has more relaxed requirements for qualified commissioning agents and only requires independence on projects &gt;50,000 s.f.</p>			
	5.410.2.1	Owner's Project Requirements (OPR)				
	5.410.2.2	Basis of Design (BOD)				
	5.410.2.3	Cx Plan				
	5.410.2.4	Functional Performance Testing				
	5.410.2.5	Documentation and Training				
5.410.2.6	Cx Report					
LEEDv4	EAp1	Fundamental Commissioning				
	EAc1	Enhanced Commissioning				
CG-2013	5.410.4	Testing and Adjusting	<p>LEED requires commissioning (not just Testing and Adjusting) of all energy-related systems in all projects regardless of size, therefore is more stringent than CALGreen's testing and adjusting measure requirements.</p> <p>However, CALGreen requires testing and adjusting irrigation systems which are unaddressed under LEED.</p>			
LEEDv4	EAp1	Fundamental Commissioning				
CG-2013	5.503.1	Fireplaces	No overlapping LEED Credit exists for comparison	N/A		
LEEDv4	N/A	N/A				
CG-2013	A5.504.1	Indoor air quality (IAQ) during construction	<p>CALGreen voluntary measures give credit for temporary ventilation during construction of at least three air changes per hour.</p> <p>Both LEED and CALGreen require MERV 8 filters on all return air grille for temporary ventilation and duct opening coverage/mechanical equipment protection during construction. LEED's requirements include limiting tobacco use during construction.</p>			
	5.504.3	Covering of duct openings & protection of mechanical equipment during construction				
LEEDv4	EQc3	Construction Indoor Air Quality Management Plan - During Construction	Both CALGreen and LEED reference Control Measures for SMACNA IAQ Guidelines for Occupied Buildings under Construction, 1995, Chapter 3.			

## CALGreen 2013 Tier Comparison to LEED v4

Code/ Rating System	Reference Number	Measure / Credit Name	Comparison Results	Difficulty of achieving LEED points under:		
				Mandatory CALGreen Measures	CALGreen Tier 1 Measures	CALGreen Tier 2 Measures
CG-2013	A5.504.2	IAQ post-construction	<p>CALGreen requires continual building flushout (after all interior finishes are installed) from all Air Handling Units at maximum outdoor air rate and all supply fans at their maximum positions for at least 14 days.</p> <p>IAQ Testing is an alternative option, but protocols must follow US EPA standards and allowable concentrations, HVAC operational duration, sampling locations and corrective action steps for noncomplying building areas must meet references in A5.504.2.1.</p> <p>LEED EQc4 Option 1 has two paths, one for Flushout Before Occupancy and one for Flushout During Occupancy. Install new filtration media and conduct flushout by providing 14,000 cubic feet of outdoor air per square foot of gross floor area. Temperatures no lower than 60, no higher than 80 degrees F and relative humidity no higher than 60%.</p> <p>LEED EQc4 Option 2 - Air Testing (2pts) = protocols allow for a variety of standards (US EPA compendium methods, ASTM method and ISO method) and allowable concentrations, HVAC operational duration, sampling locations and corrective action steps for noncomplying building areas must meet references in LEED Table and protocol procedures.</p>			
LEEDv4	EQc4	IAQ Assessment				
CG-2013	5.504.4.1	Adhesives, sealants and caulks	The requirements of CALGreen and LEED are nearly identical for all products covered by this measure.			
LEEDv4	EQc2	Low-Emitting Materials				
CG-2013	5.504.4.3	Paints and Coatings	The reference standards in CALGreen and LEED are the same			
LEEDv4	EQc2	Low-Emitting Materials				
CG-2013	5.504.4.4	Carpet Systems	While CALGreen allows for multiple compliant certifications, the acceptable certification for LEED is one of the CALGreen criteria and are therefore compliant.			
LEEDv4	EQc2	Low-Emitting Materials				
CG-2013	5.504.4.5	Composite wood products	The reference standards in CALGreen and LEED are the same. No points are tallied herein, as there is a maximum of 3 points in this category all of which are counted elsewhere.			
LEEDv4	EQc2	Low-Emitting Materials				
CG-2013	A5.504.4.7	Resilient flooring systems: Tier 1 - 90%	LEED requires 100% of resilient flooring to comply compared with only 80% for CALGreen's mandatory measure and 90% and 100% for Tier 1 and Tier 2 respectively. CALGreen allows multiple VOC emission standards to comply, where LEED requirements follow only the California Department of Public Health Standard Method v1.1–2010.			
	A5.504.4.7.1	Resilient flooring systems: Tier 2 - 100%				
	A5.504.4.7.2	Verification of compliance				
	5.504.4.6	Resilient flooring systems				
LEEDv4	EQc2	Low-Emitting Materials				

## CALGreen 2013 Tier Comparison to LEED v4

Code/ Rating System	Reference Number	Measure / Credit Name	Comparison Results	Difficulty of achieving LEED points under:		
				Mandatory CALGreen Measures	CALGreen Tier 1 Measures	CALGreen Tier 2 Measures
CG-2013	A5.504.4.8	Thermal insulation: Tier 1	<p>CALGreen Tier 1 requires thermal insulation to comply with three separate emissions standards:</p> <ul style="list-style-type: none"> <li>- Chapters 12-13 of Title 24 Part 12,</li> <li>- the VOC emission limits defined in 2009 CHPS High Performance Products Database criteria, and</li> <li>- California Department of Public Health 2010 Standard Method for Testing and Evaluation of Volatile Organic Chemical Emissions from Indoor Sources Using Environmental Chambers, Versions 1.1 February 2010.</li> </ul> <p>CALGreen Tier 2 requires Tier 1 compliance plus no-added formaldehyde, which LEED EQc2 does not specifically prohibit for insulation.</p> <p>LEED EQc2 requirements follow only the same California Department of Public Health Standard as listed above.</p> <p>No LEED points are tallied herein, as there is a maximum of 3 points in this category.</p>			
	A5.504.4.8.1	Thermal insulation: Tier 2 - formaldehyde free				
LEEDv4	EQc2	Low-Emitting Materials				
CG-2013	A5.504.4.9	Acoustical ceiling and wall panels (VOC)	No overlapping LEED Credit exists for comparison	N/A		
LEEDv4	N/A	N/A				
CG-2013	A5.504.5	Hazardous particulates and chemical pollutants	<p>CALGreen's mandatory measure requires MERV 8 or an ASHRAE 10% to 15 % efficiency filter compliant HVAC units as referenced in the code. CALGreen Tier 1 and Tier 2 require MERV 11 and MERV 13 respectively. CALGreen voluntary measures give credit for six foot permanent entryway systems and isolation of pollutant sources.</p> <p>LEED's MERV 13 requirement exceeds CALGreen's MERV 8 and MERV 11 requirements and the isolation of pollutant sources is more stringent and comprehensive than CALGreen. LEED projects that achieve EQc1 comply with the CALGreen requirement for filter efficiency.</p>			
	A5.504.5.1	Entryway systems				
	A5.504.5.2	Isolation of pollutant sources				
	5.504.5.3	Filters				
	A5.504.5.3.1	Filters - Tier 1 (MERV 11)				
A5.504.5.3.2	Filters - Tier 2 (MERV 13)					
LEEDv4	EQc1	Enhanced IAQ Strategies				
CG-2013	5.504.7	Environmental Tobacco Smoke (ETS) Control	CALGreen and LEED have nearly identical requirements.			
LEEDv4	EQp2					
CG-2013	5.505.1	Indoor moisture control	No overlapping LEED Credit exists for comparison	N/A		
LEEDv4	N/A	N/A				
CG-2013	5.506.1	Outside air delivery	<p>While the reference standard within LEED (ASHRAE) and CALGreen (Title 24 Energy Code) differ, they are largely similar and have the same intent. For most projects the LEED requirements are slightly more restrictive because the ASHRAE 62.1-2010 Ventilation Rate Procedure takes into account air distribution effectiveness and ventilation efficiency. Both calculations are performed on a space-by-space basis and not universally consistent; however many of space types the ASHRAE (LEED) ventilation requirements are more stringent than CALGreen.</p>			
LEEDv4	EQp1	Minimum Indoor Air Quality Performance				
CG-2013	5.506.2	Carbon dioxide (CO2) monitoring	CALGreen and LEED have nearly identical requirements.			
LEEDv4	EQc1	Enhanced IAQ Strategies				

## CALGreen 2013 Tier Comparison to LEED v4

Code/ Rating System	Reference Number	Measure / Credit Name	Comparison Results	Difficulty of achieving LEED points under:		
				Mandatory CALGreen Measures	CALGreen Tier 1 Measures	CALGreen Tier 2 Measures
CG-2013	A5.507.1	Lighting and thermal comfort controls	<p>In single occupant spaces, CALGreen voluntary measures include:</p> <ul style="list-style-type: none"> <li>- lighting controls in compliance with California Energy Code,</li> <li>- individual task (day)lighting controls for 90% of building occupants and</li> <li>- thermal controls for 50% of building occupants.</li> </ul> <p>For multi-occupant spaces, lighting and thermal comfort controls must be provided for all shared spaces.</p> <p>LEED EQc5 Thermal Comfort (1 pt) - Requires both thermal comfort design and controls and has two options for the design requirement, Option 1 - ASHRAE Standard 55-2010 and Option 2 - ISO and CEN Standards. LEED requires 50% of single occupant spaces to have controls and all shared spaces to have controls.</p> <p>LEED EQc6 Interior Lighting (up to 2 pts) - Option 1 - Lighting Controls (1 pt) requires at least 90% of individual occupant spaces to have 3 level control options (on, off, midlevel) with midlevel at 30%-70% of maximum illumination levels with other referenced requirements. Option 2 - Lighting Quality (1 pt) requires projects to meet four of the referenced quality based strategies, none of which are addressed in CALGreen.</p>			
	A5.507.1.1	Single occupant spaces				
	A5.507.1.1.1	Lighting				
	A5.507.1.1.2	Thermal Comfort				
	A5.507.1.2	Multi-occupant spaces				
LEEDv4	EQc5	Thermal Comfort				
	EQc6	Interior Lighting				
CG-2013	A5.507.2	Daylight	<p>CALGreen requires daylit spaces for toplighting and sidelighting as referenced in the California Energy Code and encourages the consideration of the following:</p> <ol style="list-style-type: none"> <li>1. Light shelves and reflective room surfaces to maximize daylight penetration</li> <li>2. Elimination of glare and direct sun light, including through skylights</li> <li>3. Use of photosensors to turn off electric lighting when daylight is sufficient</li> <li>4. Not using diffuse daylighting glazing where views are desired</li> </ol> <p>LEED EQc7 has three options:</p> <ul style="list-style-type: none"> <li>Option 1. Simulation: Spatial Daylight Autonomy (2-3 pts)</li> <li>Option 2. Simulation: Illuminance Calculations (1-2 pts)</li> <li>Option 3. Measurement (2-3 pts)</li> </ul> <p>Options 1 &amp; 2 require computer simulation modeling for either (Option 1) spatial daylight autonomy (55%, 75%, or 90%) or (Option 2) illuminance Calculations. Option 3 requires field measurements.</p>			
LEEDv4	EQc7	Daylight				
CG-2013	A5.507.3	Views	<p>CALGreen and LEED are very similar, but CALGreen requires 90% of regularly occupied space (ROS) to have direct line of sight to outdoor spaces compared to LEED's 75% of ROS. LEED also has additional multi-layered requirements that need to be met addition to just meeting the percentage threshold.</p>			
	A5.507.3.1	Interior office spaces				
	A5.507.3.2	Multi-occupant spaces				
LEEDv4	EQc8	Quality Views				

### CALGreen 2013 Tier Comparison to LEED v4

Code/ Rating System	Reference Number	Measure / Credit Name	Comparison Results	Difficulty of achieving LEED points under:		
				Mandatory CALGreen Measures	CALGreen Tier 1 Measures	CALGreen Tier 2 Measures
CG-2013	5.507.4	Acoustical Control	<p>CALGreen focuses on the exterior noise control, site based mitigation and interior sound transmission primarily from the perspective of building materials.</p> <p>LEED addresses HVAC background noise, reverberation and interior sound transmission. The interior sound transmission thresholds in LEED are more stringent than those required by CALGreen.</p>			
LEEDv4	EQc9	Acoustic Performance				
CG-2013	5.508.1	Ozone depletion and greenhouse gas reductions	<p>The CALGreen mandatory measure (5.508.1) and LEED prerequisite and credit are very similar, although CALGreen does not allow new Halon based refrigerants. CALGreen voluntary measures give credit for not having HCFCs but allows global warming potential of 150 for HFCs.</p> <p>The LEED calculation methodology under EAc4 Enhanced Refrigerant Management weighs the refrigerants' global warming potential with the total ozone depletion potential and therefore is much more intensive and bans HFCs and HCFCs. LEED also allows for a phase-out plan for major renovation projects where CFC equipment is not being replaced as a part of the project scope.</p>			
	A5.508.1.3	Hydrochlorofluorocarbons (HCFCs)				
	A5.508.1.4	Hydrofluorocarbons (HFCs)				
LEEDv4	EAp3	Fundamental Refrigerant Management				
	EAc4	Enhanced Refrigerant Management				
CG-2013	5.508.2	Supermarket refrigerant leak reduction	No overlapping LEED Credit exists for comparison	N/A		
LEEDv4	N/A	N/A				