LEED NC 2009 and Light Controls

This document summarizes the 2009 LEED Green Building Design and Construction requirements that light controls help achieve. It focuses on LEED 2009 rating system for the design, construction, or major renovation of commercial buildings (LEED NC 2009). It is for information purposes only. It is not meant to replace the LEED 2009 Reference Guide. Please refer to the reference guide for precise interpretation. The reference guide is available on the USGBC website at: http://usgbc.org/.

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I. What is LEED?

LEED—Leadership in Energy and Environmental Design—is a green building rating system started in 1998 and administered by the United States Green Building Council (USGBC). It provides an objective, national standard for what constitutes a “green” building. It offers a set of scientifically-based performance criteria for LEED building certification.

The LEED Green Building Rating Systems address seven topics:

1) Sustainable Sites (SS)—for responsible and environmentally-friendly site selection and design strategies.
2) Water Efficiency (WE)—for responsible water use and conservation.
3) Energy and Atmosphere (EA)—to optimize whole-building energy efficiency.
4) Materials and Resources (MR)—to promote responsible waste management and materials selection.
5) Indoor Environmental Quality (IEQ)—to minimize contaminants and optimize the indoor environment including the use of lighting controls and daylighting.
6) Innovation in Design (ID)—for exemplary performance above LEED requirements or for new green building innovations.
7) Regional Priority (RP)—to incentivize the achievement of LEED credits that are important to the local geography.

LEED version 3.0 is the newest version of LEED, which was launched on April 27, 2009.

LEED v3.0 is comprised of the following:

• New LEED 2009 rating system (point-based green building rating system) +
• New LEEP AP exams (exams for people to become LEED Accredited Professionals) +
• New LEED online (primary resource for managing the LEED documentation process)

As of June 27, 2009 all LEED projects will have to register under the new LEED 2009 rating system.

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II. 3 key changes in LEED 2009

1) Credit weighting:
   • More emphasis on Energy and Atmosphere.
   This means that Lutron® light controls are more significant toward achieving LEED certification as all Lutron solutions save energy.

2) Updated credits:
   • Additional Innovation in Design point
   • ASHRAE 90.1 2007 is now the baseline (or Title 24 2005 for CA projects) for the Energy and Atmosphere section
   • 10% (5% for renovations) minimum energy performance improvement over the ASHRAE 90.1 2007 baseline

3) Regional Priority Credits (RPCs):
   • Based on U.S. zip code, bonus points for LEED credits that are deemed to be a priority for a particular region. RPCs are not new LEED credits, but instead are existing credits that USGBC chapters and regional councils have designated as being particularly important for their areas. The incentive to achieve the credits is in the form of a bonus point. More info: http://www.usgbc.org/News/USGBCInTheNewsDetails.aspx?ID=4099

III. LEED NC 2009 vs. LEED NC 2.2

LEED NC 2009 has more weight on energy and atmosphere.
And the point scale has also been simplified—100 base points and 10 bonus points.

<table>
<thead>
<tr>
<th>Description</th>
<th>LEED NC 2.2</th>
<th>LEED NC 2009</th>
<th>Difference in %</th>
</tr>
</thead>
<tbody>
<tr>
<td>Sustainable Sites (SS)</td>
<td>14</td>
<td>26</td>
<td>3.35</td>
</tr>
<tr>
<td>Water Efficiency (WE)</td>
<td>7</td>
<td>10</td>
<td>1.84</td>
</tr>
<tr>
<td>Energy and Atmosphere (EA)</td>
<td>17</td>
<td>35</td>
<td>7.18</td>
</tr>
<tr>
<td>Material &amp; Resources (MR)</td>
<td>13</td>
<td>14</td>
<td>-6.11</td>
</tr>
<tr>
<td>Indoor Environmental Quality (IEQ)</td>
<td>15</td>
<td>15</td>
<td>-8.10</td>
</tr>
<tr>
<td>Bonus Points</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Innovative Design (ID)</td>
<td>5</td>
<td>6</td>
<td>-1.79</td>
</tr>
<tr>
<td>Regional Priority (RP)</td>
<td>0</td>
<td>4</td>
<td>3.64</td>
</tr>
<tr>
<td>Totals</td>
<td>69</td>
<td>110</td>
<td>3.64</td>
</tr>
</tbody>
</table>

Certification Point Requirements

<table>
<thead>
<tr>
<th>Level</th>
<th>LEED NC 2.2</th>
<th>LEED NC 2009</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Lower Limit</td>
<td>Upper Limit</td>
</tr>
<tr>
<td>Certification</td>
<td>26</td>
<td>32</td>
</tr>
<tr>
<td>Silver</td>
<td>33</td>
<td>38</td>
</tr>
<tr>
<td>Gold</td>
<td>39</td>
<td>51</td>
</tr>
<tr>
<td>Platinum</td>
<td>52</td>
<td>69</td>
</tr>
</tbody>
</table>
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IV. How do Lutron® solutions contribute to LEED NC 2009 certification?

Lutron solutions can contribute to 40 out of 110 possible points (36%) in the new LEED 2009 NC rating system. The following is a summary of the credits that Lutron solutions help achieve.

<table>
<thead>
<tr>
<th>LEED NC 2009</th>
<th>Summary of the Credits and Prerequisites that Lutron Solutions Help Achieve¹</th>
</tr>
</thead>
<tbody>
<tr>
<td>Credit</td>
<td>Description</td>
</tr>
<tr>
<td>SS Sustainable Sites</td>
<td>1 out of 26</td>
</tr>
<tr>
<td>Credit 8</td>
<td>Light Pollution Reduction</td>
</tr>
<tr>
<td>EA Energy and Atmosphere</td>
<td>24 out of 35</td>
</tr>
<tr>
<td>Prereq. 1</td>
<td>Fundamental Commissioning</td>
</tr>
<tr>
<td>Prereq. 2</td>
<td>Min. Energy Performance</td>
</tr>
<tr>
<td>Credit 1</td>
<td>Optimize Energy Performance²</td>
</tr>
<tr>
<td>Credit 3</td>
<td>Enhanced Commissioning</td>
</tr>
<tr>
<td>Credit 5</td>
<td>Measurement &amp; Verification</td>
</tr>
<tr>
<td>MR Material &amp; Resources</td>
<td>2 out of 14</td>
</tr>
<tr>
<td>Credit 4</td>
<td>Recycled Content</td>
</tr>
<tr>
<td>IEQ Indoor Environmental Quality</td>
<td>3 out of 15</td>
</tr>
<tr>
<td>Credit 6.1</td>
<td>Controllability of Systems - Lighting</td>
</tr>
<tr>
<td>Credit 8.1</td>
<td>Daylight</td>
</tr>
<tr>
<td>Credit 8.2</td>
<td>Views</td>
</tr>
<tr>
<td>ID Innovative Design</td>
<td>6 out of 6</td>
</tr>
<tr>
<td>Credit 1</td>
<td>Innovative Design</td>
</tr>
<tr>
<td>Credit 2</td>
<td>LEED AP</td>
</tr>
<tr>
<td>RP Regional Priority</td>
<td>4 out of 4</td>
</tr>
<tr>
<td></td>
<td>Various</td>
</tr>
<tr>
<td>Total Possible Points</td>
<td>40 out of 110</td>
</tr>
</tbody>
</table>

¹ Note that use of any products will not guarantee any LEED points. Products may have to be combined with other solutions to meet the full requirements for each credit.

² Please refer to page 9 for more details.

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IV. How do Lutron® solutions contribute to LEED NC 2009 certification? (con’t.)

1) Sustainable Sites (Lutron solutions help achieve 1 point)

Credit 8 Light Pollution Reduction (1 pt)

Intent:
• Minimize light trespass from the building.

Key Requirements:
• Interior lighting—No light shining out windows or all non-emergency interior lighting power reduced by at least 50% during non-business hours (11 pm to 5 am).
• Exterior lighting—Must comply with ASHRAE 90.1 2007 Lighting Power Densities (watts per square foot) and lighting zone requirements in IESNA RP 33.

Lutron Solution:
• Controllable window shades with the right fabrics prevent light from escaping on the windows of the building.
• Occupancy sensors turn lights off when spaces are vacant to not only save energy but also prevent light pollution from escaping the building.
• Timeclock scheduling can be used to provide a building lighting sweep at night so that lights are off or set to a low dimmed level at certain times, saving energy and preventing light pollution.

Lutron is not liable for reliance on this document towards interpreting or complying with LEED 2009 requirements.
IV. How do Lutron® solutions contribute to LEED NC 2009 certification? (con’t.)

2) Energy and Atmosphere (Lutron solutions help achieve 24 points)

**Prerequisite 1 Fundamental Commissioning**

**Intent:**
Verify that the building’s energy systems are installed, calibrated, and perform according to owner’s requirements, basis of design, and construction docs.

**Key Requirements:**
Develop a commissioning plan; verify the installation and performance of systems to be commissioned.

**Lutron Solution:**
Lutron field service team will help the Commissioning Authority (CxA) verify the installation and performance of the Lutron systems.

**Prerequisite 2 Minimum Energy Performance**

**Intent:**
Establish a minimum level of energy efficiency for the building.

**Key Requirements:**
- Demonstrate a 10% minimum energy reduction compared to an ASHRAE 90.1 2007 (or CA Title 24 2008) compliant building.
- Comply with mandatory lighting control requirements in Section 9.4 of ASHRAE 90.1 2007.

**Lutron Solution:**
- Occupancy sensors and timeclock scheduling can be used to meet the mandatory lighting control requirements in Section 9.4 of ASHRAE 90.1 2007.
- Using a combination of Quantum® or EcoSytem® energy saving light control strategies such as automated shading, daylight harvesting, high-end trim, light level tuning, dimming, scheduling, and occupancy sensing can reduce lighting loads by 60% or more. And these strategies can also reduce HVAC loads by 20% or more.

**Credit 1 Optimize Energy Performance (1-19 pts)**

**Intent:**
Achieve energy performance beyond the prerequisite standard.

**Key Requirements:**
Whole building energy simulation to show energy performance better than ASHRAE 90.1 2007 (or Title 24 2005 for CA projects) by at least 12% (8% for renovation).

**Lutron Solution:**
- Occupancy sensors and timeclock scheduling can be used to meet the mandatory lighting control requirements of ASHRAE 90.1 2007 chapter 9.
- Using a combination of Quantum® or EcoSystem® energy-saving light control strategies such as daylight harvesting, high-end trim, light level tuning, dimming, scheduling, automatic shading, and occupancy sensing reduces both lighting and HVAC loads.

One LEED point for every 2% reduction in energy cost
IV. How do Lutron® solutions contribute to LEED NC 2009 certification? (con’t.)

2) Energy and Atmosphere (con’t.)

Credit 3 Enhanced Commissioning (2 pts)

Intent:
• Begin commissioning early in the design process and execute additional activities after systems performance verification has been completed.

Key Requirements:
• Develop a systems manual.
• Verify that the requirements for training operating personnel are in place.
• Review building performance within 10 months of substantial completion.

Lutron Solution:
• Lutron field service can train and provide necessary manuals to operating personnel.

Credit 5 Measurement and Verification* (3 pts)

Intent:
• Provide ongoing accountability of building energy consumption over time.

Key Requirements:
• Develop and implement a measurement and verification (M&V) plan to monitor building electricity consumption.
• M&V must cover at least 1-year of post-construction occupancy.
• Provide a process for corrective action if the M&V results don’t show energy savings.

Lutron Solution:
• Quantum lighting power monitoring provides continuous lighting energy consumption and savings data for the M&V plan.
• Quantum light control strategies, such as light level tuning, can be easily implemented to provide necessary corrective action to achieve the desired energy savings.

* Note that electrical components cannot be included in the calculation for this credit. Thus, the cost of the electronic drive must be excluded from the required calculations. Also, since shades are considered furniture as they are part of CSI Division 12, the cost of all Division 12 materials must be included in calculations for MR credits 3 through 7.
IV. How do Lutron® solutions contribute to LEED NC 2009 certification? (con’t.)

4) Indoor Environmental Quality (Lutron solutions help achieve 3 points)

Credit 6.1 Controllability of Systems—Lighting (1 pt)

Intent:
• Provide a high-level of lighting system control for individual occupants or groups in multi-occupant spaces (i.e. classrooms, conference rooms) and promote their productivity, comfort, and well-being.

Key Requirements:
• Provide individual lighting controls for at least 90% of the occupants to suit individual task needs and preferences; and provide lighting controllability for all shared multi-occupant spaces to allow for adjustments to meet group needs and preferences.

Lutron Solution:
• All Lutron lighting controls help achieve this credit.

Credits 8.1 Daylight and 8.2 Views (1–2 pts)

Intent:
• Provide occupants a connection to outdoors through daylight and views into regularly occupied spaces.

Key Requirements:
• At least 75% of regularly occupied spaces must be daylight illuminated with a minimum of 25 footcandles.
• Achieve a direct line of sight to the outdoor environment via vision glazing btw 30” and 90” above floor for occupants in 90% of all regularly occupied areas.
• Provide glare control.

Lutron Solution:
• Lutron automated windows shades help control glare while still providing daylight and access to views.

IV. How do Lutron® solutions contribute to LEED NC 2009 certification? (con’t.)

5) Innovation in Design (Lutron solutions help achieve 6 points)

Credit 1 Innovation in Design (1–5 pts)

Intent:
• Additional points for exceptional performance above LEED requirements and/or innovative performance in green building categories not addressed by LEED.

Key Requirements:
• Exemplary performance—Achieving double the credit requirements and/or achieving the next incremental threshold for the LEED requirement.
• Innovation in Design—Provide details on an innovative green building solution not addressed by LEED.

Lutron Solution:
• Using the Quantum® Green Glance® energy savings display in conjunction with a distributed case study or building tours helps achieve innovation point for Green Education.
• Using Quantum Hyperion solar-adaptive shading which automatically adjusts shades based on the position of the sun, may achieve an innovation point for the Daylight and Views.

Credit 2 LEED AP (1 pt)

Intent:
• Support and encourage design integration required by a LEED and streamline the application certification process.

Key Requirements:
• At least one principal participant on the project must be a LEED-AP.

Lutron Solution:
• Lutron has several LEED APs on staff that can assist the project team with the LEED rating system (see table on the next page).
VI. Sample of Lutron® LEED projects

**Project** | **Building Type** | **Rating System** | **Certification Level** | **Location** | **Other Details**
--- | --- | --- | --- | --- | ---
Access Living | Office | NC 2.1 | Gold | Chicago, IL | Case study (P/N 367-1667)
AIA HQ | Office | CI 2.0 | Gold | San Francisco, CA | www.lutron.com/casesudies
Allsteel Showroom | Retail | CI 2.0 | Silver | San Francisco, CA | www.lutron.com/casesudies
Bank of America | Office | CI 2.0 | Silver | New York, NY | Users EcoSystem
Bently Reserve | Office | CS 2.0 | Silver | San Francisco, CA | www.lutron.com/casesudies
eBay | Office | NC 2.1 | Gold | San Jose, CA | Quantum with QED shades
Exelon HQ | Office | CI 2.0 | Platinum | Chicago, IL | Users EcoSystem
Gensyme Center | Office | NC 2.0 | Platinum | Cambridge, MA | Users EcoSystem
Hotel Arista | Hotel | NC 2.2 | Certified | Naperville, IL | Video case study www.lutron.com/stanza/arista
HSBC | Office | NC 2.1 | Gold | Chicago, IL | Users Quantum
ITC Gardenia Hotel India | Hotel | NC Platinum | Bangalore, India | LCP 128
Montage Hotel Beverly Hills | Hotel | NC 2.2 | Gold | Beverly Hills, CA | Uses a Lutron GRAFIK 5000 system
Orchard Garden Hotel | Hotel | NC 2.1 | Certified | San Francisco, CA | Uses Lutron GRAFIks 4000
Salmon Creek Eco-Resource Building | Education | NC 2.2 | Platinum | Occidental, CA | EcoSystem, GRAFIK QS, QS shades and LCP
Sidwell Friends School | Education | NC 2.1 | Platinum | Washington DC | See case study (P/N 367-1136)
Starwood Element Hotel | Hotel | NC 2.2 | Gold | Lexington, MA | Users Lutron GRAFIK 4000
The Energy Foundation | Office | CI 2.0 | Platinum | San Francisco, CA | Video and hardcopy case studies coming soon; uses Quantum system with some QED shades
The Plaza Center at PPL | Office | NC 2.0 | Gold | Allentown, PA | See Lutron LEED CEU presentation for more details
Yale Sculpture Building | Education | NC 2.1 | Platinum | New Haven, CT | Lutron occupancy and daylight sensors along with Lutron dimmer ballasts

Additional information:

Yale Sculpture Building is a 51,000 sqft LEED Platinum building completed in 2007 which houses student studios, a gallery, and faculty offices. Occupancy sensors are implemented throughout to switch lights off in unoccupied areas. Lutron Daylight Sensors and Dimming Ballasts work together to maximize natural light while maintaining a constant light level in all publicly occupied spaces.

The Gensyme Center completed in 2003, is a 344,000 square foot LEED Platinum office building located in Cambridge Massachusetts. Among the state of the art strategies for sustainable design, are Lutron Daylight and Occupancy Sensors along with individually dimmable ballasts which together, are expected to reduce lighting energy use by 45%.
For more information see:
- LEED Buildings Light Control Solutions brochure (P/N 367-679)
- AIA CEU—Lighting Controls for Sustainable Design and LEED Certification
- www.lutron.com/leed

Questions?
Email: LEED@lutron.com
OR
Contact: Michael Jouaneh, LEED AP
Lutron Electronics Co., Inc
610.282.5350 office
mjouaneh@lutron.com

save energy with Lutron™

Telephone: 610.282.3800
International: +1 610.282.3800

World Headquarters
Lutron Electronics Co., Inc.
7200 Suter Road
Coopersburg, PA 18036-1299
USA