Next-Generation Codes: A look backward and the road ahead

Great Plains Energy Codes Conference
October 18, 2012
Omaha, NE

Jeremy Sigmon
Director, Technical Policy
U.S. Green Building Council
jsigmon@usgbc.org
202.742.3811
Will “Base Codes” Embrace an Enhanced Scope?

101.3 The purpose of this code is to establish the minimum requirements to safeguard the public health, safety and general welfare through structural strength, means of egress facilities, stability, sanitation, adequate light and ventilation, energy conservation, and safety to life and property from fire and other hazards attributed to the built environment and to provide safety to fire fighters and emergency responders during emergency operations.

Source: 2006 International Building Code
U.S. Building Impacts:

- 12% water use
- 39% CO$_2$ emissions
- 65% waste output
- 71% electricity consumption
HISTORY OF LEED LAUNCHES

NCv1.0  NCv2.0  NCv2.1  NCv2.2  EBv1.0  EBv2.0  HPO  Clv2.0  Clv2.0  CSV1.0  CSV2.0  Retail CI Pilot  Retail CI  Retail NC Pilot  Retail NC  LEED for Schools  Healthcare  Homes  ND Pilot  ND  LOv1  LOv2.0  LOv2.1  LOv2.2  VOLUME - Institutions  VOLUME - Corporate  VOLUME - Retail  LEED-Online/ Certification Version 3
The World
Green buildings around the world

<table>
<thead>
<tr>
<th>LEED Projects</th>
<th>Size of LEED</th>
<th>All Projects</th>
</tr>
</thead>
<tbody>
<tr>
<td>13,260</td>
<td>2 Billion</td>
<td>75,560</td>
</tr>
</tbody>
</table>

...and 23,000+ certified homes
How engaged is your market?

Choose a city, congressional district, state, country, or even the world, and analyze its green building activity by the number of LEED projects, LEED-Certified square footage, USGBC members, and credentialed green building professionals.

Try it:
- Shanghai, China
- Texas
- Chicago, Illinois
TOP 10 STATES SQUARE FOOTAGE CERTIFIED PER CAPITA IN 2011

(As of 1/1/2012)
## Top 10 Cities for LEED Project Activity

<table>
<thead>
<tr>
<th>City, State</th>
<th>Registered</th>
<th>Certified</th>
<th>Grand Total</th>
</tr>
</thead>
<tbody>
<tr>
<td>New York, NY</td>
<td>639</td>
<td>242</td>
<td>881</td>
</tr>
<tr>
<td>Washington, DC</td>
<td>649</td>
<td>231</td>
<td>880</td>
</tr>
<tr>
<td>Chicago, IL</td>
<td>472</td>
<td>295</td>
<td>767</td>
</tr>
<tr>
<td>Houston, TX</td>
<td>381</td>
<td>190</td>
<td>571</td>
</tr>
<tr>
<td>San Francisco, CA</td>
<td>335</td>
<td>202</td>
<td>537</td>
</tr>
<tr>
<td>Los Angeles, CA</td>
<td>302</td>
<td>139</td>
<td>441</td>
</tr>
<tr>
<td>Seattle, WA</td>
<td>264</td>
<td>165</td>
<td>429</td>
</tr>
<tr>
<td>Atlanta, GA</td>
<td>248</td>
<td>154</td>
<td>402</td>
</tr>
<tr>
<td>San Diego, CA</td>
<td>233</td>
<td>118</td>
<td>351</td>
</tr>
<tr>
<td><strong>Grand Total</strong></td>
<td><strong>3,523</strong></td>
<td><strong>1,736</strong></td>
<td><strong>5,259</strong></td>
</tr>
</tbody>
</table>

(As of 6/1/2012)
(oversimplification of Great Plains region)
LEED in the Great Plains

ND – 20 certified (54 registered), 0.8M ft\(^2\)
SD – 30 certified (67 registered), 1.6M ft\(^2\)
NE – 44 certified (80 registered), 4.3M ft\(^2\)
OK – 47 certified (159 registered), 5.0M ft\(^2\)
KS – 78 certified (174 registered), 6.2M ft\(^2\)
IA – 114 certified (222 registered), 8.7M ft\(^2\)
MO – 165 certified (397 registered), 16.4M ft\(^2\)
MN – 197 certified (301 registered), 36.6M ft\(^2\)
CO – 416 certified (678 registered), 57.3M ft\(^2\)
TX – 791 certified (2,016 registered), 175.2M ft\(^2\)
Omaha, Nebraska

- **52** Total projects
- **56** Average Walk Score
- **19** LEED Certified Projects
- **2,458 M** LEED Certified Sq. Ft.
- **32%** Use renewables for some energy
- **21%** Track ongoing energy performance
- **63%** Reduced water use by ≥ 20%

**LEED Certified Projects by Gross Sq. Ft.**

LEED Certification in Omaha, Nebraska by Square Footage

Tip: Turn off a certification level by clicking its legend label
Omaha, Nebraska

- **52** Total projects
- **56** Average Walk Score
- **19** LEED Certified Projects
- **2,458 M** LEED Certified Sq. Ft.
- **32%** Use renewables for some energy
- **21%** Track ongoing energy performance
- **63%** Reduced water use by ≥ 20%

### LEED Certification in Omaha, Nebraska by Project Count

Tip: Turn off a certification level by clicking its legend label

- Certified
- Silver
- Gold
- Platinum
Omaha, Nebraska

52
Total projects

55
Average Walk Score

19
LEED Certified Projects

2,458 M
LEED Certified Sq. Ft.

32%
Use renewables for some energy

21%
Track ongoing energy performance

63%
Reduced water use by ≥ 20%

New Construction vs. Existing Buildings in Omaha, Nebraska

Trends in LEED between NC and EBOM
Omaha, Nebraska

- **Total projects**: 52
- **Average Walk Score**: 56
- **LEED Certified Projects**: 19
- **LEED Certified Sq. Ft.**: 2,458 M
- **Use renewables for some energy**: 32%
- **Track ongoing energy performance**: 21%
- **Reduced water use by ≥ 20%**: 63%

LEED Certifications

Cumulative Count of AP, Specialty and Green Associate

**LEED Professional Credentials**

- LEED Certified Projects by Gross Sq. Ft.
- LEED Certified Projects by Project Count
- LEED EB vs. NC Trends by Sq. Ft.
- LEED EB vs. NC by Project Count
- Top Project Owner Types
## Overview

<table>
<thead>
<tr>
<th>Description</th>
<th>Value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Population (2009 est.)</td>
<td>454,700</td>
</tr>
</tbody>
</table>

### LEED Certification

<table>
<thead>
<tr>
<th>Category</th>
<th>Value</th>
</tr>
</thead>
<tbody>
<tr>
<td>LEED® Certified Projects</td>
<td>19</td>
</tr>
<tr>
<td>LEED Certified Gross Sq. Ft.</td>
<td>2.458 Million</td>
</tr>
<tr>
<td>LEED Registered Projects</td>
<td>33</td>
</tr>
<tr>
<td>LEED Registered Gross Sq. Ft.</td>
<td>6.59 Million</td>
</tr>
<tr>
<td>Government Owned LEED Certified Projects</td>
<td>3</td>
</tr>
<tr>
<td>Government Owned LEED Certified Gross Sq. Ft.</td>
<td>202,000</td>
</tr>
<tr>
<td>LEED ND Certified Projects</td>
<td>1</td>
</tr>
</tbody>
</table>

### Members and Professionals

<table>
<thead>
<tr>
<th>Category</th>
<th>Value</th>
</tr>
</thead>
<tbody>
<tr>
<td>LEED Accredited Professionals</td>
<td>603</td>
</tr>
<tr>
<td>USGBC Members</td>
<td>26</td>
</tr>
</tbody>
</table>

### Building Performance

<table>
<thead>
<tr>
<th>Category</th>
<th>Value</th>
</tr>
</thead>
<tbody>
<tr>
<td>ENERGY STAR® Buildings &amp; Plants</td>
<td>46</td>
</tr>
<tr>
<td>Building Performance Partnership Buildings</td>
<td>2</td>
</tr>
</tbody>
</table>
Projects

Note: Projects are listed only with the consent of each project's primary contact person. Please contact the project administrator to update the project confidentiality information in LEED Online.

Admin: Export these results to a spreadsheet.
**4940 Building** *(Morrissey Engineering)*

Organization: 4940 Building LLC  
4940 N 118th St  
Omaha, NE 68164  
US

**Project Data**

- Owner Sector: Corporate  
- Space Type Use: Office  
- Gross Sq. Ft.: 14,350  
- Total Area: 51,460  

**Collections**

- Add to My Collections

Found in these collections:

- Fidelity National Financial: LEED Data Report  
- LEED Project Profiles  
- Nebraska Flatwater Chapter

**Other projects at this address**

- 4940 Building

**You might also like...**

Highest scoring projects in LEED NC 2.2:

- 66/69 502 Second Street  
- 63/69 Benedictine Women of Madison  
- 62/69 Johnson Controls Glendale Building 3  
- 62/69 Turbo Energy Limited

**Certifications**

LEED NC 2.2 Platinum certified  
56 of 69 possible points.  
Awarded October 02, 2009
Benchmark 4940 Building

**Benchmarks**

<table>
<thead>
<tr>
<th>POINTS</th>
<th>25</th>
<th>30</th>
<th>35</th>
<th>40</th>
<th>45</th>
<th>50</th>
<th>55</th>
<th>60</th>
<th>65</th>
</tr>
</thead>
<tbody>
<tr>
<td>Total Points</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

- **Good**
- **Very Good**
- **Excellent**
- **Exceptional**

**4940 Building**

- **Points:** 56

**Nebraska**

- **Min:** 26
- **Max:** 56
- **Points:** 37

**24 total projects**

**United States**

- **Min:** 25
- **Max:** 66
- **Points:** 39
What does the LEED plaque mean?

Explore the world of thousands of reviewed projects and see what they are doing to optimize energy efficiency, reduce water usage, improve indoor air quality, preserve green space and habitats, and source sustainable materials.

View resource use-reduction goals based on design or operations and view comparative metrics on the project dashboard.

Try it:
- The Pyramid
- Wake Forest Town Hall
- USGBC Headquarters Dashboard
## Benchmark Iowa

<table>
<thead>
<tr>
<th>LEED NC 2.2</th>
<th>Total Points</th>
</tr>
</thead>
<tbody>
<tr>
<td>LEED NC 2.2</td>
<td></td>
</tr>
<tr>
<td>LEED NC 2.1</td>
<td></td>
</tr>
<tr>
<td>LEED EB 2009</td>
<td></td>
</tr>
<tr>
<td>LEED CI 2.0</td>
<td></td>
</tr>
<tr>
<td>LEED NC 2009</td>
<td>LEED Points</td>
</tr>
<tr>
<td>LEED Retail NC Pilot</td>
<td></td>
</tr>
<tr>
<td>LEED Retail CI</td>
<td></td>
</tr>
<tr>
<td>LEED CS 2.0</td>
<td></td>
</tr>
<tr>
<td>LEED NC 2.0</td>
<td></td>
</tr>
</tbody>
</table>

- **Total Points**
  - Energy and Atmosphere
  - Materials and Resources
  - Indoor Environmental Quality
  - Sustainable Sites
  - Water Efficiency
  - Innovation in Design

### Benchmarks

<table>
<thead>
<tr>
<th>POINTS</th>
<th>Total Points</th>
</tr>
</thead>
<tbody>
<tr>
<td>25</td>
<td>Good</td>
</tr>
<tr>
<td>30</td>
<td>Very Good</td>
</tr>
<tr>
<td>35</td>
<td>Excellent</td>
</tr>
<tr>
<td>40</td>
<td>Exceptional</td>
</tr>
</tbody>
</table>

- **Min**: 26
- **Max**: 37
- **Iowa**
Benchmark Iowa

LEED NC 2.2

Energy and Atmosphere

Benchmarks

- **Energy and Atmosphere**
  - Iowa: Min 2, Max 14
  - United States: Min 1, Max 7
  - The World: Min 1, Max 6

Good
Very Good
Excellent
Exceptional
Benchmark Iowa

LEED for New Construction v2.2
2006 → 0%-42% below 90.1-2004
2007 → 14%-42% below 90.1-2004

LEED Building Design & Construction v.2009
2009 → 10%-48% below 90.1-2007

LEED Building Design & Construction v4
2013 → 5%-50% below 90.1-2010

1 project scored 2
12 projects scored 9
2 projects scored 14

75 total projects

# of Projects by Energy and Atmosphere

1 project scored 2
12 projects scored 9
2 projects scored 14
## Weightings Tool

### Impact Categories

- **Building Systems**: Dark Blue
- **Transportation**: Red
- **Water**: Green
- **Materials**: Light Blue
- **Solid Waste**: Light Green

**Impact Category Weighting**

Relative Importance [%]

<table>
<thead>
<tr>
<th>Credit</th>
<th>Description</th>
<th>Impact</th>
<th>Carbon Footprint</th>
<th>Fossil Fuel Depletion</th>
<th>Water Use</th>
<th>Land Use</th>
<th>Acidification</th>
</tr>
</thead>
<tbody>
<tr>
<td>SS 7.1</td>
<td>Landscape and exterior design to reduce heat island, non-roof</td>
<td>Reduce ELI</td>
<td>1</td>
<td>3.4</td>
<td>1</td>
<td>2.6</td>
<td>0</td>
</tr>
<tr>
<td>SS 7.2</td>
<td>Landscape and exterior design to reduce heat island, roof</td>
<td>Reduce ELI</td>
<td>1</td>
<td>3.4</td>
<td>1</td>
<td>2.6</td>
<td>0</td>
</tr>
<tr>
<td>SS 8</td>
<td>Light pollution reduction</td>
<td>Reduce ELI</td>
<td>1</td>
<td>3.4</td>
<td>1</td>
<td>2.6</td>
<td>0</td>
</tr>
<tr>
<td>EA 11</td>
<td>Optimize Energy Performance 10.5%</td>
<td>Reduce ELI</td>
<td>1</td>
<td>3.4</td>
<td>1</td>
<td>2.6</td>
<td>0</td>
</tr>
<tr>
<td>EA 12</td>
<td>Optimize Energy Performance 14%</td>
<td>Reduce ELI</td>
<td>1</td>
<td>3.4</td>
<td>1</td>
<td>2.6</td>
<td>0</td>
</tr>
<tr>
<td>EA 13</td>
<td>Optimize Energy Performance 17.5%</td>
<td>Reduce ELI</td>
<td>1</td>
<td>3.4</td>
<td>1</td>
<td>2.6</td>
<td>0</td>
</tr>
<tr>
<td>EA 14</td>
<td>Optimize Energy Performance 21%</td>
<td>Reduce ELI</td>
<td>1</td>
<td>3.4</td>
<td>1</td>
<td>2.6</td>
<td>0</td>
</tr>
<tr>
<td>EA 15</td>
<td>Optimize Energy Performance 24.5%</td>
<td>Reduce ELI</td>
<td>1</td>
<td>3.4</td>
<td>1</td>
<td>2.6</td>
<td>0</td>
</tr>
<tr>
<td>EA 16</td>
<td>Optimize Energy Performance 28%</td>
<td>Reduce ELI</td>
<td>1</td>
<td>3.4</td>
<td>1</td>
<td>2.6</td>
<td>0</td>
</tr>
<tr>
<td>EA 17</td>
<td>Optimize Energy Performance 31.5%</td>
<td>Reduce ELI</td>
<td>1</td>
<td>3.4</td>
<td>1</td>
<td>2.6</td>
<td>0</td>
</tr>
</tbody>
</table>
Capitol Plaza I

1200 First Street NE
Washington, DC US

LEED-EB:OM v2009 Platinum certified 82 of 110 possible points.

Energy and Atmosphere

28/35
Total EA Points

Exceptional
Top 4% of all LEED ES 2009 projects.

Benchmark

- Good
- Very Good
- Excellent
- Exceptional

This Project

Top 6% of all projects in District of Columbia.

United States

Top 4% of all projects in United States.

Credit Achievement

EAc1: Optimize energy efficiency performance

- Excellent
- Top 71% of all projects.

EAc2:1: Existing building commissioning.

- Very Good
- Top 58% of all projects.

EAc2:2: Existing building commissioning.

- Excellent
- Top 50% of all projects.

EAc2:3: Existing building commissioning, ongoing

- Top 20% of all projects.

EAc3:1: Performance measurement, building

- YES
- Top 37% of all projects.

EAc3:2: Performance measurement, system-level

- YES
- Achieved by 15% of all projects.

EAc4: On-site and off-site renewable energy

- Excellent
- Top 26% of all projects.

EAc5: Enhanced refrigerant management

- YES
- Top 26% of all projects.

EAc6: Emissions reduction reporting

- Very Good
- Top 77% of all projects.
Commercial Energy Codes and LEED Energy Requirements

Energy Use Index (1975 use = 100)

- Std 90A-1980
- Std 90.1-1989: 14%
- Std 90.1-1999: 4%
- Std 90.1-2004: 5%
- Std 90.1-2007: 25%
- Std 90.1-2010
- 2013 LEED v4: 5%-50% below 90.1-2010

Lane Burt, USGBC
Charlie Haack, ICF International
Jeremy Sigmon, USGBC
Brian Dean, ICF International
The Motivation

- The development of green building codes and beyond-code programs creates:
  - an effective way to drive market transformation
  - much-needed set of regulatory tools for states and localities
- However, these new green building codes have
  - caused unintended market confusion.
- As a result it was determined that:
  - a rational framework for evaluation would clarify this confusion and
  - such an evaluation framework would support the appropriate roles of these distinct and complementary policy tools.
The Framework

- “apples to apples” comparison of code provisions and the LEED rating system:
  - based on actual minimum requirements and typical LEED credits earned.
  - avoid comparisons with combined sustainability metrics that add bias by over- or under-weighting a category, like energy efficiency.

- demonstrate the effectiveness of both green codes and green building rating systems by:
  - documenting how building to a code achieves the outcomes that are evaluated, verified, and communicated by green building rating systems.
The Tool

- Both **flexible and expandable**, the tool is intended to:
  - accommodate new codes, updated rating systems, refined metrics and revised categorization
  - analyze and evaluate across two critical spectra – **Breadth and Depth**
  - calibrate each metric, requirement or credit through specific weightings
  - be useful as the starting point and foundation for **future code and rating system analyses**
The Tool

- **Breadth Analysis:**
  - analysis and collation of all metrics across all documents at the highest level to determine binary, yes/no coverage (Energy and Atmosphere, Sustainable Sites, Materials and Resources, Water Efficiency, and Indoor Environmental Quality)
  - speaks to **scope and coverage** of the each of the codes and rating systems only

- **Depth Analysis:**
  - an **in-depth** look at a single metric, such as Energy.
  - to include variation in building type, location, etc.
  - **results** in site energy, source energy, and source emissions
Assumptions

- That the **average credit attainment profile** of LEED Certified; LEED Silver; LEED Gold; LEED Platinum buildings is representative.
  - variability in LEED projects to stretch and reach beyond code is fixed to specific attainment of specific credits;
  - all certified buildings achieve the most commonly earned credits for their data set (Certified, Silver, Gold, Platinum) up to the average point threshold for that data set: Certified (44.1), Silver (52.8), Gold (64.4) and Platinum (84);

- That **code compliance = 100%**
  - all compliant buildings are minimally code compliant;
  - verification infrastructure is sufficient and effective;
  - education and training to support code officials and code users is sufficient and effective;
Note: Breadth analysis assesses coverage of green building impact areas on a binary basis, and does not evaluate the relative effectiveness or stringency of the provisions. Once similarly-intended provisions or credits are grouped a “Depth Analysis” evaluates effectiveness and stringency against a common metric.
Breadth: Sustainable Sites

Note: Breadth analysis assesses coverage of green building impact areas on a binary basis, and does not evaluate the relative effectiveness or stringency of the provisions. Once similarly-intended provisions or credits are grouped a “Depth Analysis” evaluates effectiveness and stringency against a common metric.
Breadth: Indoor Environment Quality

Note: Breadth analysis assesses coverage of green building impact areas on a binary basis, and does not evaluate the relative effectiveness or stringency of the provisions. Once similarly-intended provisions or credits are grouped a “Depth Analysis” evaluates effectiveness and stringency against a common metric.
Note: Breadth analysis assesses coverage of green building impact areas on a binary basis, and does not evaluate the relative effectiveness or stringency of the provisions. Once similarly-intended provisions or credits are grouped a “Depth Analysis” evaluates effectiveness and stringency against a common metric.
Note: Breadth analysis assesses coverage of green building impact areas on a binary basis, and does not evaluate the relative effectiveness or stringency of the provisions. Once similarly-intended provisions or credits are grouped a “Depth Analysis” evaluates effectiveness and stringency against a common metric.
Depth: Energy and Atmosphere

ASHRAE 189.1 - 2011
IgCC
CalGreen
LEED Certified
LEED Silver
LEED Gold
LEED Platinum

ENERGY & ATMOSPHERE DEPTH
SITE ENERGY
Depth: Energy and Atmosphere

ASHRAE 189.1 - 2011
LEED Platinum
LEED Gold
LEED Silver
LEED Certified
IgCC
CalGreen

ENERGY & ATMOSPHERE DEPTH
SOURCE ENERGY
Depth: Energy and Atmosphere

ENERGY & ATMOSPHERE DEPTH SOURCE EMISSIONS
BUILD GREEN

GROW REAL ESTATE MARKET

IMPROVE INFRASTRUCTURE

SAVE ENERGY
WATER AND WASTE, TOO

SAVE MONEY

CREATE JOBS
A long road ahead...

- Positive Environmental Impact
  - Platinum
  - Gold
  - Silver
  - Certified

- Negative Environmental Impact
  - Platinum
  - Gold
  - Silver
  - Certified

Green Building Practices Becoming Foundational in Building Codes

Traditional Building Codes
For You, Your Home and Business

- Consider how the International Green Construction Code can enhance your state or community’s building regulations -- [www.iccsafe.org/IgCC](http://www.iccsafe.org/IgCC)
- Tap your local USGBC chapter - [www.usgbc.org/chapters](http://www.usgbc.org/chapters)
- Review and comment on LEED v4 (10/2-12/10) -- [www.usgbc.org/LEEDv4](http://www.usgbc.org/LEEDv4)
- Learn what you can do at home at the Green Home Guide -- [www.greenhomeguide.com](http://www.greenhomeguide.com)
- See you at Greenbuild (11/14-16) and the Codes Summit (11/13) -- [www.greenbuildexpo.org](http://www.greenbuildexpo.org)