Section IV- Guidance for Beyond-Code Design

One of the confusions that frequently occurs when looking into designing beyond code is the variety of resources and differing guidelines. There are several different standards for what “efficiency” means, depending on your source. It can also be difficult to determine which version of the code these guides are using. Older guides have been designed based on the 1999 or 2004 standards, so it is important to check on whether your guidelines are up to date. The 2013 ASHRAE standards have also been released for those interested in viewing updates to the 2010 code. Incentives for achieving beyond-code design can be found on the Department of Commerce and Economic Opportunity website. The following resources are available to assist designers in achieving efficiency beyond the standards outlined in the current code.

a.) ASHRAE Advanced Energy Design Guides (AEDG)

- To reduce building energy usage, the U.S. DOE, through its Building Technologies (BT) Program, established a strategic goal to “create technologies and design approaches that enable net-zero energy buildings (NZEB) at low incremental cost by 2025.”
- The ASHRAE Advanced Energy Design Guides (AEDG) are a series of publications designed to provide recommendations for achieving energy savings over the minimum code requirements of ANSI/ASHRAE/IESNA Standard 90.1.
- This is the first step in the process toward achieving a net zero energy building, which is defined as a building that, on an annual basis, draws from outside resources equal or less energy than it provides using on-site, renewable energy sources.
- These guides have been developed in collaboration with these partnering organizations:
  - The American Institute of Architects (AIA)
  - Illuminating Engineering Society of North America (IES)
  - U.S. Green Building Council (USGBC)
  - U.S. Department of Energy (DOE)
- The New Building Institute (NBI) also participated in the development of the initial guide.
- The 50 Percent AEDG series offer recommendations for achieving a 50% energy savings compared to buildings that meet the minimum requirements of ANSI/ASHRAE/IESNA Standard 90.1-2004. These include 50% Advanced Energy Design Guides for:
  - Small to Medium Office Buildings
  - K-12 School Buildings
- Medium to Big Box Retail Buildings
- Large Hospitals

**CAUTION:** The 30 Percent AEDG series offer recommendations for achieving a 30% energy savings compared to buildings that meet the minimum requirements of ANSI/ASHRAE/IESNA Standard 90.1-1999. These include 30% Advanced Energy Design Guides for:
- Small Hospitals and healthcare Facilities
- Highway Lodging
- Small Warehouses and Self-Storage Buildings
- Small Retail Buildings

b.) Building Energy Rating Systems

Energy Performance Rating of new and existing buildings is also available. ASHRAE is developing a rating system of A-F. Although the disclosure of energy usage is voluntary, it is quite useful for building owners and managers to have this information. The marketability of energy hogs may be severely reduced over time with tax base implications for the public sector.

### TABLE A-5 (Supersedes Table 5.5-5)
**Building Envelope Requirements**

<table>
<thead>
<tr>
<th>Opaque Elements</th>
<th>Assembly Max.</th>
<th>Insulation Min. R-Value</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Roofs</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Insulation Entirely above Deck</td>
<td>U-0.039</td>
<td>R-25.0 ci</td>
</tr>
<tr>
<td>Metal Building</td>
<td>U-0.035</td>
<td>R-19.0 + R-11.0 Ls</td>
</tr>
<tr>
<td>Attic and Other</td>
<td>U-0.021</td>
<td>R-49.0</td>
</tr>
<tr>
<td><strong>Walls, Above Grade</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Mass</td>
<td>U-0.080</td>
<td>R-13.3 ci</td>
</tr>
<tr>
<td>Metal Building</td>
<td>U-0.052</td>
<td>R-13.0 + R-13.0 ci</td>
</tr>
<tr>
<td>Steel Framed</td>
<td>U-0.055</td>
<td>R-13.0 + R-10.0 ci</td>
</tr>
<tr>
<td>Wood Framed and Other</td>
<td>U-0.051</td>
<td>R-13.0 + R-7.5 ci</td>
</tr>
</tbody>
</table>
c.) Architecture 2030

Architecture 2030, a non-profit organization whose mission is to transform the built environment to address climate and energy crises, began Challenge 2030 to request that the architecture and building community work toward the following targets:

- “All new buildings, developments and major renovations shall be designed to meet a fossil fuel, GHG-emitting, energy consumption performance
standard of 60% below the regional (or country) average/median for that building type.

- At a minimum, an equal amount of existing building area shall be renovated annually to meet a fossil fuel, GHG-emitting, energy consumption performance standard of 60% of the regional (or country) average/median for that building type.

- The fossil fuel reduction standard for all new buildings and major renovations shall be increased to:
  - 70% in 2015
  - 80% in 2020
  - 90% in 2025
  - Carbon-neutral in 2030 (using no fossil fuel GHG emitting energy to operate)

### 2030 Challenge Targets: U.S. National Medians:

<table>
<thead>
<tr>
<th>Building Use Description</th>
<th>Median Site EUI&lt;sup&gt;4&lt;/sup&gt; (kBtu/Sq.Ft./Yr)</th>
<th>2030 Challenge Site EUI Targets (kBtu/Sq.Ft./Yr)</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>50% Target</td>
<td>60% Target</td>
</tr>
<tr>
<td>Education</td>
<td>144</td>
<td>63%</td>
</tr>
<tr>
<td>K-12 School</td>
<td>X</td>
<td></td>
</tr>
<tr>
<td>College / University (campus-level)</td>
<td>244</td>
<td>63%</td>
</tr>
<tr>
<td>Food Sales</td>
<td>570</td>
<td>86%</td>
</tr>
<tr>
<td>Grocery Store / Food Market</td>
<td>X</td>
<td></td>
</tr>
<tr>
<td>Convenience Store (with or without gas station)</td>
<td>607</td>
<td>90%</td>
</tr>
<tr>
<td>Food Service</td>
<td>575</td>
<td>59%</td>
</tr>
<tr>
<td>Restaurant / Cafeteria</td>
<td>434</td>
<td>53%</td>
</tr>
<tr>
<td>Fast Food</td>
<td>1170</td>
<td>64%</td>
</tr>
<tr>
<td>Inpatient Health Care (Hospital)</td>
<td>X</td>
<td></td>
</tr>
<tr>
<td>Lodging</td>
<td>163</td>
<td>61%</td>
</tr>
<tr>
<td>Dormitory / Fraternity / Group Home</td>
<td>X</td>
<td></td>
</tr>
<tr>
<td>Hotel, Motel or Inn</td>
<td>X</td>
<td></td>
</tr>
<tr>
<td>Mall (Strip Mall and Enclosed)</td>
<td>247</td>
<td>71%</td>
</tr>
</tbody>
</table>
d.) ENERGY STAR

- **Target Finder:** Some of the information available through Challenge 2030 can also be accessed on [ENERGY STAR Target Finder](https://www.energystar.gov/). This tool reports on the annual energy usage required to meet a target and evaluates estimated energy use.

- **Portfolio Manager:** [ENERGYSTAR Portfolio Manager](https://www.energystar.gov/) measures and tracks energy and water consumption, along with greenhouse gas emissions. This tool can be used to benchmark the performance of one building or multiple buildings.
• **Performance-based certification**: Commercial buildings are eligible to become [ENERGY STAR certified](#) after one year of superior energy performance. This requires the building receive a score of 75 in Portfolio Manager, meaning it performs better than 75% of similar buildings nationwide. Buildings that can earn ENERGY STAR certification include:
  - Bank branches
  - Courthouses
  - Data Centers
  - Dormitories
  - Financial centers
  - Hospitals
  - Hotels
  - Houses of worship
  - K-12 schools
  - Medical offices
  - Offices
  - Retailers
  - Senior care facilities

Industrial plans are also eligible to earn certification, including:
  - Auto assembly plants
  - Cement plants
  - Container glass manufacturing
  - Cookie and cracker baking plants
  - Flat glass manufacturing
  - Frozen fried potato processing plants
- Juice processing
- Petroleum refineries
- Pharmaceutical manufacturing plants
- Pulp and paper plants
- Wet corn mills

e.) LEED v4

LEED v4 is a new energy simulation based certification sponsored by the USGBC. It will be taking the place of the LEED Green Associate and LEED AP exams in June 2014. The final day to take the credential exams with LEED v2009 content will be June 15, 2014, and the first day to take the exams with the new LEED v4 content will be June 30, 2014.

- 20% of all points within LEED v4 are allocated to optimizing building energy efficiency, including credits for beyond code performance, advanced energy metering, demand response, etc.
- Prerequisite requirement of 5% improvement for new buildings (3% for major renovations) compared with ANSI/ASHRAE/IESNA Standard 90.1-2010.