The study took in a variety of building types, based on real projects in the Gulf Coast region of Texas. The small park pavilion (3,120 sf) is being designed to comply with the Living Building Challenge. The others are either seeking or have earned LEED certification.

In each of the charts, the height of the bar measures the energy use intensity (EUI) of each building before applying commercially avail-
able energy-conserving measures. The lower portion of the bar (in red) shows the EUI of the building after the various energy-saving strate-
gies have been employed. This is the amount of energy that must be generated by on-site renewables.

<table>
<thead>
<tr>
<th>Building Type</th>
<th>Area (sf)</th>
<th>Window-to-wall ratio</th>
<th>EUI (original design)</th>
<th>EUI (ZEB design)</th>
</tr>
</thead>
<tbody>
<tr>
<td>10-story spec office building</td>
<td>253,000</td>
<td>43%</td>
<td>39.9</td>
<td>17.0</td>
</tr>
<tr>
<td>Low-rise owner-occupied office</td>
<td>33,000</td>
<td>32%</td>
<td>42.1</td>
<td>28.1</td>
</tr>
<tr>
<td>College residence hall (384 beds)</td>
<td>126,000</td>
<td>19%</td>
<td>51.9</td>
<td>29.0</td>
</tr>
<tr>
<td>Pre-K to grade 5 elementary school</td>
<td>87,000</td>
<td>18%</td>
<td>36.9</td>
<td>24.9</td>
</tr>
<tr>
<td>Warehouse</td>
<td>60,000</td>
<td>20%</td>
<td>22.5</td>
<td>16.5</td>
</tr>
<tr>
<td>Park pavilion</td>
<td>3,120</td>
<td>70%</td>
<td>38.7</td>
<td>21.0</td>
</tr>
</tbody>
</table>

**Source:** Kirksey EcoServices

**Energy Use Intensity**

The physical parameters of the six buildings under study are as follows:

- **Mid-rise spec office building**
  - Geothermal
  - Reduced ventilation
  - Displacement ventilation
  - Energy recovery
  - Night visioning
  - Triple glazing

- **Low-rise owner-occupied office building**
  - Natural ventilation
  - Displacement ventilation
  - Energy recovery
  - Daylighting
  - Reduced lighting power density

- **College residence hall**
  - Geothermal
  - Reduced ventilation
  - Natural ventilation
  - Solar hot water
  - Energy recovery
  - Daylighting
  - Reduced LPD
  - Triple glazing

- **Pre-K to grade 5 elementary school**
  - Natural ventilation
  - DX ventilation
  - Energy recovery
  - Daylighting
  - ZEB

- **Warehouse**
  - Water source heat pump
  - Natural ventilation
  - HVAC efficiency
  - Daylighting
  - Reduced LPD
  - Triple glazing

- **College residence hall (384 beds)**
  - Natural ventilation
  - Heat pump
  - HVAC efficiency
  - Daylighting
  - Reduced LPD
  - ZEB

- **Park pavilion**
  - Natural ventilation
  - Heat pump
  - HVAC efficiency
  - Daylighting
  - Reduced LPD
  - ZEB