ZNE for Multifamily Residences

Track: Advancing Residential & Multifamily ZNE Markets

- Ann Edminster, Design AVEnues LLC (moderator)
- Sue McFaddin, Development Consultant
- Joe Giampietro, NK Architects
- Cody Lodi, Weber Thompson

Q:
ZNE buildings will greatly increase if ...?

HOLD THAT THOUGHT!
Part 1.
Residential ZNE in North America

Part 2.
Programs & Policies Behind ZNE

Part 3.
ZNE Distinctions & Implications
INVENTORY
ZERO-ENERGY HOMES

407 projects
3,331 buildings
6,177 units*

*With performance from ZNE-ready to net positive.

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ZERO-ENERGY HOMES

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*With performance from ZNE-ready to net positive.
Flavors of ZNE Homes
http://netzeroenergycoalition.com/zero-energy-case-studies

Zero Net Energy –
- Site
- Source
- Cost
- Emissions
- Peak
- TDV

Custom & Luxury ZNE Homes
Spec & Production ZNE Homes

Thriving Communities

The Paul Davis Partnership

One Sky Homes

Meritage

Affordable/Multifamily ZNE Homes

K. Boodeh Architects

The Pacific Companies

Plaza Point, Arcata, CA

K. Boodeh Architects
ZNE is happening at community scale (and it’s global!)

FortZED, Ft. Collins, CO
Fujisawa Sustainable Smart Town, Japan
Pecan Street, Austin, TX
Lancaster, CA

Part 1.
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Where are ZNE Homes emerging fastest?

Top states have zero energy policies and programs to drive the market.

<table>
<thead>
<tr>
<th>States</th>
<th>Total ZNE Residential Units</th>
</tr>
</thead>
<tbody>
<tr>
<td>California</td>
<td>1,538</td>
</tr>
<tr>
<td>Massachusetts</td>
<td>219</td>
</tr>
<tr>
<td>Connecticut</td>
<td>206</td>
</tr>
<tr>
<td>Alberta, CA</td>
<td>212</td>
</tr>
<tr>
<td>New Mexico</td>
<td>168</td>
</tr>
</tbody>
</table>

**States with the Most ZNE Builders**

<table>
<thead>
<tr>
<th>State</th>
<th>Count</th>
</tr>
</thead>
<tbody>
<tr>
<td>CA</td>
<td>62</td>
</tr>
<tr>
<td>OR</td>
<td>27</td>
</tr>
<tr>
<td>CT</td>
<td>18</td>
</tr>
<tr>
<td>MA</td>
<td>14</td>
</tr>
<tr>
<td>NY</td>
<td>11</td>
</tr>
</tbody>
</table>

**WHY? CA Executive Order: All New Homes ZERO ENERGY by 2020**

**Cities Working on ZNE/Low-CO2 Building Sector Initiatives**

- Vancouver CA
- Seattle
- San Francisco
- Berkeley
- Palo Alto
- Lancaster
- Boulder
- Ft. Collins
- Cambridge
- Boston
- New York
- London UK
- Washington
- Austin
- Phoenix
- Boulder
- Ft. Collins
- Cambridge
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- London UK
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- Phoenix
ZNE Stakeholder Organizations

- DOE ZERH Program
- International Living Future Institute
- Earth Advantage Institute
- Thousand Home Challenge
- Passive House Institute US
- Passive House International
- Build It Green
- Net Zero Energy Coalition
- Architecture 2030
- National Renewable Energy Lab
- Northeast Sustainable Energy Association
- New Buildings Institute
- North American Passive House Network
- Passive House California
- Energy & Environmental Building Alliance
- Structural Insulated Panel Association

Part 1.
Residential ZNE in North America

Part 2.
Programs & Policies Behind ZNE

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ZNE Program Distinctions

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3 major program distinctions:
- Modeled vs. measured energy
- Onsite vs. offsite
- Flavor of ZNE

<table>
<thead>
<tr>
<th>Organization</th>
<th>Modeled vs. Measured</th>
<th>Allowable Renewable Energy Sources</th>
<th>Site vs. Source</th>
</tr>
</thead>
<tbody>
<tr>
<td>DOE</td>
<td>modeled</td>
<td>Onsite, community, or offsite</td>
<td>source</td>
</tr>
<tr>
<td>International Living Future Institute</td>
<td>measured</td>
<td>Onsite, or offsite only per “scale jumping” criteria – generally nearby; no RECs</td>
<td>site</td>
</tr>
<tr>
<td>Earth Advantage</td>
<td>modeled</td>
<td>Onsite; neighborhood/community under consideration</td>
<td>site (90%)</td>
</tr>
<tr>
<td>Passive House International</td>
<td>modeled</td>
<td>Onsite or offsite</td>
<td>source</td>
</tr>
<tr>
<td>Passive House Institute US</td>
<td>modeled</td>
<td>Onsite or neighborhood/community</td>
<td>source</td>
</tr>
<tr>
<td>Thousand Home Challenge</td>
<td>measured</td>
<td>Onsite, or offsite only if the owner/occupant owns a share of the renewable system and has actual production from the facility</td>
<td>site</td>
</tr>
<tr>
<td>Build It Green</td>
<td>modeled</td>
<td>Onsite, only after code has been met</td>
<td>source</td>
</tr>
</tbody>
</table>
ZNE Program Distinctions
Implications: modeled vs. measured energy

**MEASURED** energy:
- Is the only way to know if ZNE really achieved
- Necessary for proof of concept
- Most practical for existing homes

**MODELED** energy:
- Is the only way to objectively evaluate the home rather than the occupants
- Pragmatic need for market transformation programs

**IMPLICATIONS:**
- **Measured** energy likeliest basis for programs & policies targeting existing homes
- **Modeled** energy likeliest basis for new homes

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ZNE Program Distinctions
Implications: onsite vs. offsite renewables

**ONSITE** renewable energy:
- Is the easiest way to verify ZNE performance (of whatever flavor)

**OFFSITE** renewable energy:
- Is needed for community-scale ZNE
- Is more economical and equitable

**IMPLICATIONS:**
- **Onsite** RE likeliest basis for programs & policies that focus on individual buildings
- **Offsite** RE likeliest basis for community-scale initiatives
- Credible accounting mechanism needed for **offsite**
### ZNE Program Distinctions

**Implications: site vs. source energy definition**

**SITE ZNE:**
- Is the easiest definition for verifying ZNE performance
- Is hardest to understand

**SOURCE ZNE:**
- Is more intuitively in line with carbon goals

**IMPLICATIONS:**
- **Site**: results in the largest renewable energy requirement
- **Site**: is a driver towards 100% electric building energy
- **Source**: is more compatible with mixed-fuel projects due to utility economics

### ZNE Program Distinctions

**Conclusions**

**IMPLICATIONS:**
- Valid program distinctions should and will remain
- Consensus on other points of divergence would be beneficial to market transformation; in particular:
  - Site vs. source vs. other ZNE definitions
  - Contribution of offsite renewable energy
  - Mechanism to account for offsite renewable energy
A house today, a community tomorrow!

Thank you!

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