The Need for a Multifamily Building Energy Efficiency Code, and How We Can Get There

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EEBA Conference
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Stone Energy Associates
Big Questions

• Why do we need an energy code specifically for multifamily buildings?
• How do we get there?
• Are there any benefits that might make it a good deal?
Indigenous Western MF Housing
What Do MF Buildings Look Like Today?
Need and Purpose

• For the past six years, MF construction outpaced single-family construction.

• 54% of residential new construction was MF in 2015. 57% in 2014.

• There are many unsupported assumptions that SF data adequately describes MF Bldgs.

• Need a much deeper, more focused examination of MF buildings and measures.
Are they “Homes”?

• In the US, 30.2 Million households (29% of all households) live in MF buildings (4.1M or 33% of California households)

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<table>
<thead>
<tr>
<th></th>
<th>Millions of Households</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Single Family</td>
</tr>
<tr>
<td>U.S.</td>
<td>77+</td>
</tr>
<tr>
<td>CA</td>
<td>8.1</td>
</tr>
</tbody>
</table>
```

• ~30% of new residential construction is MF
So then, Why Not Lump them with “Residential”?  

• On average in the U.S.,  
  – Single-family households pay ~22% of their monthly income for housing burden (rent or mortgage, plus utilities)  
  – Multifamily households pay well over 30% of their monthly income on their housing burden
Why Not Lump them with “Residential”?  

- Approximately 86% of single-family homes are owner occupied  
- Approximately 88% of multifamily homes are tenant occupied  
- Average annual income in SF is $61,000/yr  
- Average annual income in MF is $31,000/yr
Why Not Lump them with “Residential”?

• Building owners, not tenants, make the decisions that affect efficiency of the envelope or equipment – other than tenant-supplied appliances
• MF households are much more affected by their neighbors actions and choices than SF households
• Central systems, multiple stories, shared walls
Are they “Commercial Buildings”? 

- Together, just **seven** MF companies own >1,000,000 dwelling units
- Bought and sold more like NR buildings than single-family homes [of top 50 owners, 31 increased portfolios and 17 reduced portfolios in 2014]
- Majority are managed by professional management companies [with an average of ~50,000 units per company]
- Many have commercial HVAC equipment and/or central hot water (CDHW)

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So then, Why Not Lump them with “Nonresidential”? 

• Completely different occupancy schedules 

• Different needs for achieving healthy air quality 

• People live there!
Current Code Landscape

- A 3-Story building and a 4-Story building of otherwise exactly the same design on the same property, have different code requirements

<table>
<thead>
<tr>
<th>Measure</th>
<th>3 Stories</th>
<th>4 Stories</th>
</tr>
</thead>
<tbody>
<tr>
<td>Window Area</td>
<td>WFR</td>
<td>WWR</td>
</tr>
<tr>
<td>Envelope</td>
<td>Low-rise</td>
<td>Nonres/HR Res</td>
</tr>
<tr>
<td>Heating &amp; Cooling</td>
<td>Low-rise</td>
<td>Nonres/HR Res</td>
</tr>
<tr>
<td>Ventilation</td>
<td>ASHRAE 62.2</td>
<td>ASHRAE 62.1</td>
</tr>
<tr>
<td>Lighting</td>
<td>Low-rise</td>
<td>Low-rise</td>
</tr>
<tr>
<td>Water Heating</td>
<td>Low-rise</td>
<td>Low-rise</td>
</tr>
<tr>
<td>Modeling</td>
<td>CBECC-Res</td>
<td>CBECC-NR</td>
</tr>
</tbody>
</table>
Modeling Differences Matter

- Can someone explain how these per-square-foot EUIs could BOTH be right???

<table>
<thead>
<tr>
<th>End Use</th>
<th>Standard Design</th>
<th>Proposed Design</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>HR</td>
<td>LR</td>
</tr>
<tr>
<td>Space Cooling</td>
<td>51.35</td>
<td>30.15</td>
</tr>
<tr>
<td>Fans</td>
<td>62.93</td>
<td>8.24</td>
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<tr>
<td>DHW</td>
<td>33.93</td>
<td>31.88</td>
</tr>
<tr>
<td>Pumps</td>
<td>0.00</td>
<td>0.00</td>
</tr>
<tr>
<td><strong>Totals</strong></td>
<td><strong>169.82</strong></td>
<td><strong>91.82</strong></td>
</tr>
<tr>
<td><strong>% Better than Standard</strong></td>
<td><strong>5.4%</strong></td>
<td><strong>6.7%</strong></td>
</tr>
</tbody>
</table>

TDV Energy Use shown as kBtu/ft² yr of Conditioned Floor Area
Are We Giving Designers Useful Information?
The Solution

• A multifamily energy code with requirements that vary not by a 3 - 4-story split, but by what actually affects performance
  – Structural constraints (e.g., wind & seismic loads)
  – Building tightness and ventilation measures appropriate to residential IAQ needs
  – Lighting measures aligned with actual multifamily LPDs and schedules
  – And...
The Solution (continued)

• A building performance analysis tool designed for multifamily buildings:
  – Includes the kinds of HVAC equipment used in MF
  – “Maps” equipment consistently regardless of number of stories
  – Consistent leakage and ventilation requirements
  – Consistent metrics where appropriate (e.g., WWW or WFR) regardless of number of stories
  – Appropriate and accurate CDHW algorithms
The Path

• Work to have ICC adopt a MF IECC section, and to have the California Energy Commission adopt a MF Compliance Manual. The former in 2016, the latter in 2019.

• Develop a building performance tool for the MF code.

• Update as needed.
How it Feels at Different Times
Team/Supporters, So Far

• New Buildings Institute
• Energy Foundation
• Build It Green, Association for Energy Affordability, Redwood Energy
• PG&E and SCE
• California Energy Commission (in principle, though not yet committed)
So, If We Do This Right...

...even Nature will rejoice!

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Thanks!