Overcoming Barriers to Heat Pumps in Multifamily Buildings

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Overcoming barriers to heat pumps in multifamily buildings

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2/28/22
Reason for study

Massachusetts targeting net-zero greenhouse gas emissions by 2050 and level of emissions 85% below the 1990 level


Key measure: HEAT PUMPS. Uptake in single family homes is greater than in multifamily buildings. Why?
About the study

› MF buildings (3+ units)
› Market rate
› Retrofit
› All type of heat pumps – space heating

Supply Side Interviews (online)
- 15 contractors
- 10 distributors
- 4 permitting offices
- 3 electricians

Demand Side Surveys (online)
- 37 MF building owners
- 31 MF property managers
- 30 condo unit owners
- 10 renters
Market characterization

Buildings, Heat Pumps, Stakeholders
Multifamily Building Stock

- 128,797 MF buildings (including 3- and 4-unit buildings)
- 907,495 units

Current Heat Pump Saturation

- 7% for 5+ unit MF buildings
- 6% for 2- to 4-unit buildings
- 11% for single family.

Source: Massachusetts Residential Building Use and Equipment Characterization Study
- Contractors – key player
- Distributor – manufacturer specific or wholesale
- PA’s vendors – field insight
Findings - Barriers

Tier 1
Tier 2
Tier 3
## Tier 1 Barriers

### Greater complexity of MF installations

<table>
<thead>
<tr>
<th>Relevant to:</th>
<th>Narrative</th>
<th>Considerations</th>
</tr>
</thead>
</table>
| Contractors  | • Limited space at MF properties  
               • Locating compressors often only possible in difficult-to-access areas  
               • Greater challenges accessing, modifying, or installing MF ductwork | • Hold MF specific installation workshops for each heat pump technology  
               • Leverage distributor support |
| Distributors |           |                |
| Electricians |           |                |
## Tier 1 Barriers (2)

**Contractors are still uncomfortable with heat pumps**

<table>
<thead>
<tr>
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</table>
| Contractors  | • Distributors signaled contractors’ lack of education  
• Bad installations hurt the market – some contractors on refrigerant leakages.  
• Still concerned about heat pump performance in extreme cold weather  
• Maturing market | • Hold contractor training in heat pump technology and technical design |
**Current heat pump incentives are not enough for MF**

## Tier 1 Barriers (3)

<table>
<thead>
<tr>
<th>Relevant to:</th>
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<th>Considerations</th>
</tr>
</thead>
</table>
| Building Decision Makers | • Increased equipment and labor cost  
• Electrical infrastructure upgrades  
• Low access/awareness of financing options | • Allow HEAT Loan for MF buildings with residential rate code  
• Extend the Expanded 2-4 Family Loan offer to small or mid-sized MF buildings  
• Increase visibility of commercial financing options for large MF buildings |
### Tier 2 Barriers

<table>
<thead>
<tr>
<th>Relevant to:</th>
<th>Narrative</th>
<th>Considerations</th>
</tr>
</thead>
<tbody>
<tr>
<td>Contractors</td>
<td>Distribution mentioned:</td>
<td></td>
</tr>
<tr>
<td>Distributors</td>
<td>• Complex and time-consuming process</td>
<td></td>
</tr>
<tr>
<td></td>
<td>• Large amount of paperwork and lack of clarity of the process make it hard to capture all savings</td>
<td></td>
</tr>
<tr>
<td>Contractors</td>
<td>• Lack of knowledge was the second largest barrier among building decision-makers</td>
<td></td>
</tr>
<tr>
<td></td>
<td>• 2/3 slightly or not at all familiar with HPs</td>
<td></td>
</tr>
<tr>
<td></td>
<td>• Twice as many respondents selected poor performance in extreme weather vs good performance in any weather</td>
<td></td>
</tr>
<tr>
<td></td>
<td>• Lack of trust in heat pumps</td>
<td></td>
</tr>
<tr>
<td></td>
<td>• Contractor often educates customers</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>• Streamline the process</td>
</tr>
<tr>
<td></td>
<td></td>
<td>• Include part prescriptive rebates</td>
</tr>
<tr>
<td></td>
<td></td>
<td>• Develop case studies of retrofit MF buildings</td>
</tr>
<tr>
<td></td>
<td></td>
<td>• Create a “climate champion campaign”</td>
</tr>
<tr>
<td></td>
<td></td>
<td>• Continue to promote heat pumps</td>
</tr>
</tbody>
</table>
## Tier 3 Barriers

<table>
<thead>
<tr>
<th>No rebates for natural gas replacement</th>
<th>Contractors</th>
<th>Distributors</th>
<th>Considerations</th>
</tr>
</thead>
<tbody>
<tr>
<td>Full replacement rebates are available for oil, propane and electric systems.</td>
<td>Contractors mentioned:</td>
<td>• Cheap gas prices make no economic sense for installing heat pumps without rebates</td>
<td>• Include rebates for gas replacement</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Aesthetics concerns</th>
<th>Building Decision Makers</th>
<th>Occupants</th>
<th>Considerations</th>
</tr>
</thead>
<tbody>
<tr>
<td>Ugly look of compressors on the outside or inside units hanging on the wall</td>
<td>Building Decision Makers mentioned:</td>
<td>• Ugly look of compressors on the outside or inside units hanging on the wall</td>
<td>• Continue heat pump marketing to promote customer visual habituation to the technology</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Local regulations and building guidelines</th>
<th>Contractors</th>
<th>Distributors</th>
<th>Building Decision Makers</th>
<th>Considerations</th>
</tr>
</thead>
<tbody>
<tr>
<td>Zoning regulation on noise</td>
<td>Contractors</td>
<td>Distributors</td>
<td>Building Decision Makers</td>
<td>• Work with municipalities to amend zoning regulations on noise</td>
</tr>
<tr>
<td>ASHRAE refrigerant ratio to room size requirement</td>
<td>• Building guidelines not allowing compressor to hang on outside of walls</td>
<td></td>
<td></td>
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</tr>
</tbody>
</table>
Additional findings
Type of heat pumps among respondents

- Air source HP (central system - ducted): 23
- Ductless mini-split HP: 19
- Water source HP (WSHP): 9
- VRF (variable refrigerant flow): 3
- Other: 2
- Ground source HP: 1
- Packaged terminal HP (PTHPs): 1
Reasons for installing heat pumps

- Increase energy efficiency: 12
- Failure of an old system: 10
- Availability of rebates / incentives: 9
- Increase occupant comfort: 9
- Wanted to add cooling: 8
- Indoor air quality: 5
- Reduce building-level heating bills: 4
- Reduce carbon footprint as an individual or...: 4
- Reduce heating bills for residents: 3
- Reduce greenhouse gas emissions: 3
- Achieve LEED or other "green" building certification: 2
- Positive experience with heat pumps at other...: 2
- To improve over window units: 2
Likelihood of recommending heat pumps

Heat pump satisfaction

<table>
<thead>
<tr>
<th>Likelihood of recommending heat pumps</th>
<th>Not at all likely</th>
<th>Slightly likely</th>
<th>Moderately likely</th>
<th>Very likely</th>
<th>Extremely likely</th>
</tr>
</thead>
<tbody>
<tr>
<td>10%</td>
<td>6%</td>
<td>31%</td>
<td>47%</td>
<td>6%</td>
<td></td>
</tr>
</tbody>
</table>

Likelihood of recommending heat pumps

<table>
<thead>
<tr>
<th>The HP's ability to heat space</th>
<th>The HP's ability to cool space</th>
<th>The HP's performance on the coldest days of the year</th>
<th>The cost to operate your HP (i.e., your utility bill)</th>
<th>The cost to maintain your HP</th>
<th>The HP overall</th>
</tr>
</thead>
<tbody>
<tr>
<td>Not at all satisfied</td>
<td>Slightly satisfied</td>
<td>Moderately satisfied</td>
<td>Very satisfied</td>
<td>Completely satisfied</td>
<td></td>
</tr>
<tr>
<td>4%</td>
<td>2%</td>
<td>4%</td>
<td>9%</td>
<td>7%</td>
<td>4%</td>
</tr>
</tbody>
</table>

Heat pump satisfaction
Questions

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