US Heat Pump Deployment

**Growth Impacts on the Grid**

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In 2020 RECS survey, 15%+ of households use heat pumps as their primary method of space heating.

In the same survey, nearly 68% of households use central air conditioning equipment.

In 2021, space conditioning accounted for roughly 42% of residential energy usage.

References:
- Residential Energy Consumption Survey (RECS) - Energy Information Administration (eia.gov)
- Residential Buildings Factsheet | Center for Sustainable Systems (umich.edu)
- https://www.eia.gov/todayinenergy/detail.php?id=52558

Heat pumps could play a large role in decarbonizing space conditioning.
US Heat Pump Adoption Regionally Driven

Over last 10yrs, residential adoption of heat pumps has increased dramatically

- Growth largely in the South
- Skepticism remains in colder regions
- Gaps in understanding the technology remain for owners & contractors

Reference: Residential Energy Consumption Survey (RECS) - Energy Information Administration (eia.gov)
US Electrification Impacts: Energy, CO₂, Demand

SCENARIO
Electricity Portion of Final Energy (2015 - 2050)

<table>
<thead>
<tr>
<th>Scenario</th>
<th>Total Final Energy</th>
<th>Economy Wide</th>
<th>Electric Load</th>
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</thead>
<tbody>
<tr>
<td>CONSERVATIVE (32%)</td>
<td>20%</td>
<td>19%</td>
<td>24%</td>
</tr>
<tr>
<td>REFERENCE (36%)</td>
<td>22%</td>
<td>20%</td>
<td>32%</td>
</tr>
<tr>
<td>PROGRESSIVE (39%)</td>
<td>27%</td>
<td>57%</td>
<td>35%</td>
</tr>
<tr>
<td>TRANSFORMATION (47%)</td>
<td>32%</td>
<td>67%</td>
<td>52%</td>
</tr>
</tbody>
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Projected US Heat Pump Growth & Drivers

Heat Pump Adoption

- New construction
- Fuel switching
- Conversion Efficiencies
Space Heating Load Shape Examples

Sorted annual (diversified) load for representative house, a 3,000 ft² single-family home in central Michigan

Heat pump reduces gas use by 70% overall, but only by 30% at the peak

Older home with electric resistance heating

Current new home with current (single speed) air-source heat pump

Future new home with future variable speed air-source heat pump

Future new home with future heat pump + hybrid gas back-up
New York Aggregate Electricity Load Shape

2050 Net-Zero Limited Options

30% of peak heating demand

2015

Vehicle Charging
Space Heating
Non-Seasonal

Vehicle Charging
Cooling
Non-Seasonal
Southeast Aggregate Electricity Load Shape

2050
Net-Zero
Limited Options

71% of peak heating demand

2015
Heat Pump Growth Impediments

Grid stability, non-traditional challenges

- Reliability
- Resilience
- Workforce
- Electric Panels
Positive Impacts From Heat Pump Growth

- Reduced Carbon
- Efficiency Gains
- Net Peak Load Reductions
- Demand Response Gains
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