

US Heat Pump Deployment

GROWTH IMPACTS ON THE GRID

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Residential Space Conditioning in the U.S.



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

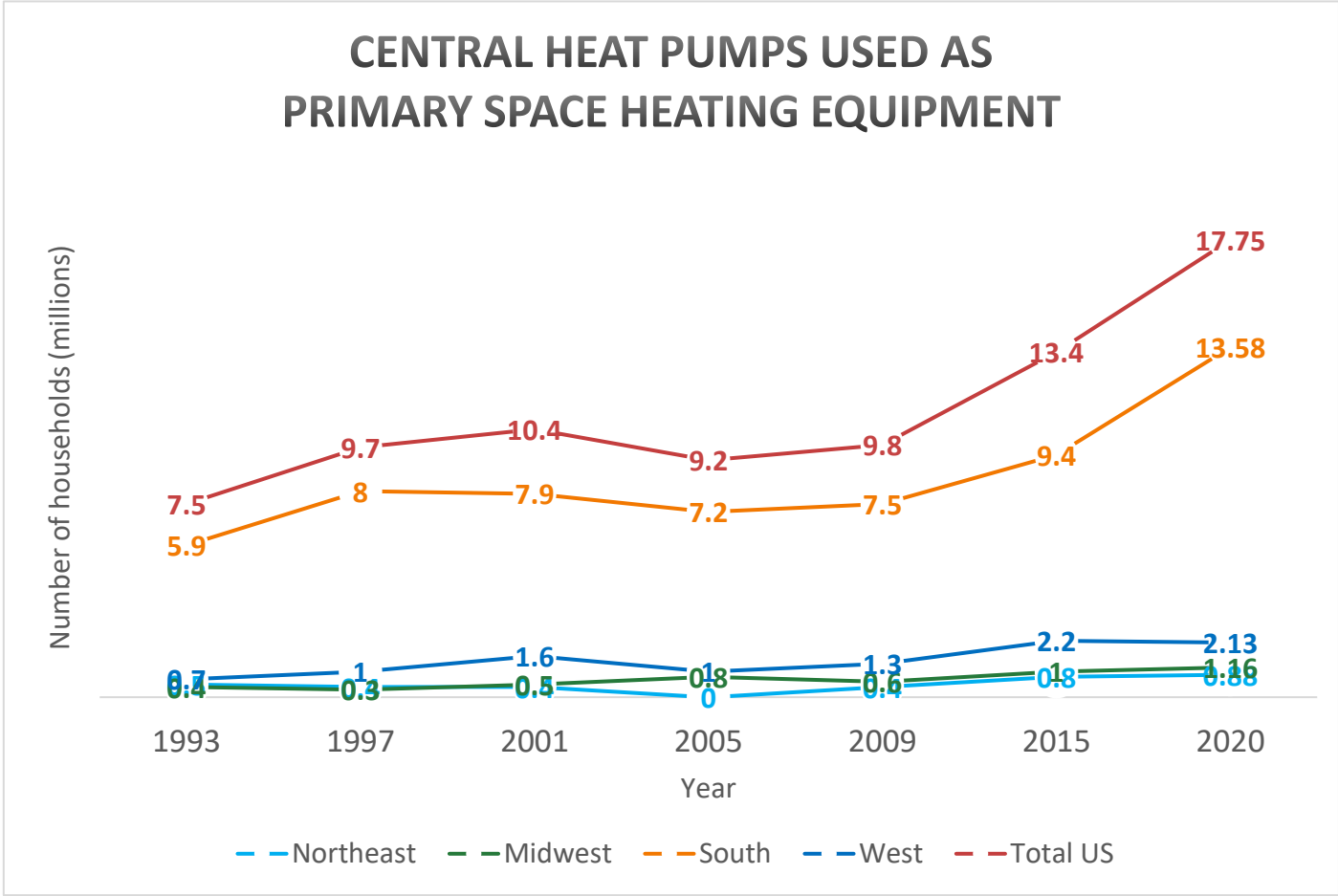


In 2021, space conditioning accounted for roughly **42%** of residential energy usage

References: [Residential Energy Consumption Survey \(RECS\) - Energy Information Administration \(eia.gov\)](https://www.eia.gov)
[Residential Buildings Factsheet | Center for Sustainable Systems \(umich.edu\)](https://www.eia.gov)
<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



Reference: [Residential Energy Consumption Survey \(RECS\) - Energy Information Administration \(eia.gov\)](#)

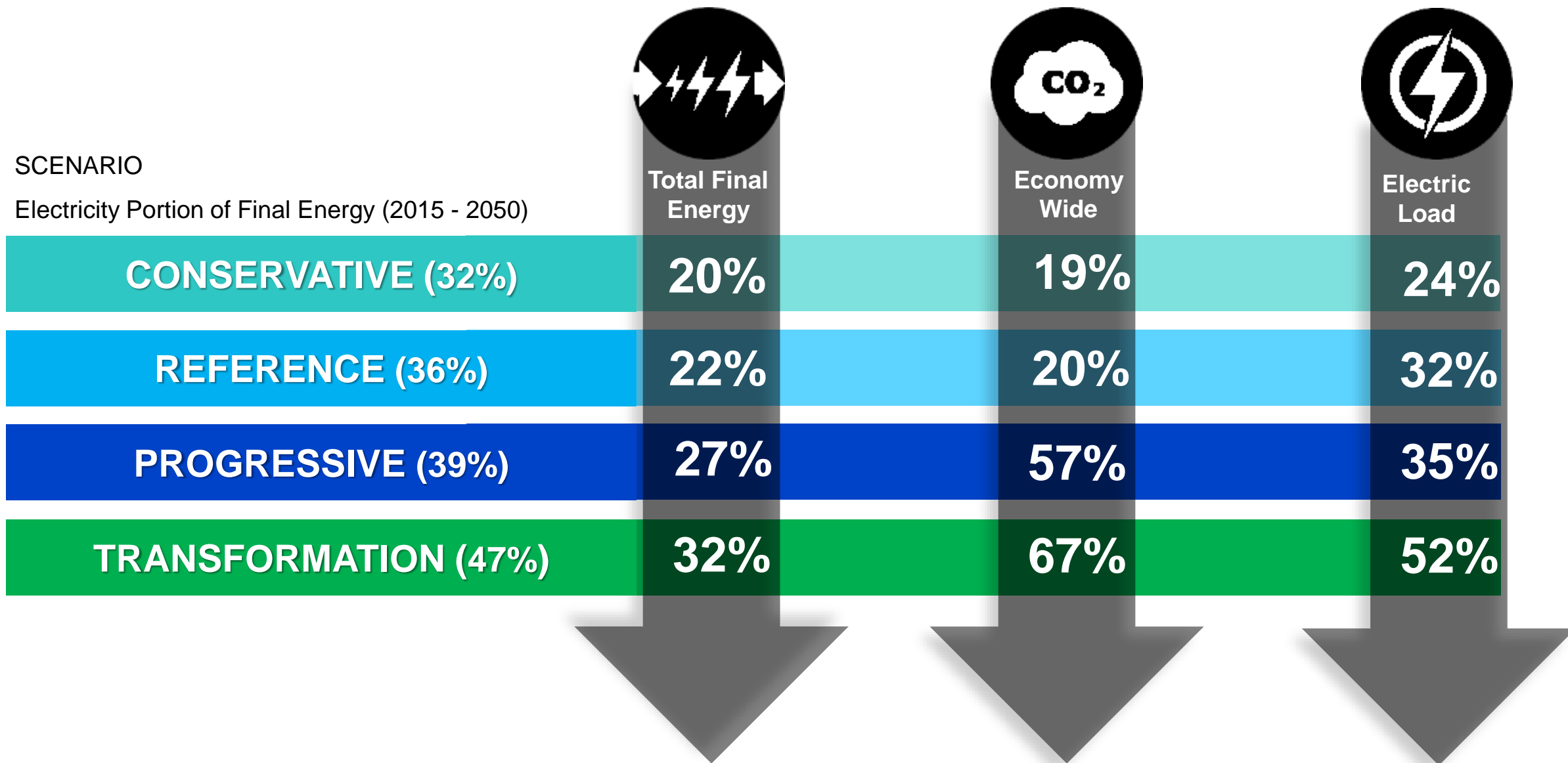
- Growth largely in the South
- Skepticism remains in colder regions
- Gaps in understanding the technology remain for owners & contractors

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

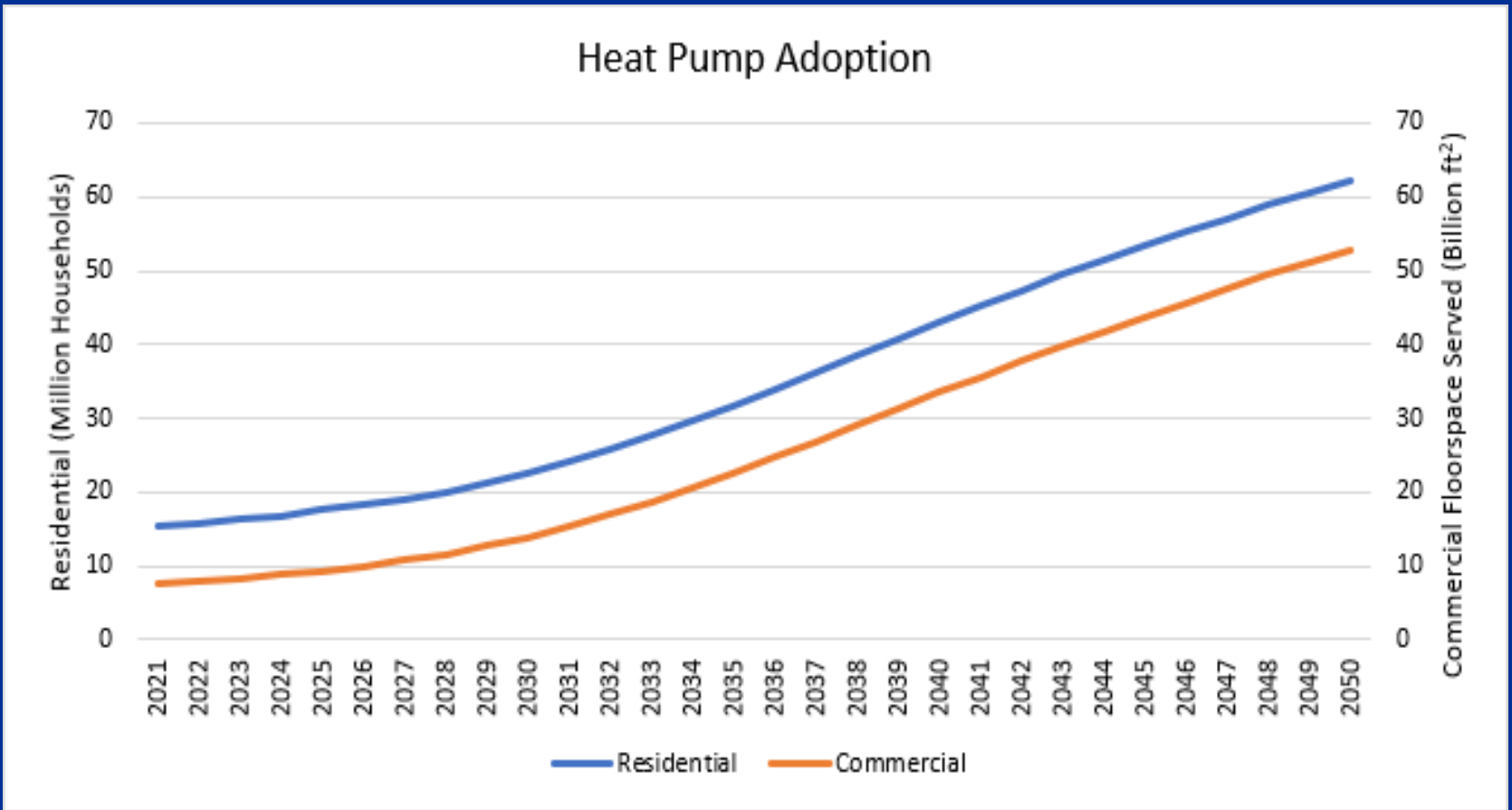
US Electrification Impacts: Energy, CO₂, Demand

SCENARIO

Electricity Portion of Final Energy (2015 - 2050)



Projected US Heat Pump Growth & Drivers



New construction



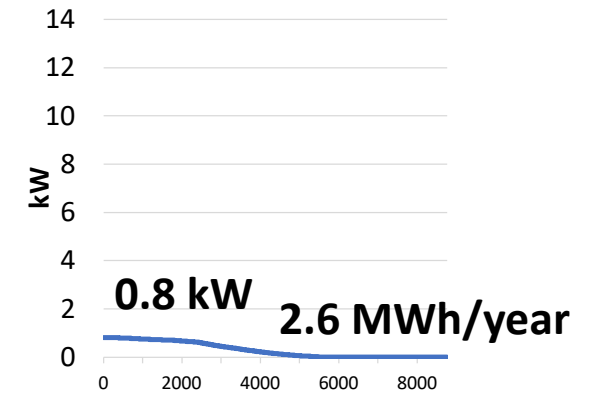
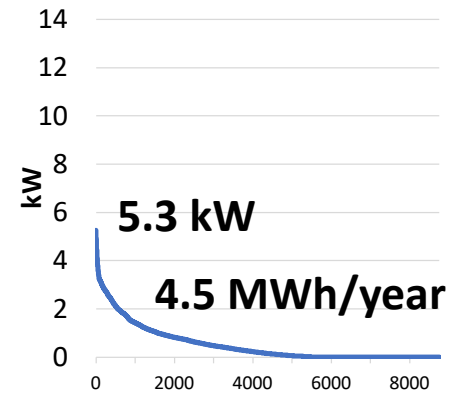
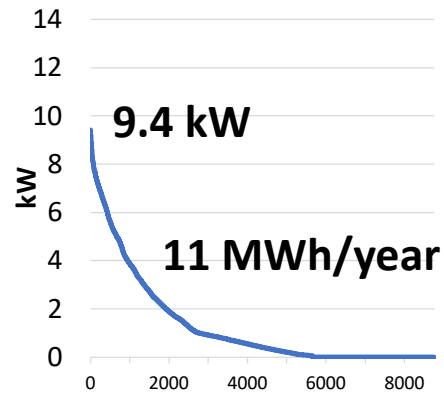
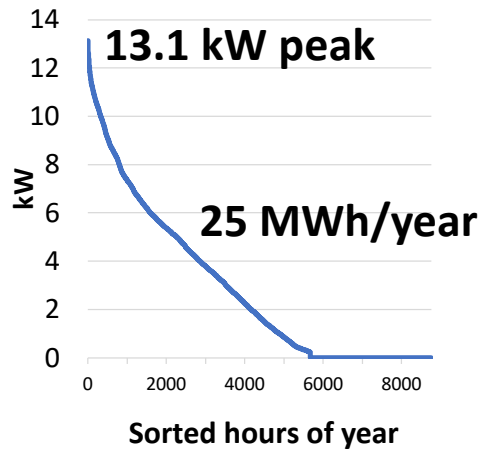
Fuel switching



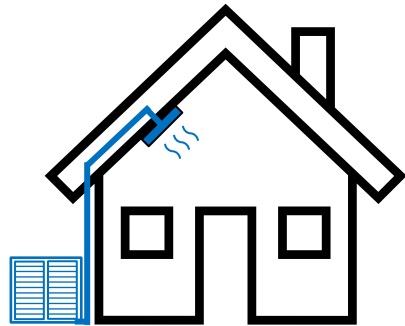
Conversion Efficiencies

Space Heating Load Shape Examples

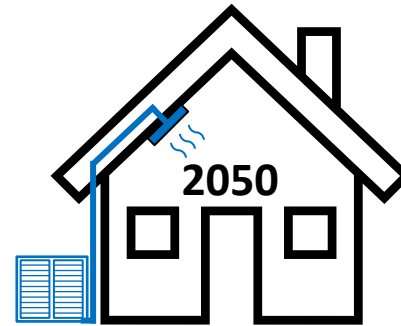
Sorted annual (diversified) load for representative house, a 3,000 ft² single-family home in central Michigan



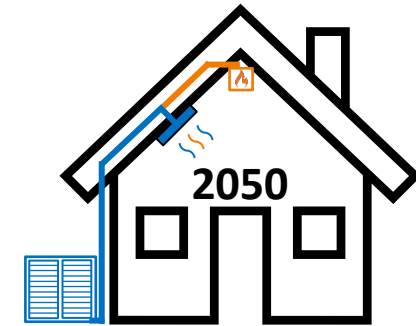
Older home with electric resistance heating



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

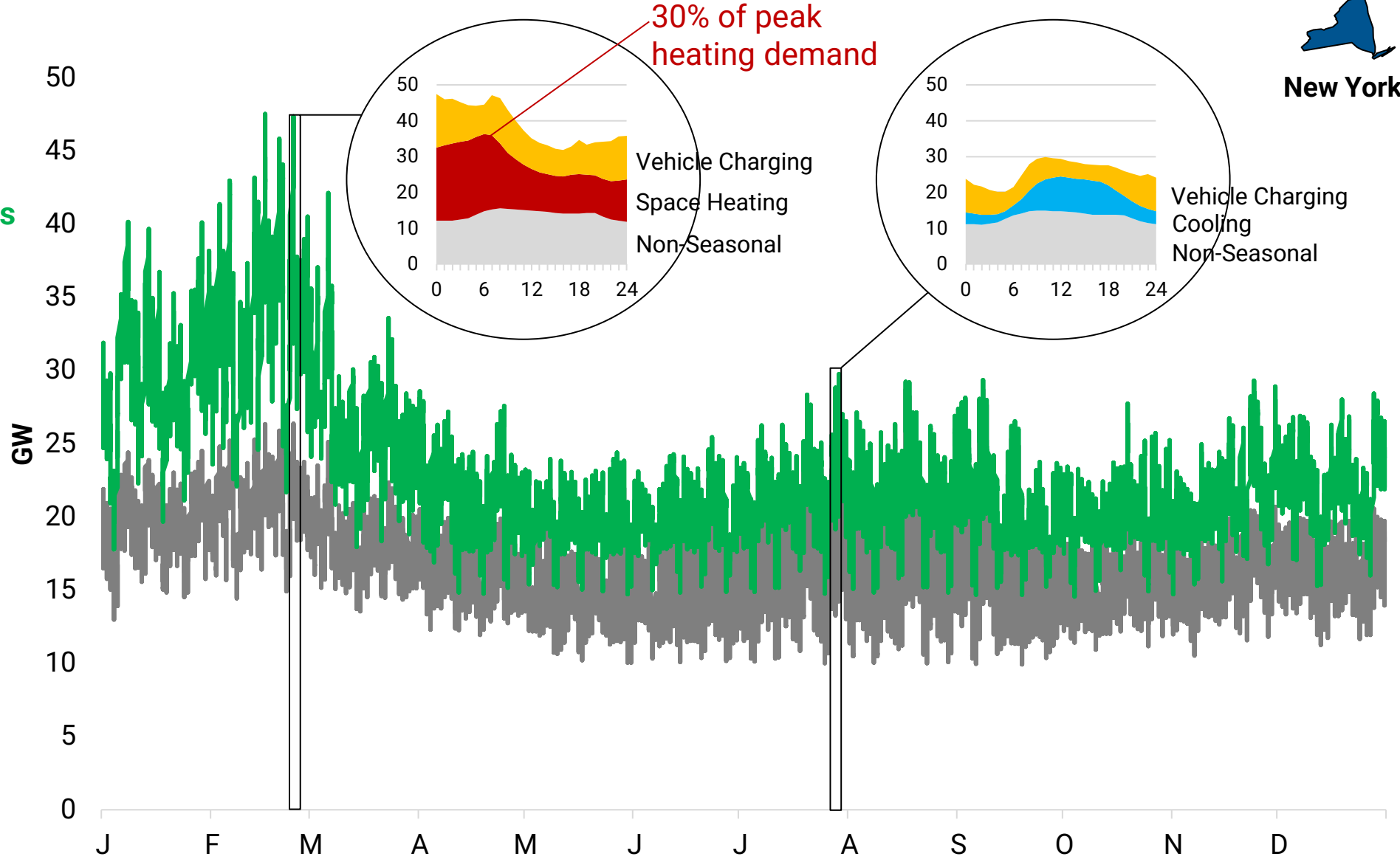
Heat pump reduces gas use by **70%** overall, but only by **30%** at the peak

New York Aggregate Electricity Load Shape



New York

2050
Net-Zero
Limited Options

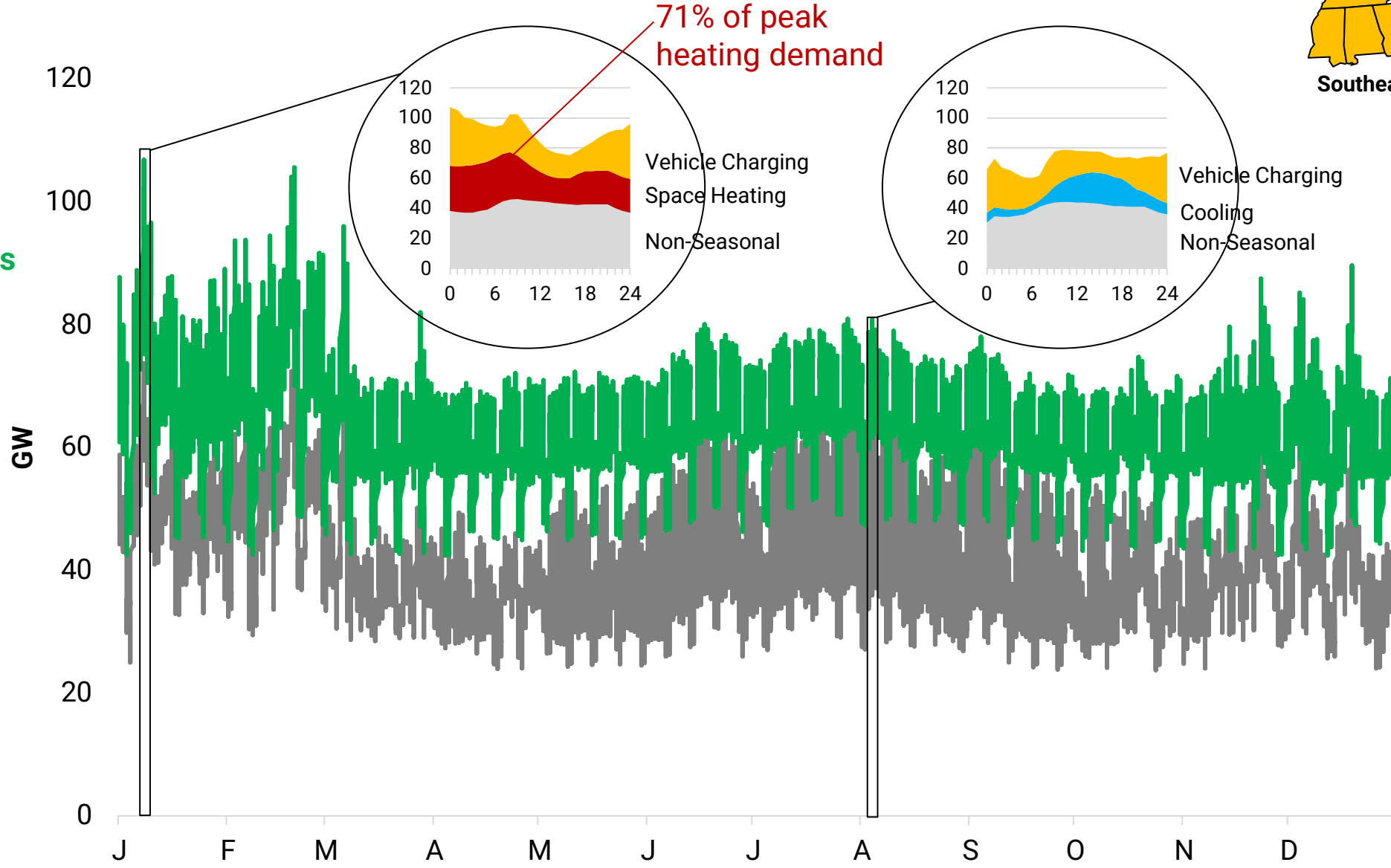


Southeast Aggregate Electricity Load Shape

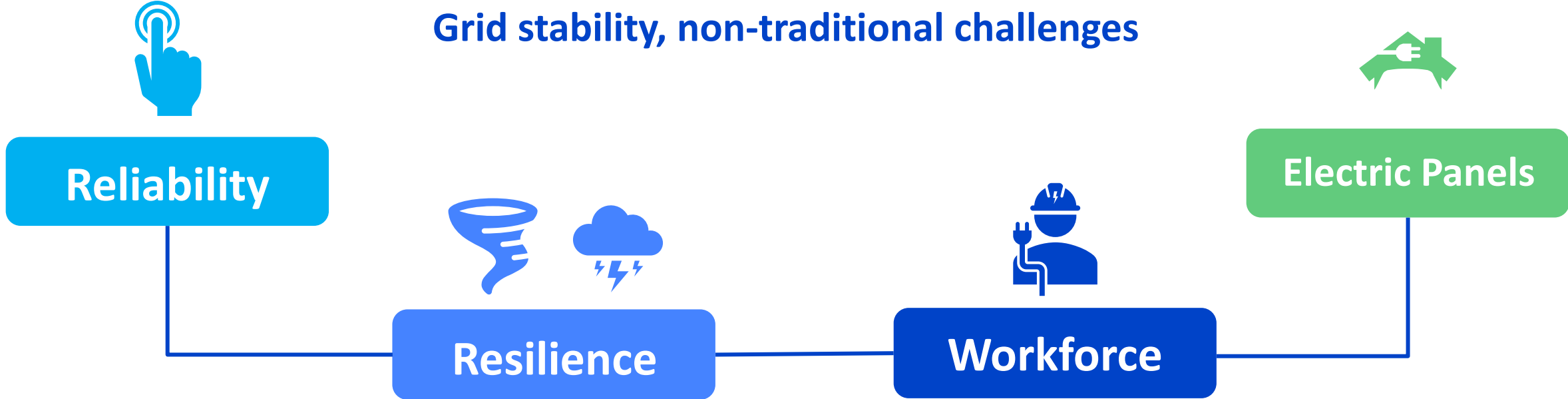


2050
Net-Zero
Limited Options

2015




Heat Pump Growth Impediments



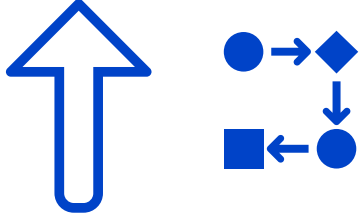
Positive Impacts From Heat Pump Growth

Reduced Carbon




A large white downward-pointing arrow is positioned to the left of a blue cloud icon containing the text 'CO₂'.

Efficiency Gains



A large white upward-pointing arrow is positioned to the left of a flow diagram icon consisting of four shapes (circle, diamond, square, circle) connected by arrows in a clockwise cycle.

Net Peak Load Reductions



A large white downward-pointing arrow is positioned to the left of a line graph icon showing a peak with a sun symbol above it.

Demand Response Gains



A large white upward-pointing arrow is positioned to the left of an icon of a hand with a double-headed arrow above it, indicating interaction or response.

A blue-tinted photograph of four people, two men and two women, standing in a row. They are dressed in professional attire, including lab coats and a hard hat. The image is semi-transparent, allowing the text to be clearly visible over it.

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