New York ISO
Independent System Operator

2024 Building Electrification Assumptions

Arthur Maniaci

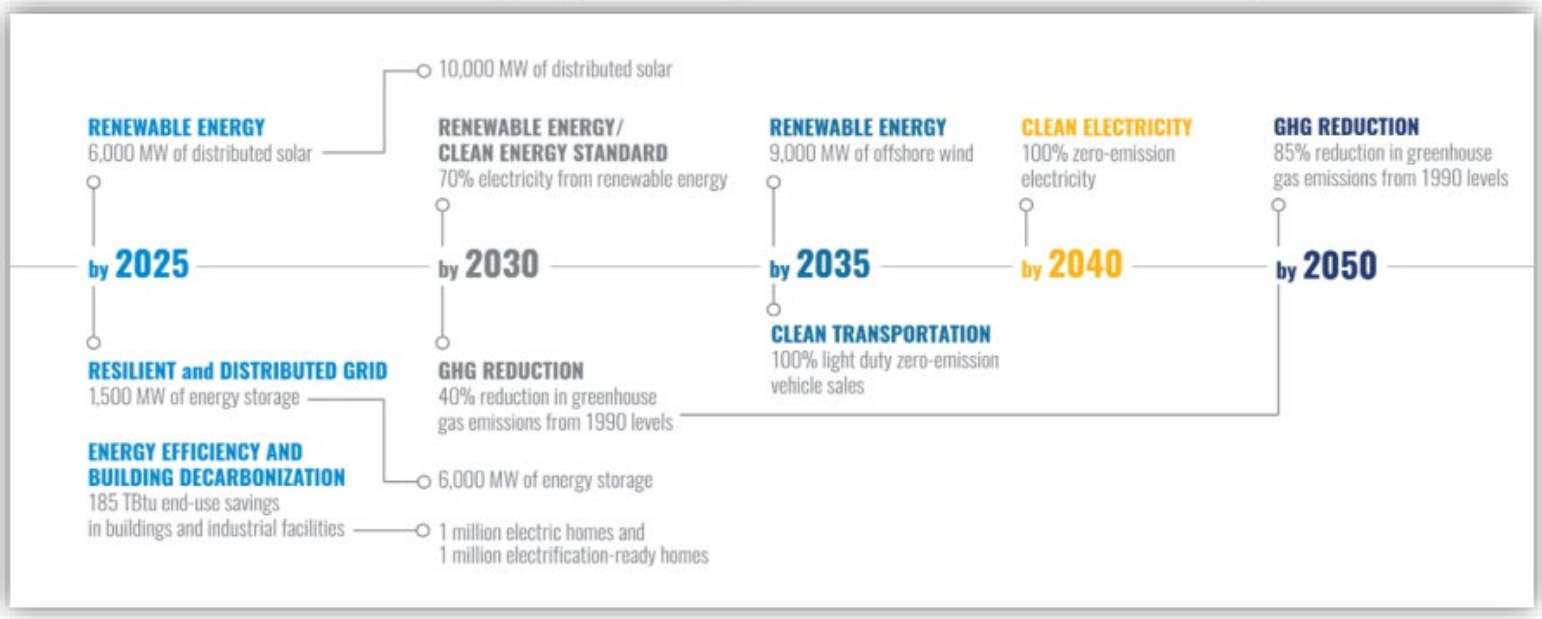
PRINCIPAL FORECASTER

ESPWG

March 21, 2024

CLCPA Targets

The Climate Leadership and Community Protection Act (CLCPA), signed into law on July 18, 2019, including emissions reduction and clean energy targets including the below, some of which have been update since.



Source: CLCPA Annual Informational Presentation DPS Staff First Annual Report, July 2023
https://dps.ny.gov/system/files/documents/2023/07/clcpa-annual-report-session-presentation-v3.pdf
The text above is excerpted from the CLCPA Annual Report.

CLCPA Targets

Achieving Climate-Friendly Buildings

Our building decarbonization and energy efficiency efforts will advance the health and well-being of New Yorkers while enhancing resilience to climate change and cutting greenhouse gas emissions.

By 2030, New York State will have 2 million homes and buildings equipped with heat pumps to provide electric heating and cooling and paired with energy efficiency.

> *By 2050, 85% of New York buildings will use clean heating and cooling technologies, such as heat pumps and thermal energy networks.*

These climate-friendly buildings will operate without fossil fuels and be designed with flexible loads or storage to respond to grid conditions and maintain service reliability. Clean energy incentives, financing, and product innovation will continue promoting building decarbonization as a cost-saving investment for homes and businesses alike. Capitalizing on key points in the building cycle, such as renovations, heating equipment replacement, and property transfer, will streamline energy efficiency and building electrification opportunities.

Transforming New York's buildings will require a skilled workforce and support job opportunities across the State, with the potential to create 100,000 jobs in the coming decade.

Source: https://www.nyserda.ny.gov/Impact-Energy-Efficiency-and-Building-Decarbonization
The text above is excerpted from NYSERDA's website.

Building Electrification End Uses and Technologies

Residential Sector

- Space Heating
  - Air Source Heat Pumps
  - Ground Source Heat Pumps
  - Electric Resistance Heating
  - Electric Supplemental Heating
- Water Heating
- Cooking
- Clothes Drying

Commercial Sector

- Space Heating
- Water Heating
- Cooking
- Clothes Drying

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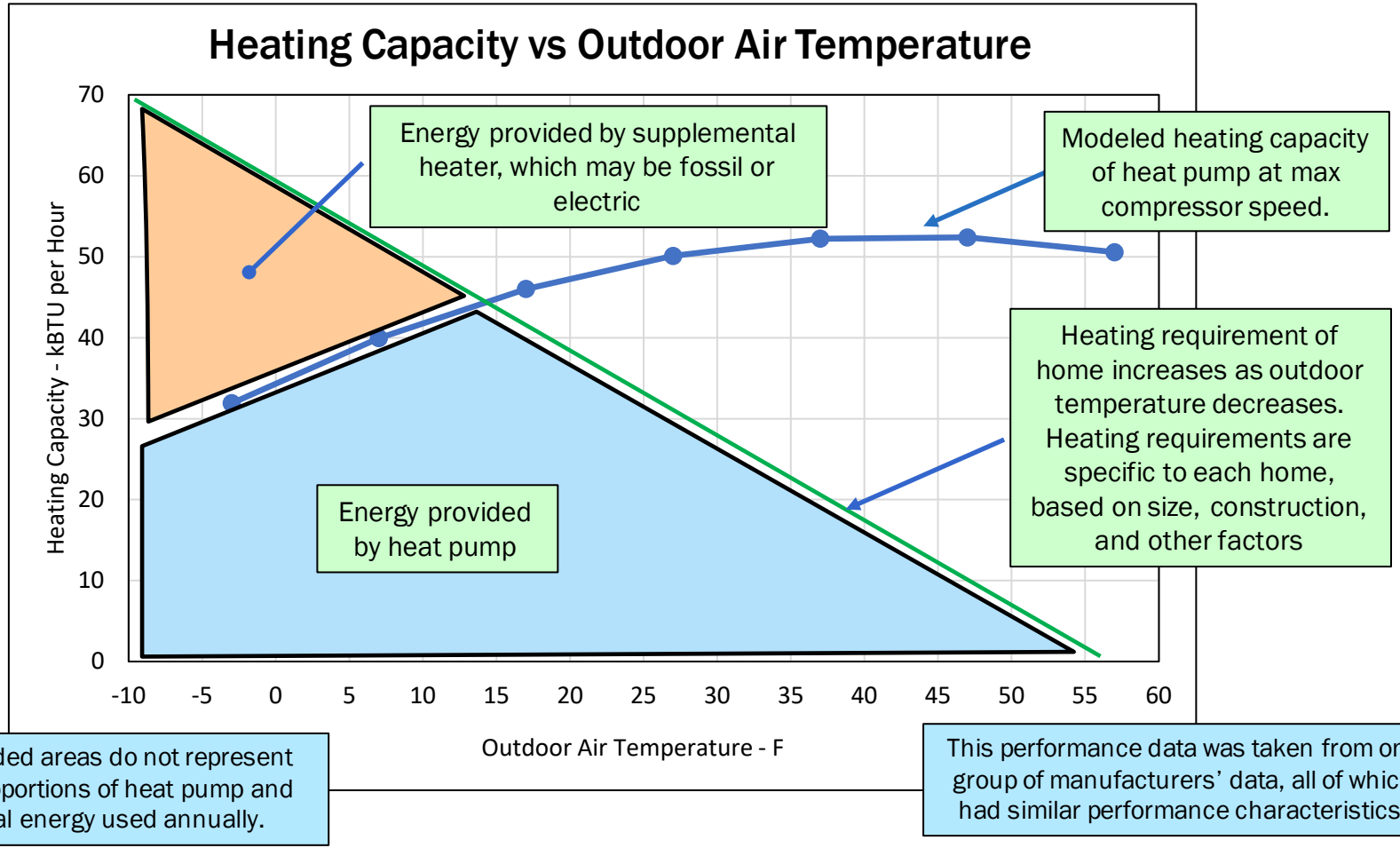
Heating Capacity vs Outdoor Air Temperature

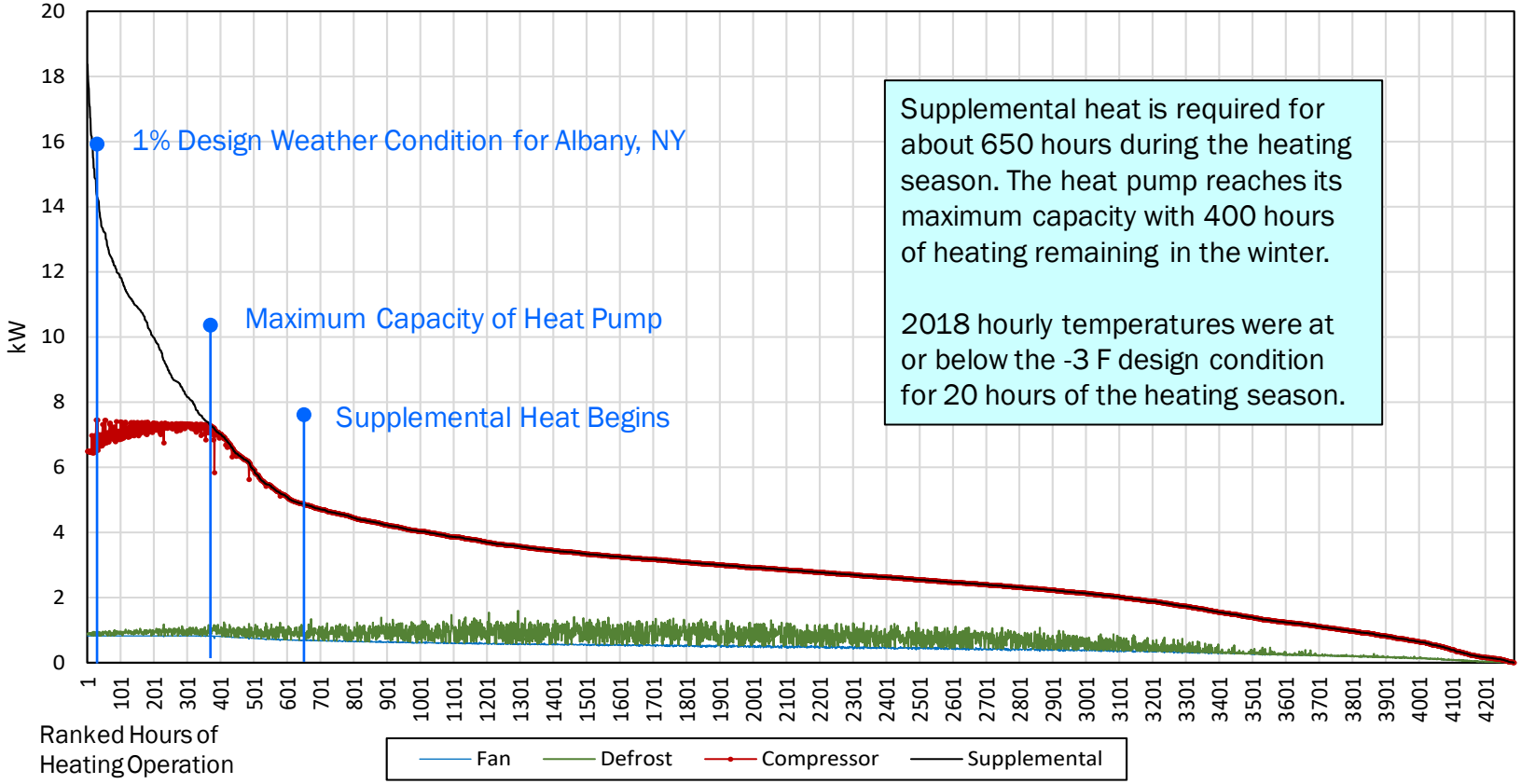


Note: The shaded areas do not represent the relative proportions of heat pump and supplemental energy used annually.

This performance data was taken from one group of manufacturers' data, all of which had similar performance characteristics.

Load Duration of Heat Pump System – Heating Season – kW

Including Supplemental Heat

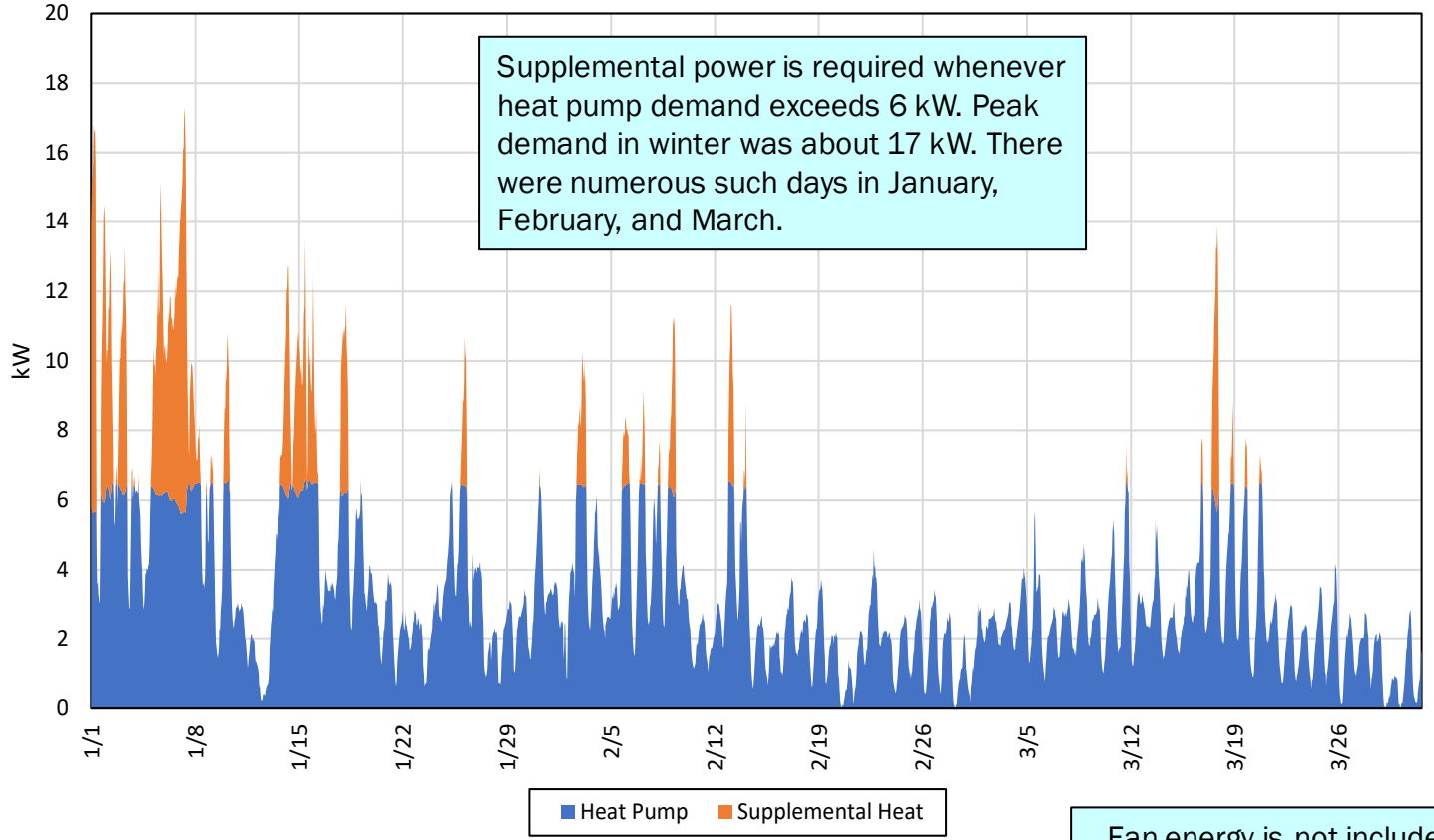


Supplemental heat is required for about 650 hours during the heating season. The heat pump reaches its maximum capacity with 400 hours of heating remaining in the winter.

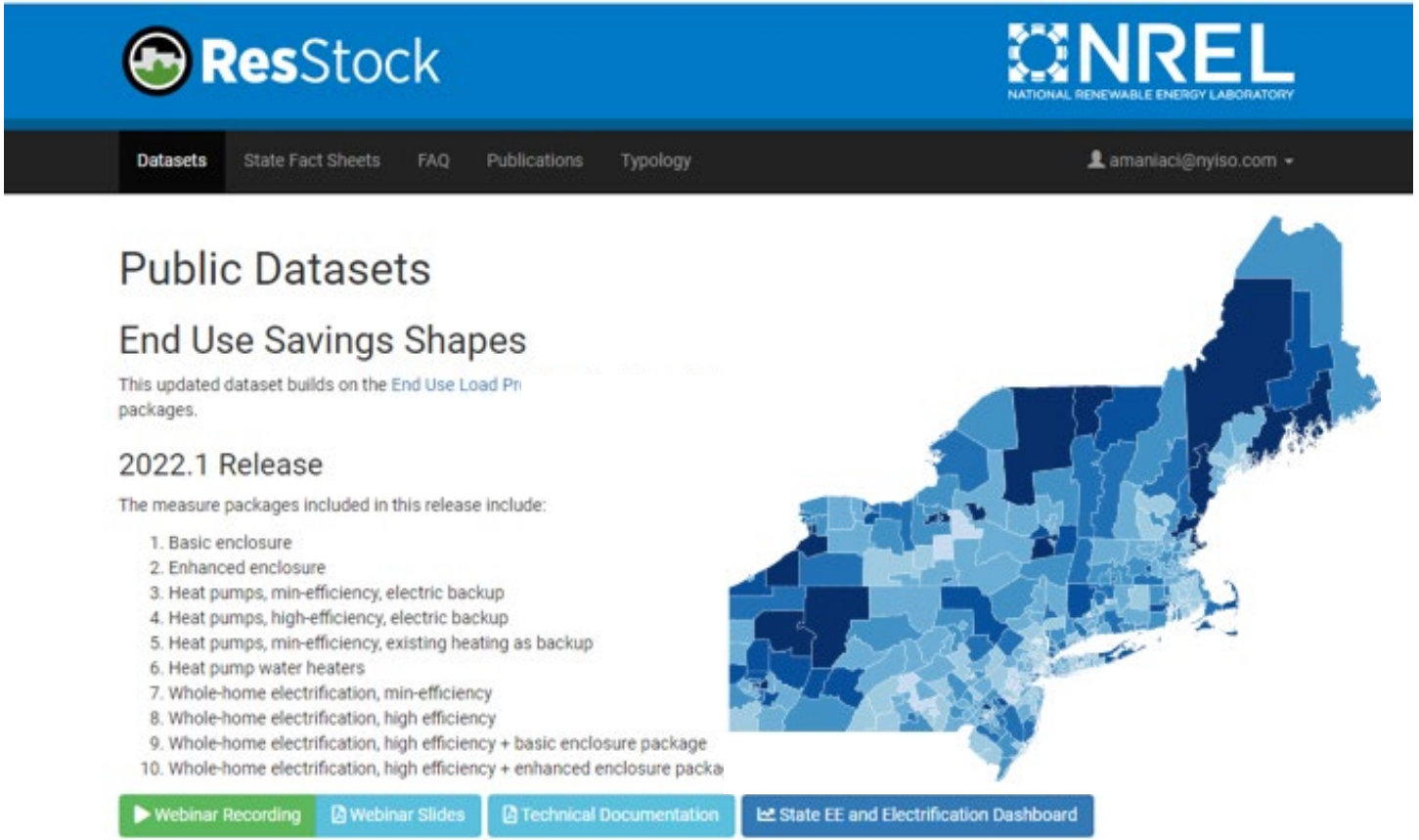
2018 hourly temperatures were at or below the -3 F design condition for 20 hours of the heating season.

Hourly Loads of Heat Pump and Supplemental Heat– kW

January Through March



Fan energy is not included in this chart.



Source: https://resstock.nrel.gov/

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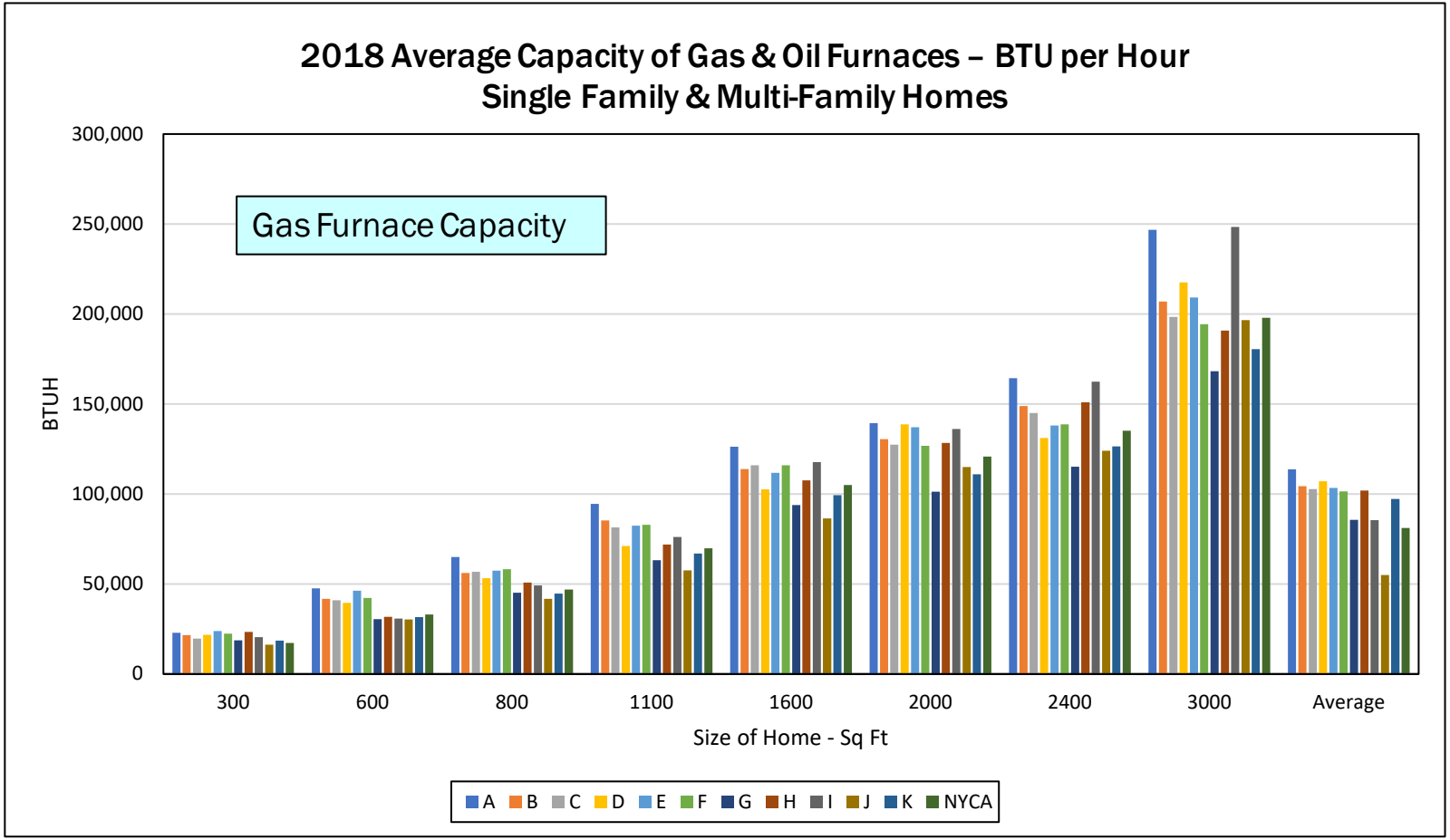
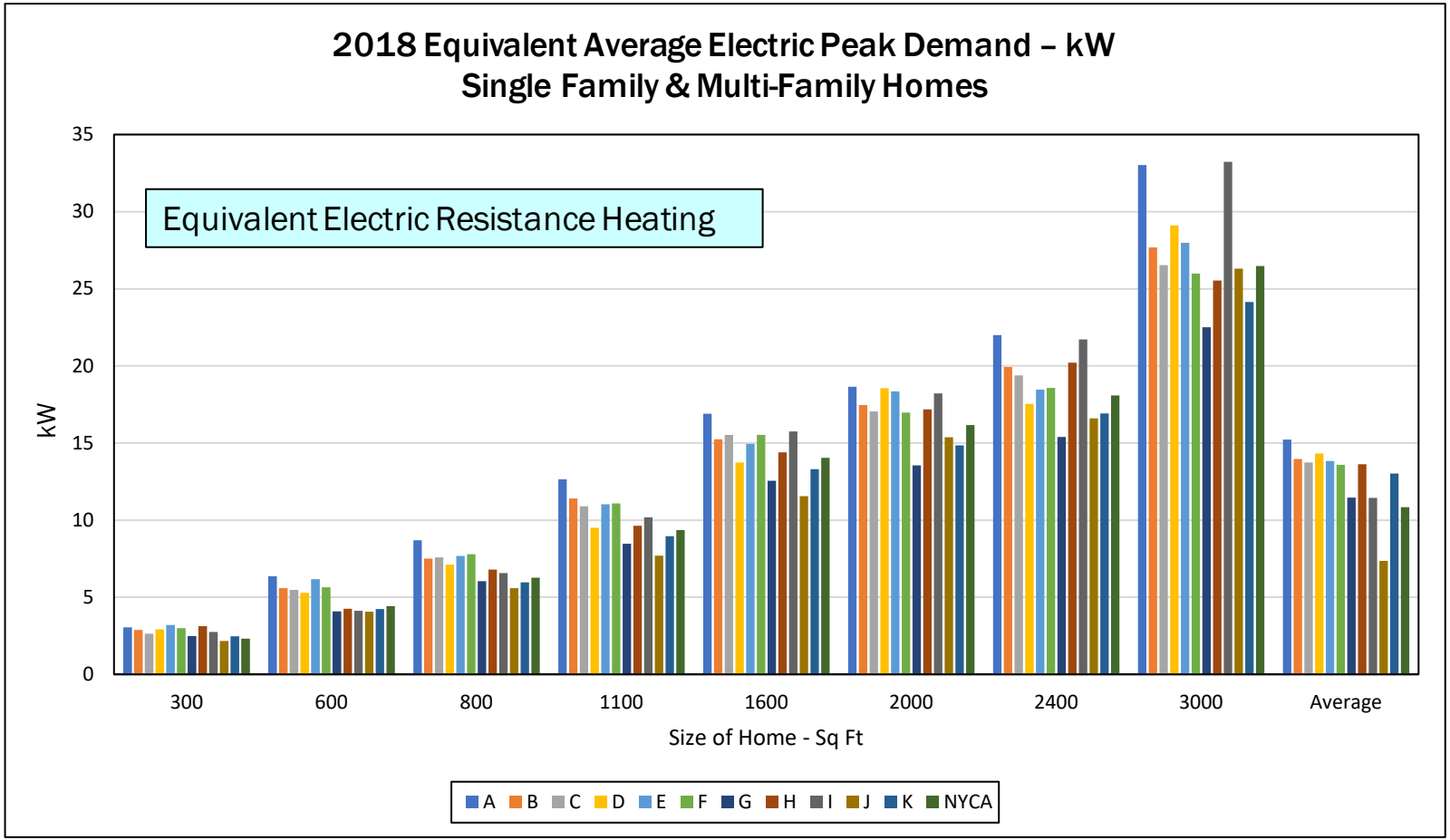
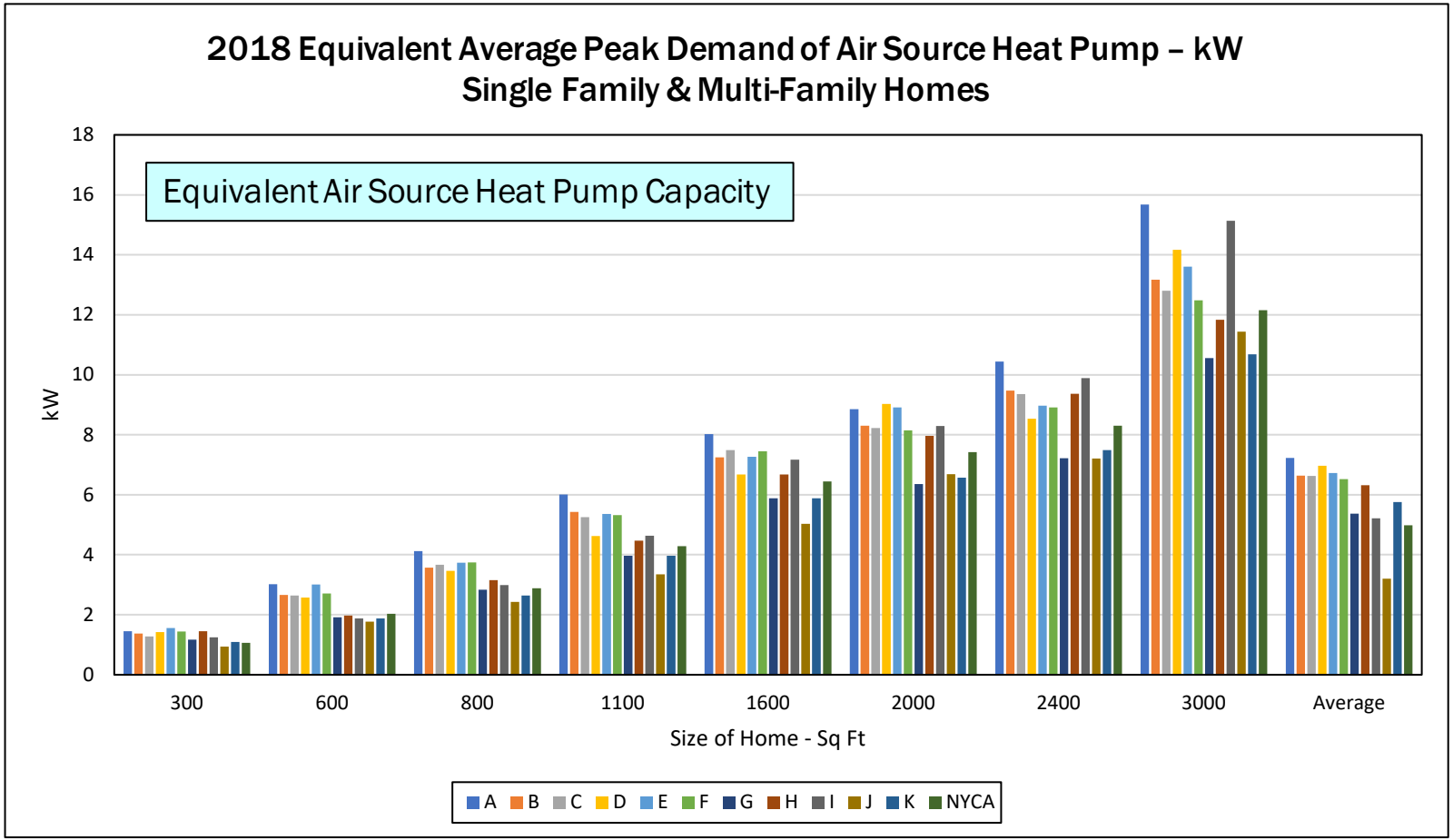


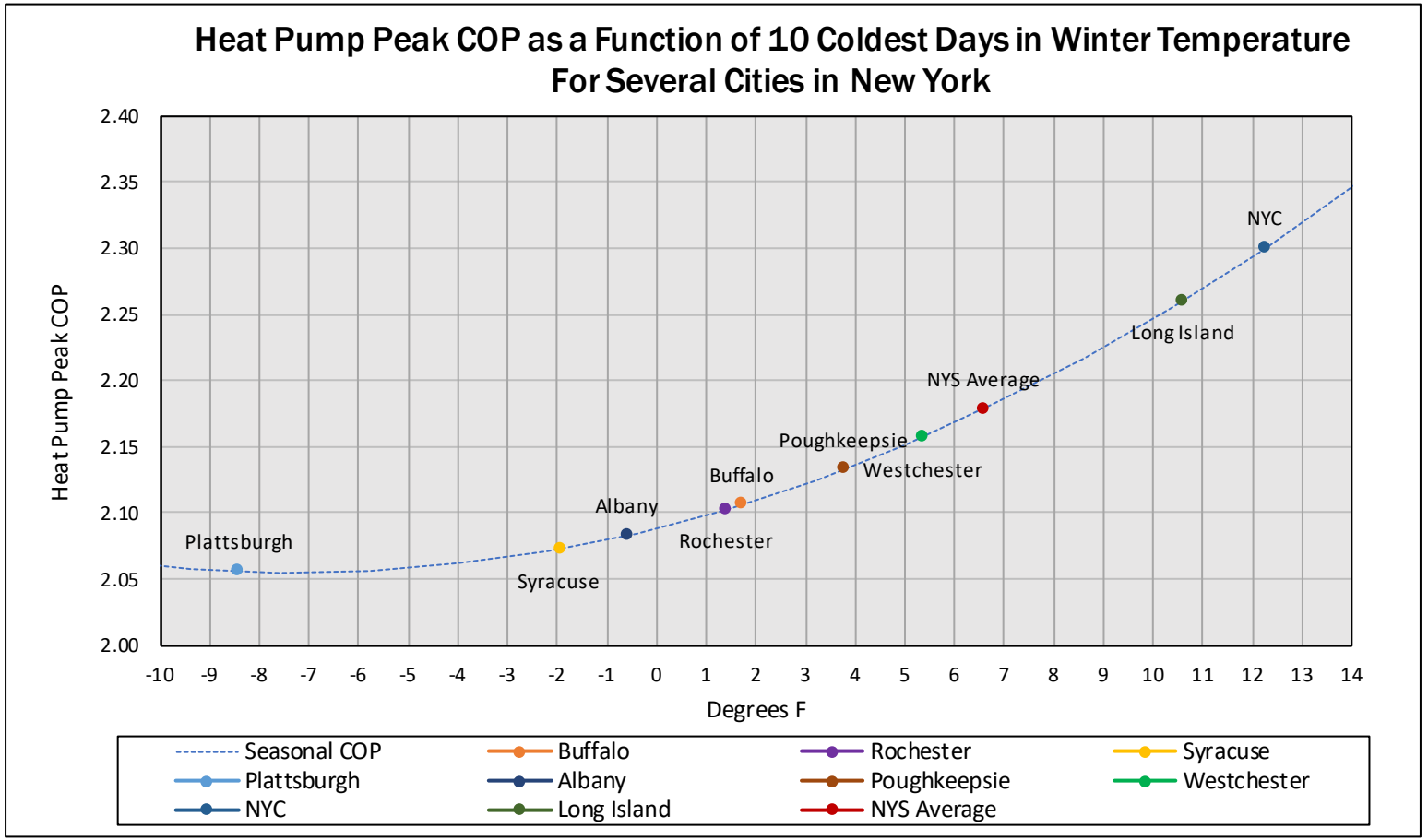
Source: NREL ResStock database



Source: NREL ResStock database



Source: NREL ResStock database



Summary of Technical Review of Cold Climate Air Source Heat Pumps

- Impact of Air Source Heat Pump (ASHP) performance forecasts can be assessed by forecasters using performance data information that is readily available.
- Comparison of ASHP to gas furnaces can provide key information needed by load forecasters to determine impact of ASHP on winter electric peak demand.
- Key factors will be the design conditions for winter peaks and the sizing of ASHP relative to peak heating requirements currently met by gas furnaces.
- In some cases, additional supplemental heat may be required.

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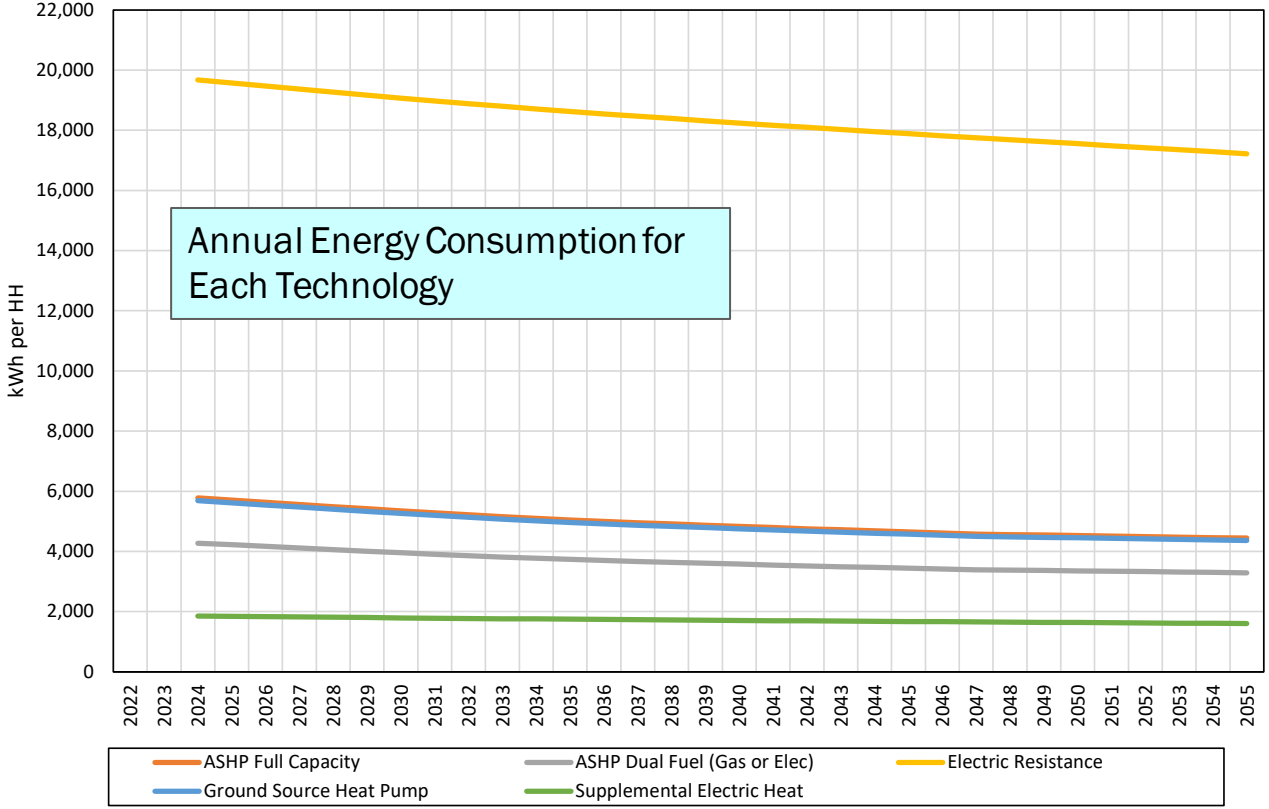
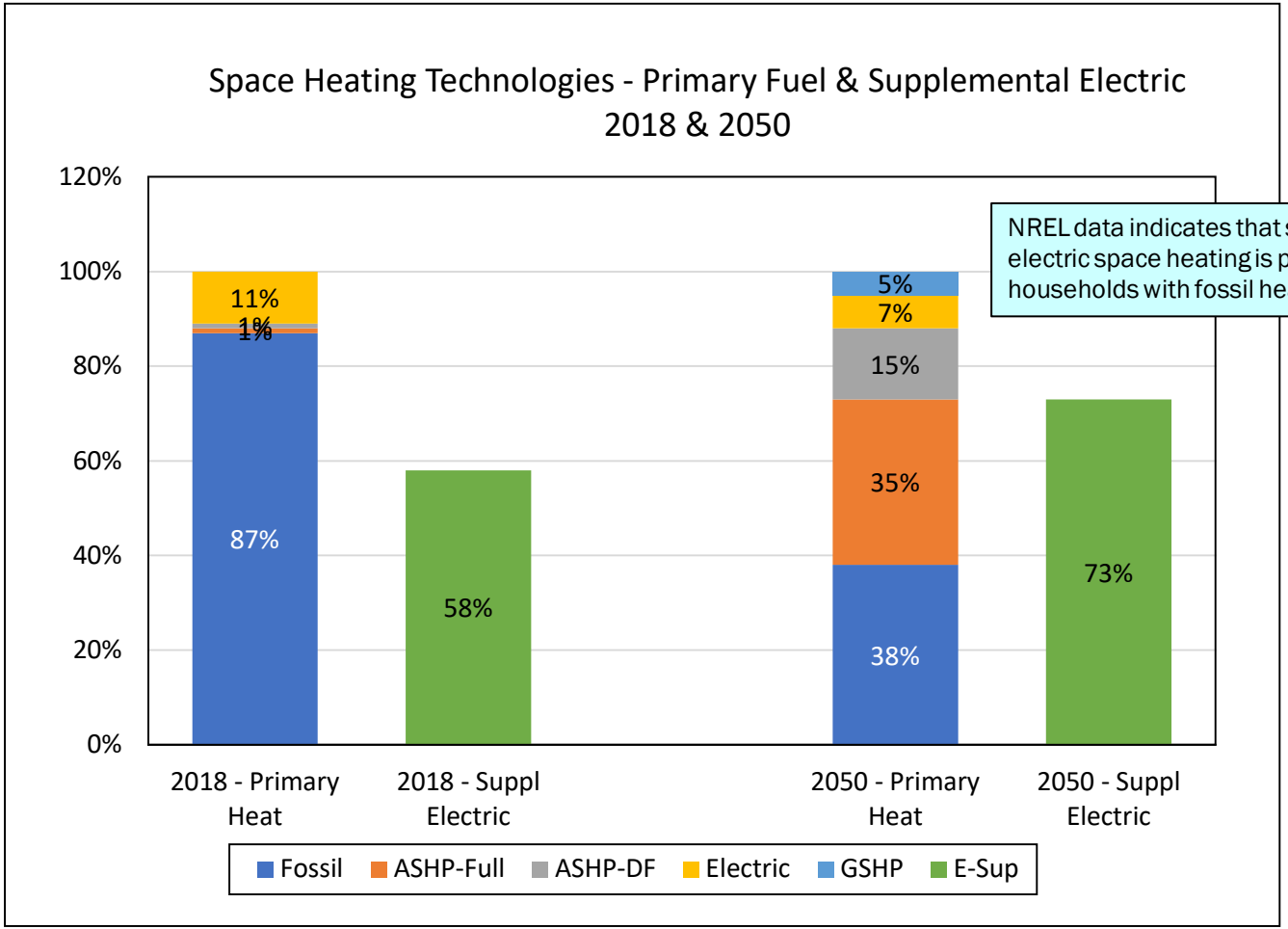
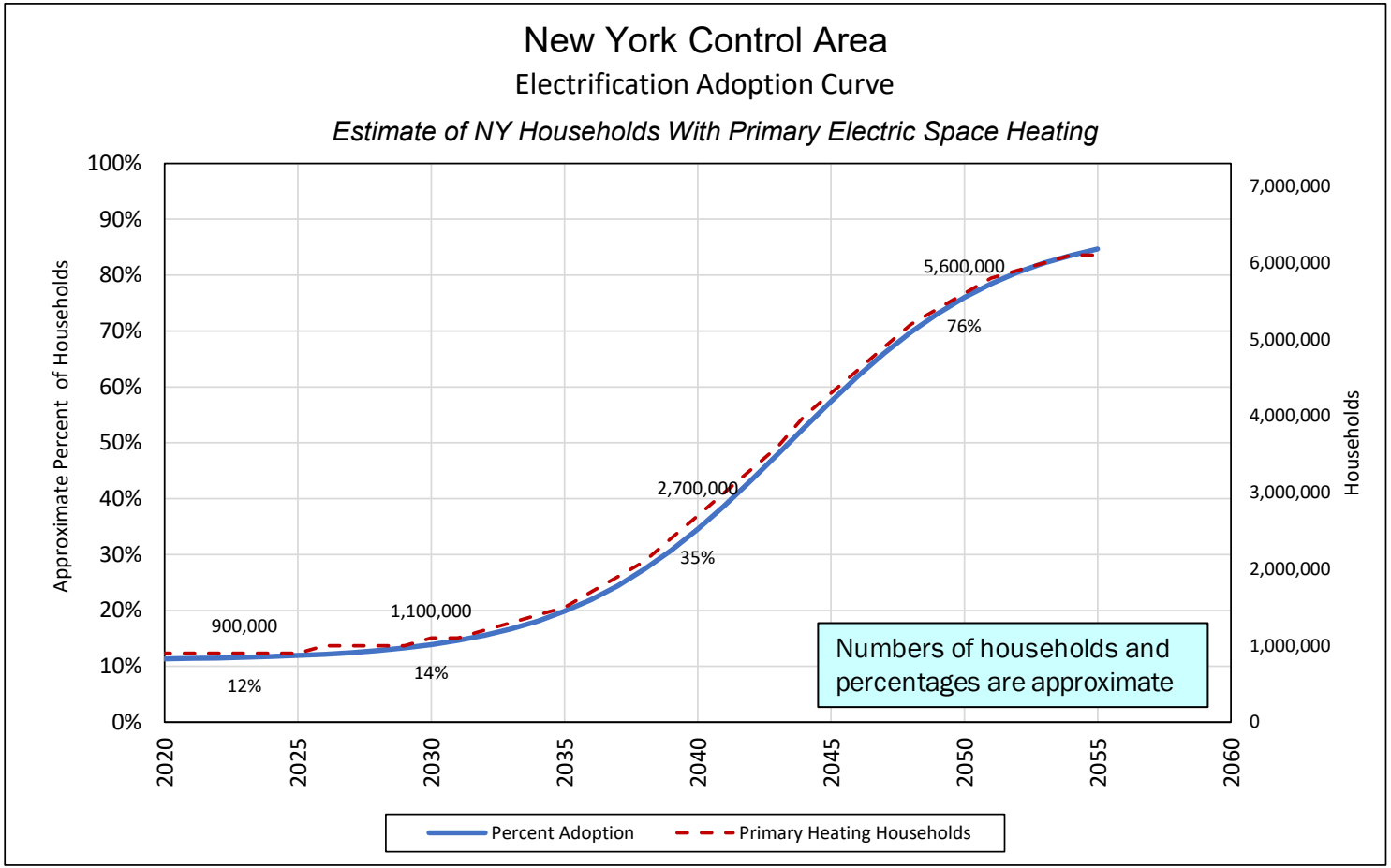
Annual Energy per Household – kWh By Technology







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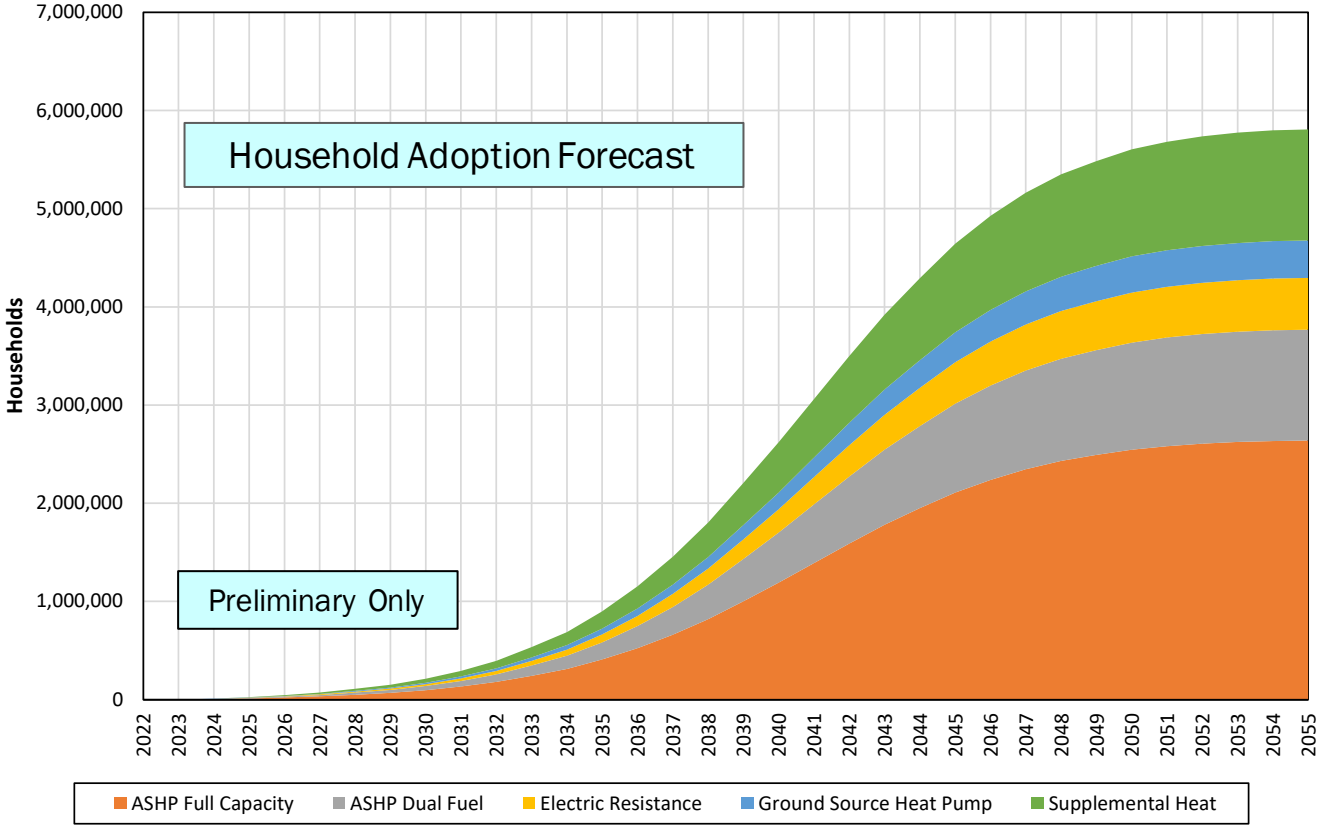
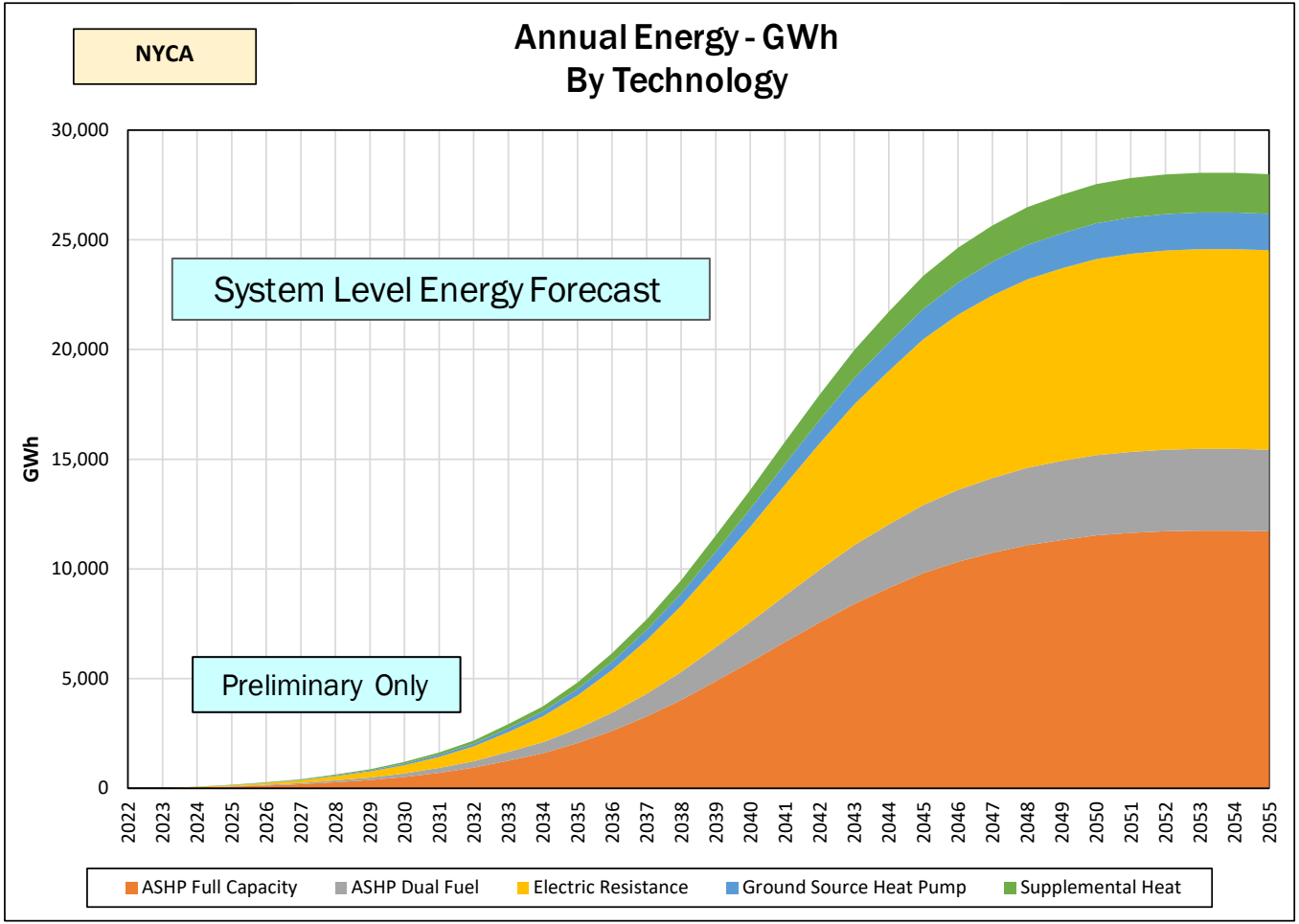
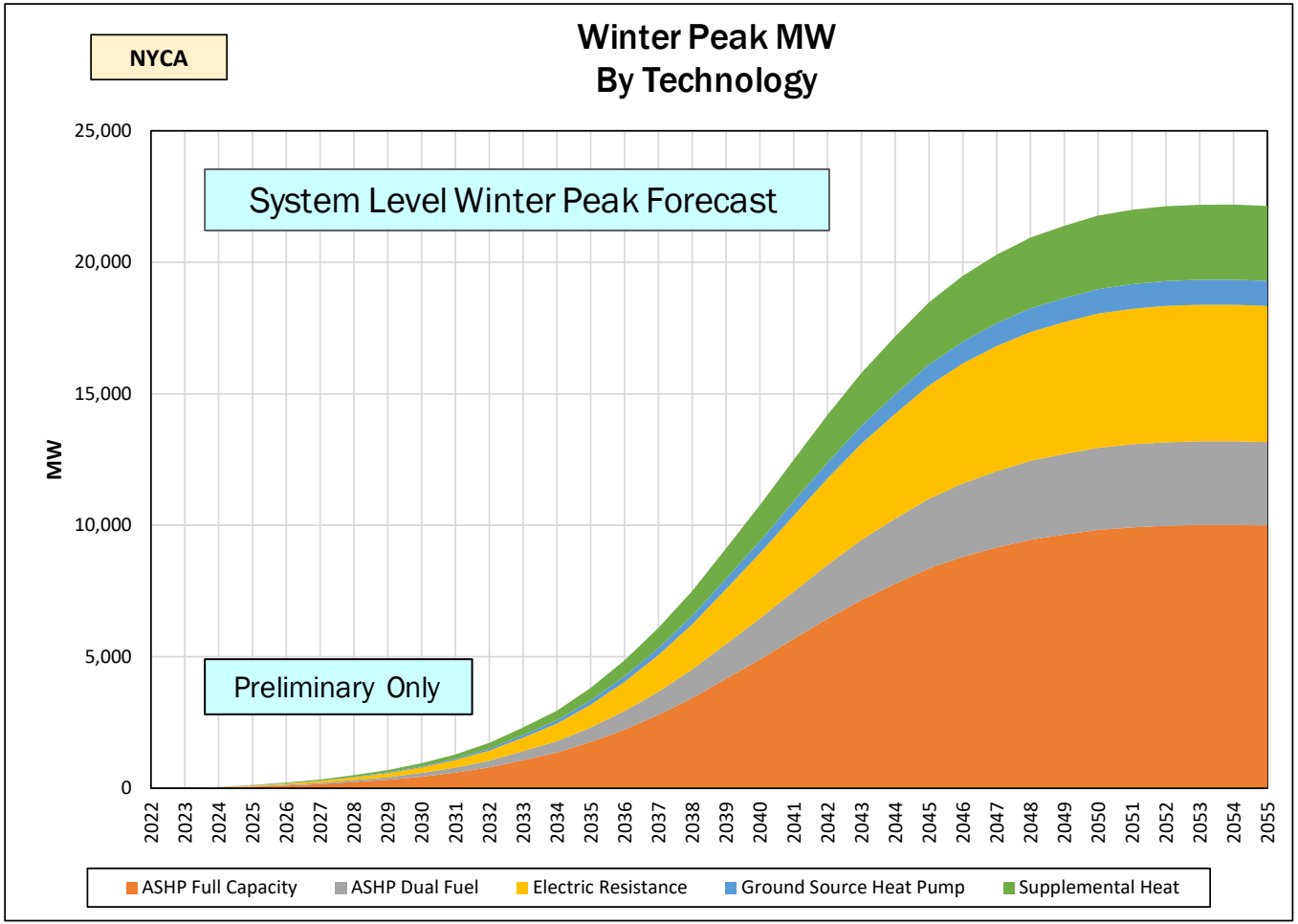
Number of Residential Households Converted to Electric Heating By Technology







Our Mission & Vision

Mission

Ensure power system reliability and competitive markets for New York in a clean energy future

Vision

Working together with stakeholders to build the cleanest, most reliable electric system in the nation

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Questions?