



# Maine Residential Baseline Study 2024

Presentation to the Board

Prepared for Efficiency Maine by NMR Group,  
Inc.

Presented by Laura Martel, Efficiency Maine

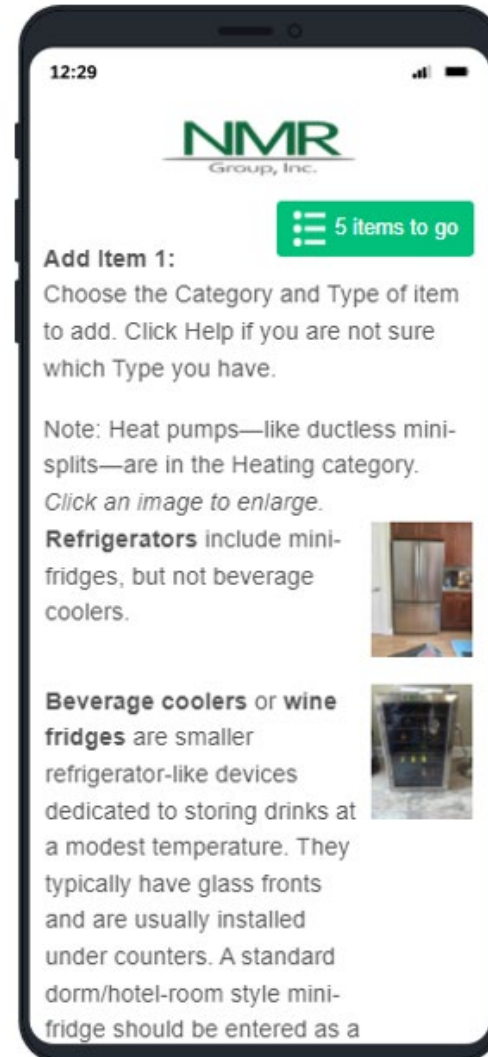
May 22, 2024



- Assess the existing condition of Maine's residential housing stock
- Identify opportunities for energy savings
- Supplement the 2015 study by providing updated data and results for multifamily and manufactured homes

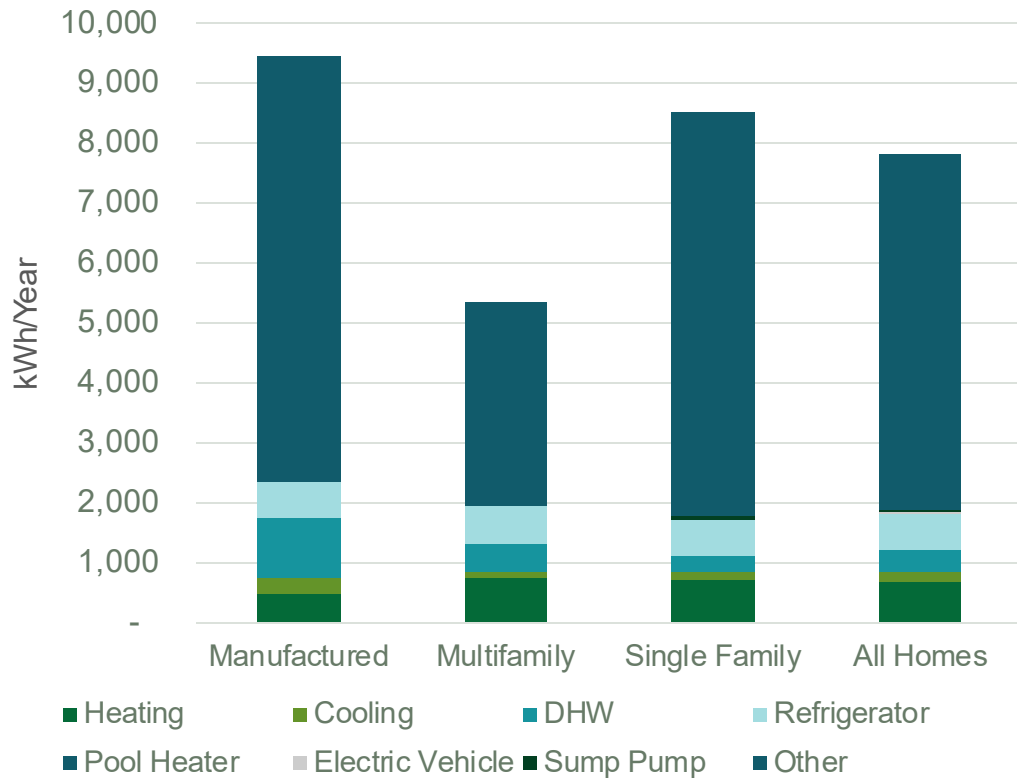
- Self-audit web survey (Dec. 2023 to March 2024)
  - 691 responses
  - Oversampled multifamily (2+ units/building) & manufactured home (these categories were not included in 2015 study)
  - 70% provided at least one photo of equipment/appliances
- Virtual visits
  - 42 (10 manufactured home, 10 multifamily, 22 single family)
- 10 landlord interviews & multifamily literature review
- End use disaggregation of electric usage data
- Manufactured home energy modeling
- Benchmark to previous baseline studies & neighboring states

Survey respondents (n=691) were guided to upload photos of their equipment and nameplates. 70% uploaded photos. Equipment was further verified during virtual on-sites (n=42).



# 2023 Electricity Consumption by End Use – All Homes

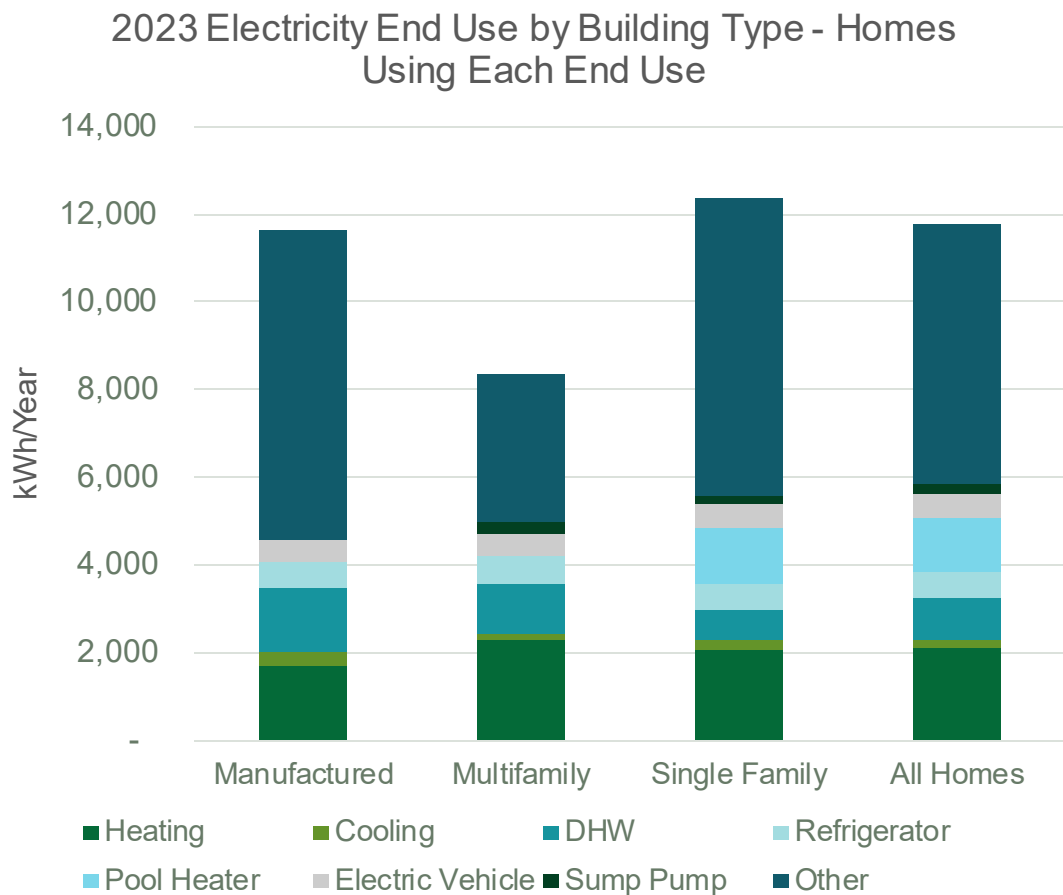
2023 Electricity End Use by Building Type - All Homes



2023 Annual Electricity Consumption (in kWh)

End Use	Manufactured	Multifamily	Single Family	All Homes
Heating	472	732	693	684
Cooling	267	104	156	152
DHW	1,010	474	261	379
Refrigerator	602	629	592	602
Pool Heater	-	-	14	9
Electric Vehicle	7	6	11	10
Sump Pump	-	15	48	35
Other	7,103	3,376	6,764	5,944
<b>Total</b>	<b>9,460</b>	<b>5,337</b>	<b>8,538</b>	<b>7,814</b>

# 2023 Electricity Consumption by End Use – Homes Using Each End Use

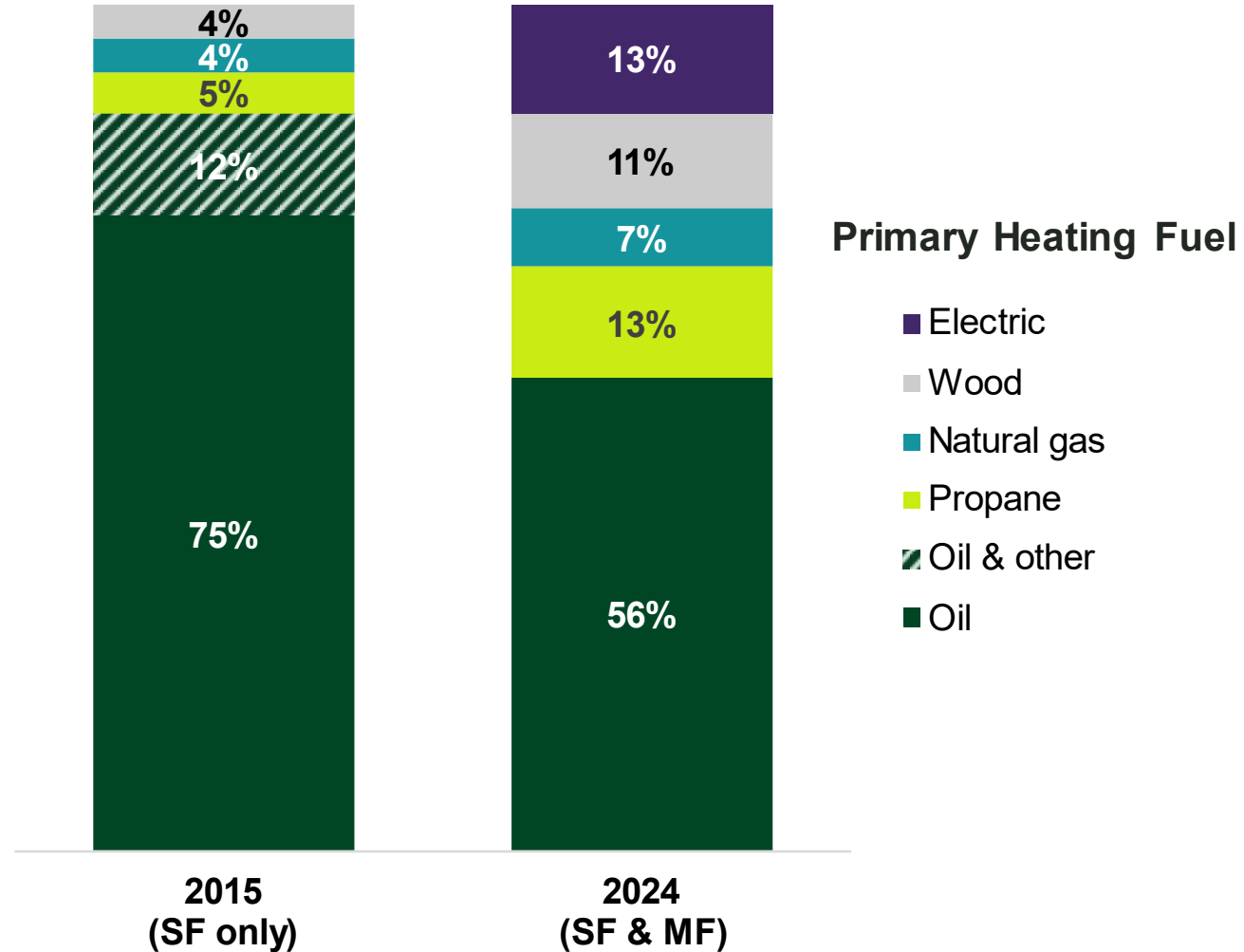


## 2023 Annual Electricity Consumption (in kWh)

End Use	Manufactured	Multifamily	Single Family	All Homes
Heating	1,692	2,294	2,067	2,095
Cooling	309	156	204	203
DHW	1,464	1,125	717	932
Refrigerator	619	651	601	615
Pool Heater	-	-	1,245	1,245
Electric Vehicle	466	470	558	536
Sump Pump	-	307	204	212
Other	7,103	3,376	6,764	5,944
<b>Total</b>	<b>11,653</b>	<b>8,379</b>	<b>12,359</b>	<b>11,781</b>

# Primary Heating Fuel

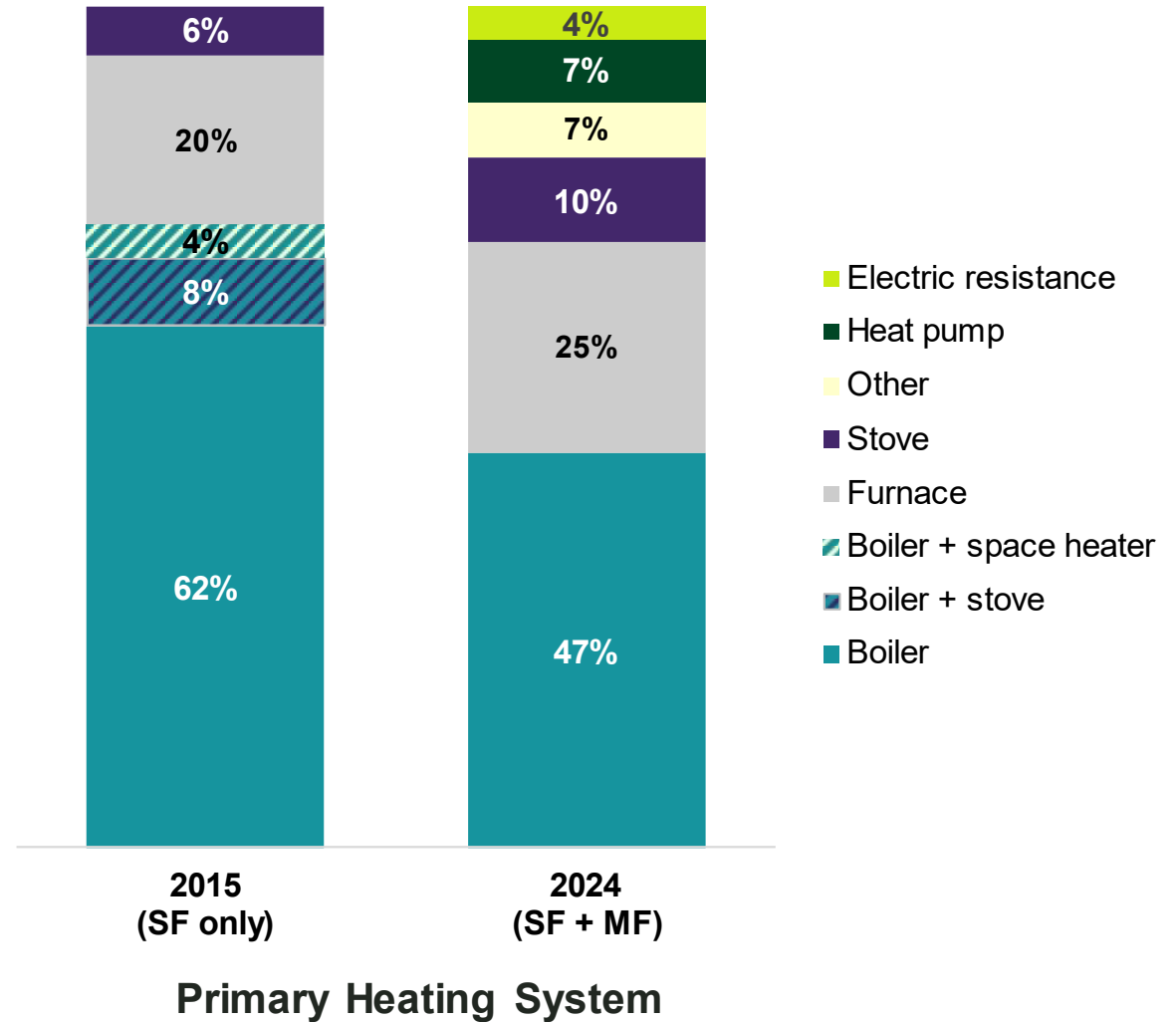
Share of homes heated primarily by oil declining; over 75% of homes in 2015 compared to 56% in 2024. Electricity & propane increasing as primary heating fuels.



# Primary Heating Type

Boilers declining as primary heating systems (74% in 2015 to 47% in 2024)

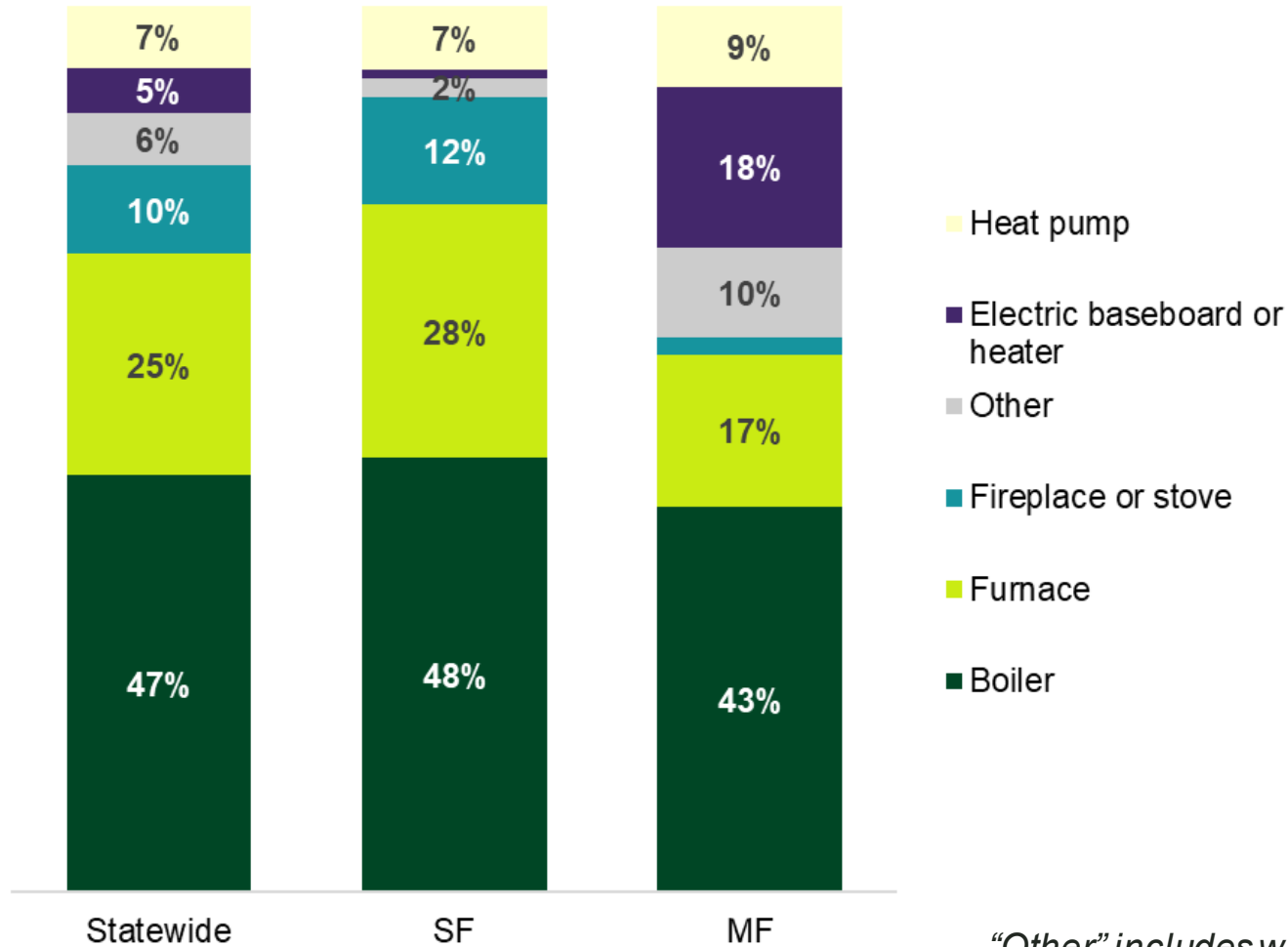
HP and electric resistance as primary heating increasing



*“Other” includes wall furnaces, non-electric portable heaters, and radiant wall/flooring*

# Primary Heating Type by Home Type

27% of multifamily homes primarily heat with electricity (heat pumps, electric baseboard, or space heater), compared to 8% of single-family homes.



2024 Baseline

*“Other” includes wall furnaces, non-electric portable heaters, and radiant wall/flooring*

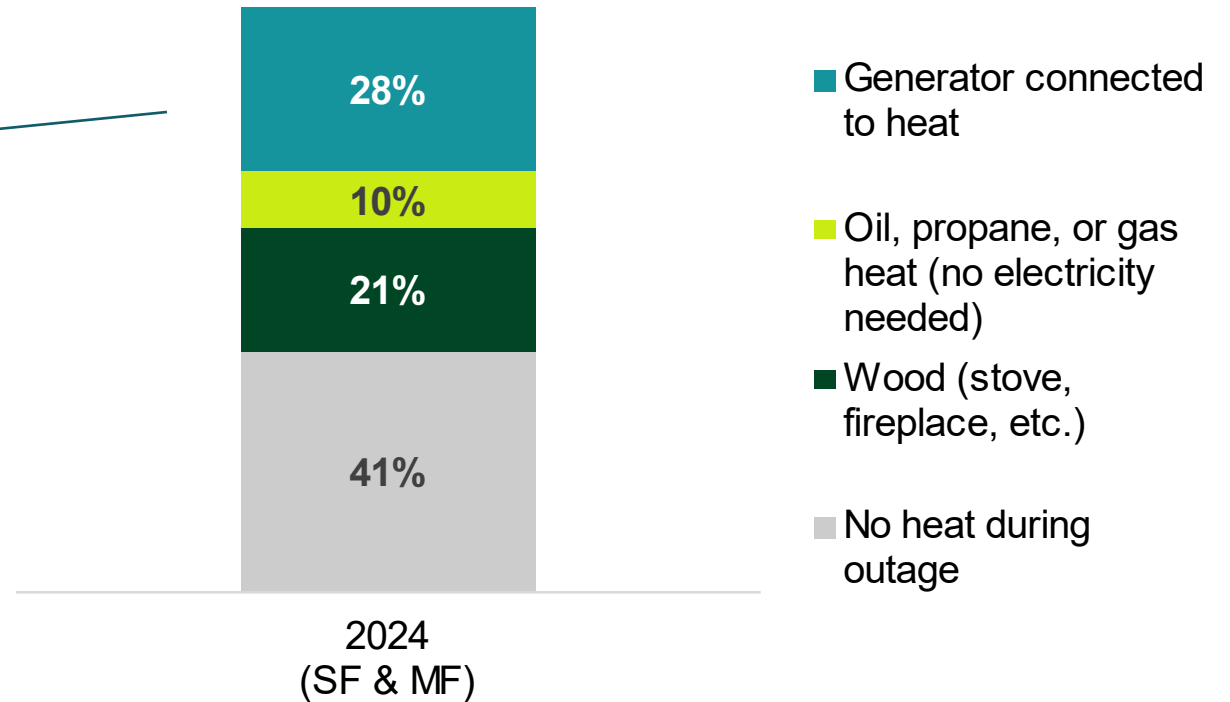
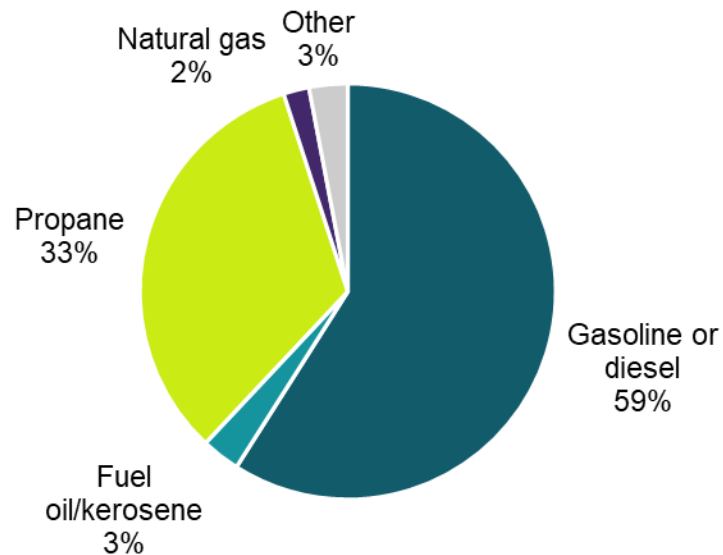
# Heating System Efficiency

- Boilers
  - 55% ENERGY STAR-qualified
  - Average AFUE 86.1%
  - 49% of boilers are 20+ years old
- Furnace
  - 27% ENERGY STAR-qualified
  - Average AFUE 82.1%
  - 29% of furnaces are 20+ years old
- Heat pumps
  - Average HSPF2 of 10.7
  - 19% installed 2022 or later, 61% 2019 to 2021

# Back-up Generation

Single-family homes more likely to have a way to heat their home during an outage (73%) than multifamily (20%)

**Generator fuel (n=180)**



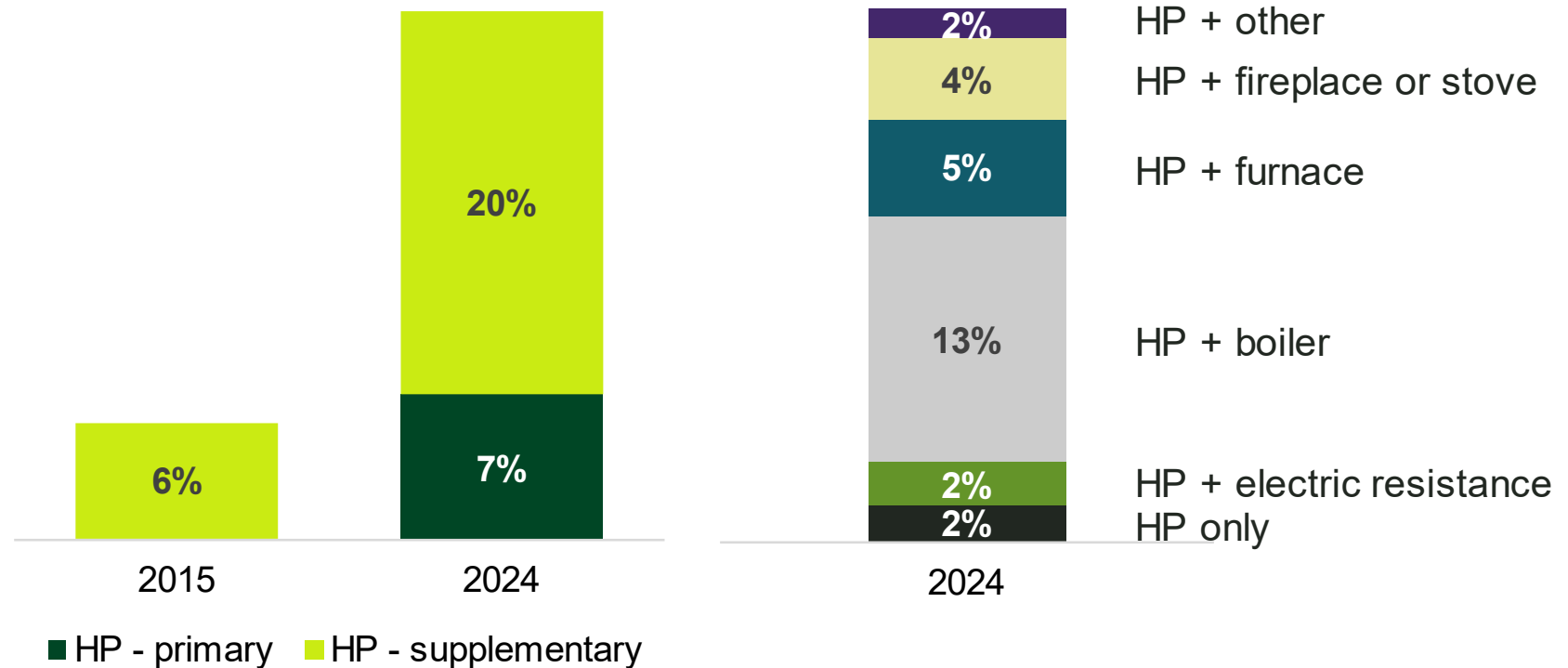
1% did not respond; 1% other (battery storage, coal stove)

# Heat Pumps

7% of households in 2024 report using heat pumps as their primary heating source

2% report using heat pumps exclusively with no other system to supplement.

98% of heat pumps are ductless mini-splits



# Heat Pump Feasibility



**18%** of the square footage of homes in Maine is already served by a heat pump



**47%** of the remaining square footage presents exceptional candidates for a new heat pump:

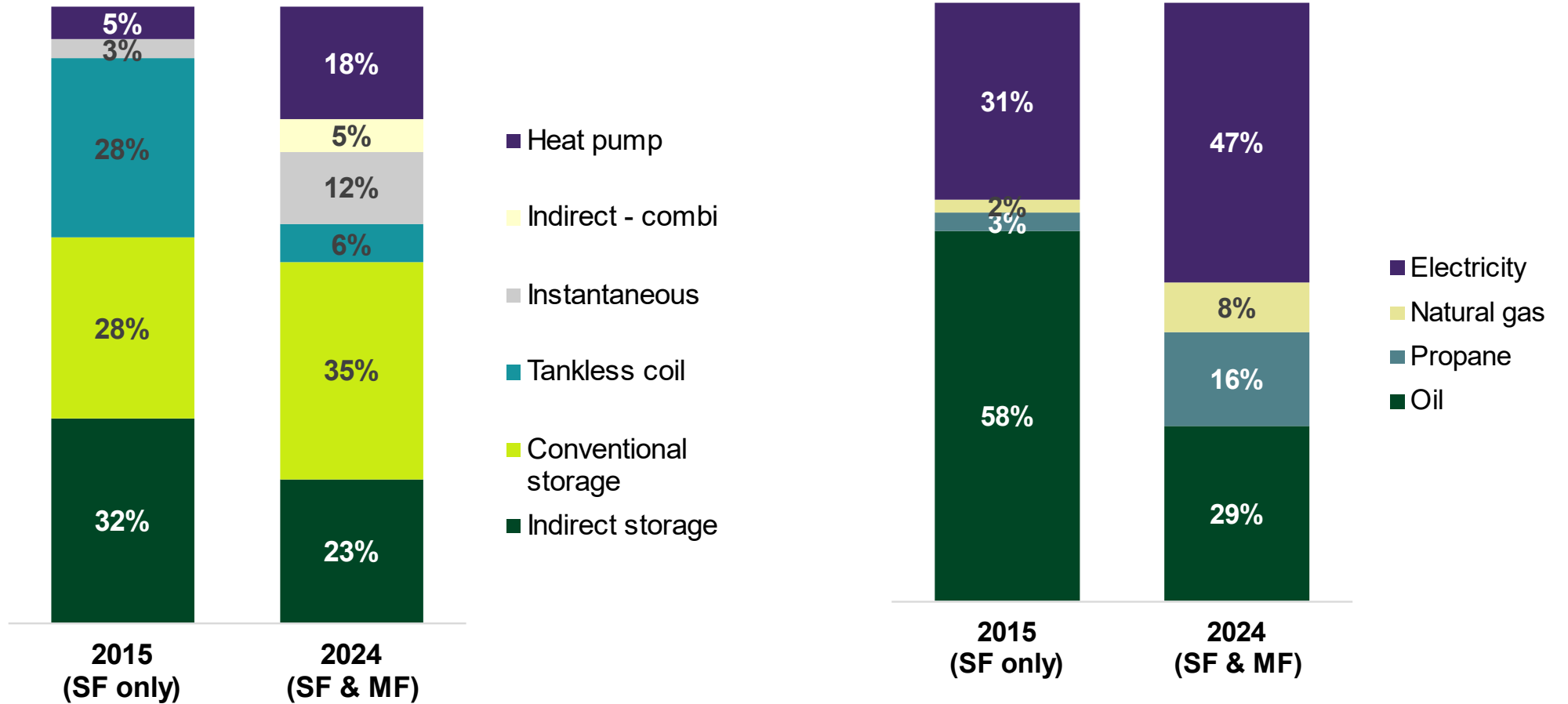
These rooms have some or all the following characteristics:

- 1) Main living space (kitchen, living, dining room, bedroom)
- 2) Room is currently heated with electric resistance
- 3) Room is served by an HVAC system >2 years old
- 4) Current heating system insufficiently serves that room

Remaining 35% of space does not necessarily have physical barriers to installation, but may be a harder sell (existing heating is sufficient and/or current HVAC was newly installed)

# Water heating

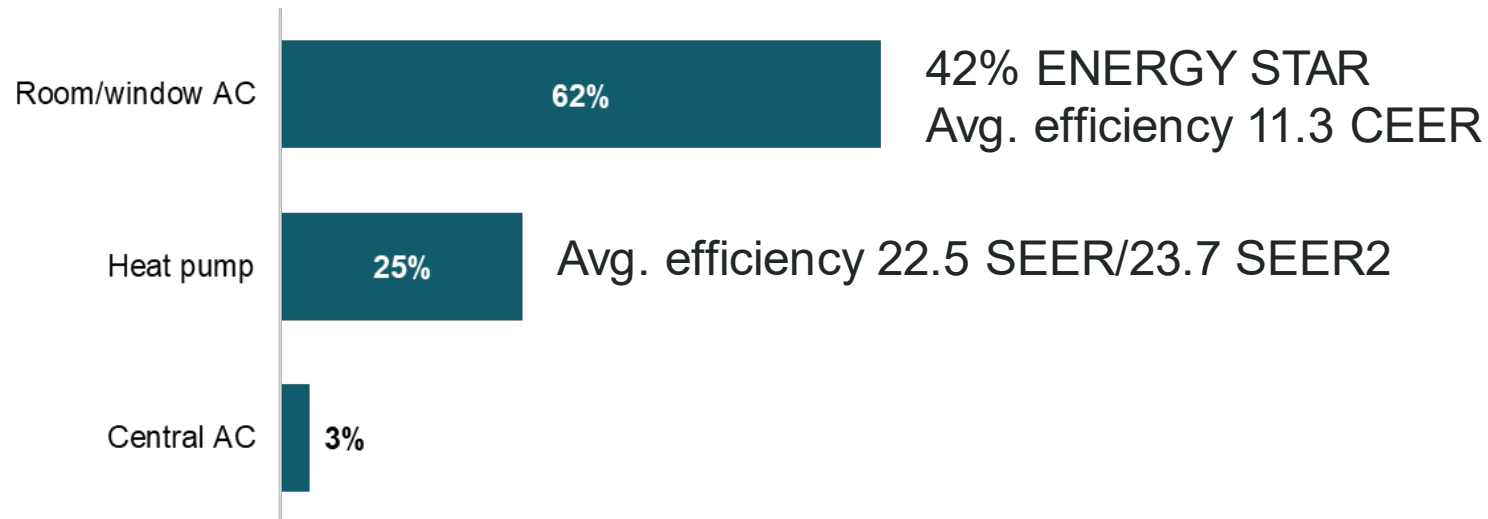
Electric resistance storage and HPWH increasing; oil & indirect systems decreasing.



Not shown: 3% of households in 2015 and 1% in 2023 have solar DHW.

## 82% of homes have a cooling system

Remainder use fans (11%) or do not have a cooling system (7%)

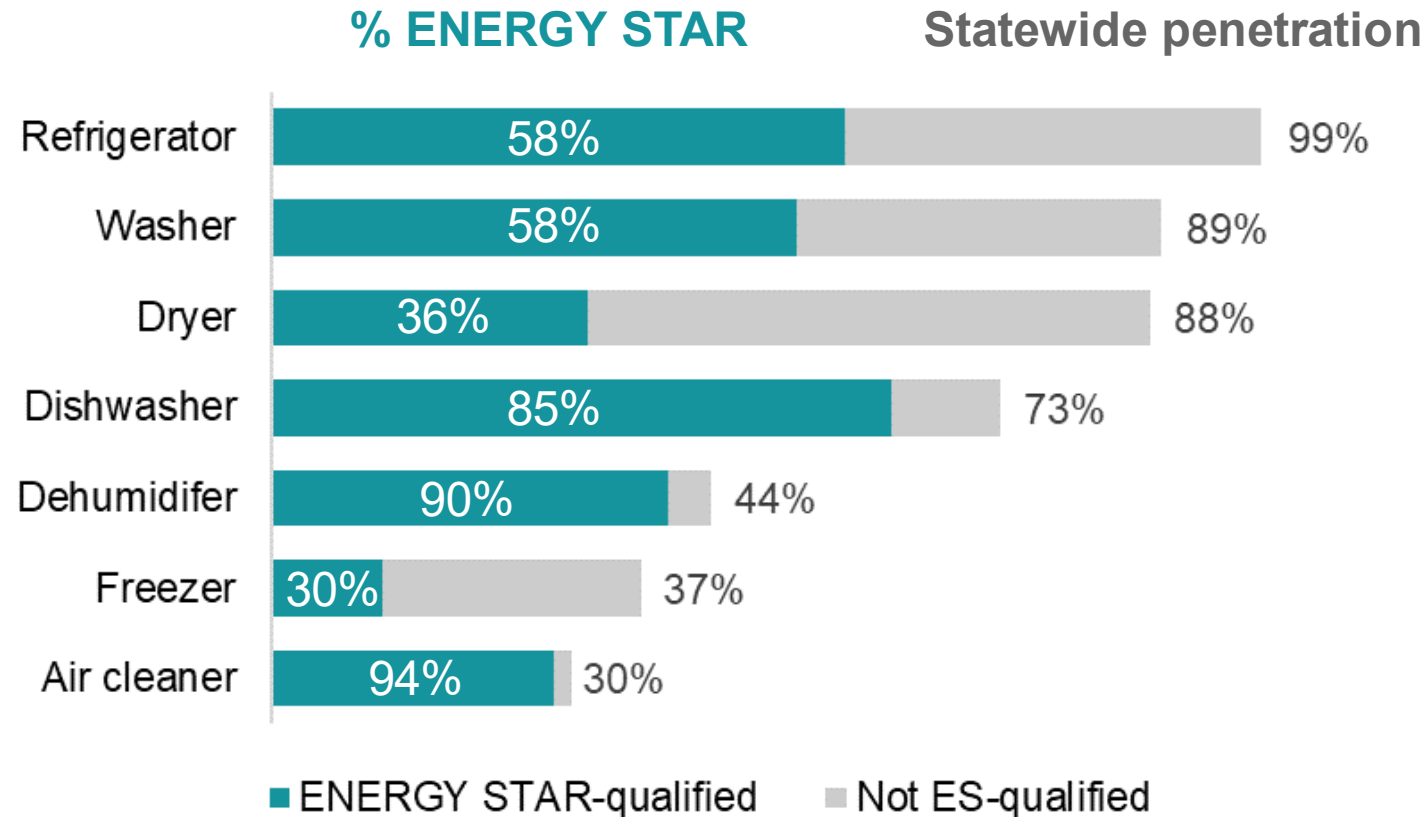


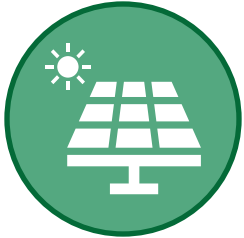
*Figure sums to greater than 82%; some homes have multiple systems.*



**79%** of heat pumps and **65%** of room air-conditioners installed in past 3 years to provide cooling to an area of the home **not previously cooled**

Refrigerators, washers, & dryers have highest penetration and lower shares of ENERGY STAR-qualified units





**5%** of homes statewide have **solar panels**

More common in single family households (8%) than multifamily (1%)



Households with solar are more likely to have **heat pumps**

**58%** have heat pumps (compared to 27% statewide)

More likely to use their heat pumps as primary heating systems (**15%**, compared to 6% statewide)



**2%** of homes have an **energy storage battery** or whole home back-up

26% of homes with solar have battery back-up

40% of battery owners do not have solar panels



**5%** of households have an **electric vehicle or plug-in hybrid**

More common in single family households (7%) than multifamily (3%)



**5%** of households statewide have an **electric bike or scooter**

9% of low- and moderate-income households have an e-bike or e-scooter

**Primary form of transportation** for 12% of e-bike/e-scooter owners  
(Most of these respondents are low-income)

- 88% of multifamily 3+ households in 2024 baseline sample are renters
- Most renters responsible for paying own utilities; only 12% say it is paid by landlord
- All 10 landlords interviewed were familiar with or had participated in Efficiency Maine programs
- Landlord reported challenges maintaining buildings and mechanical equipment:
  - Maintenance & repair (4 of 10); finding skilled contractors (3); financial constraints (2); building degradation due to weather (2)

# Multifamily Buildings Heating Systems

- All 10 landlords said they would only replace mechanical equipment if failing
- 17% of multifamily households have a heat pump
  - 9% use their heat pump as primary heat
- All landlords familiar with heat pumps
  - There is interest but also reported concerns and challenges:
    - funding, labor, building logistics (masonry); insurance coverage; cold weather performance

*Insurance would not provide coverage if heat pumps were the only heating supply for the building. It was not economical to replace a failed boiler and add heat pumps.*

*Heat pumps are very expensive, and multifamily buildings require the installation of multiple heads.*