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July 2, 2024

### **MEMORANDUM**

**TO: Council Members**

**FROM: Kevin Smit**

**SUBJECT: Residential Building Stock Assessment**

### **BACKGROUND:**

**Presenter:** Mike Psaris, Senior Program Manager, NEEA

**Summary:** The Northwest Energy Efficiency Alliance recently completed the 2022 Residential Building Stock Assessment (RBSA). NEEA will provide background information and high-level results of this RBSA.

**Relevance:** The RBSA is a region-wide survey of the housing characteristics of our northwest existing stock. Council staff rely heavily on the various stock assessments, including the RBSA in developing the energy efficiency supply curves for the power plan. The RBSA provides data for things like shares of electricity vs. gas heating equipment, insulations levels, window types, light bulbs, water heaters and appliances. These data enable the Council and regional utilities to define baseline energy characteristics of the housing stock and then estimate remaining energy efficiency potential in significant detail. The Regional Technical Forum (RTF) also utilizes these data for EE measure development. NEEA develops a new RBSA approximately every five years.

**Workplan:** B.2.1 Prepare for the ninth power plan, developing a draft scope, preparing models and inputs, and developing environmental methodology.  
B.2.1 Expand modeling and data sets.

# 2022 Residential Building Stock Assessment (RBSA)

## Findings

Mike Psaris  
Senior Program Manager, NEEA  
07/09/2024






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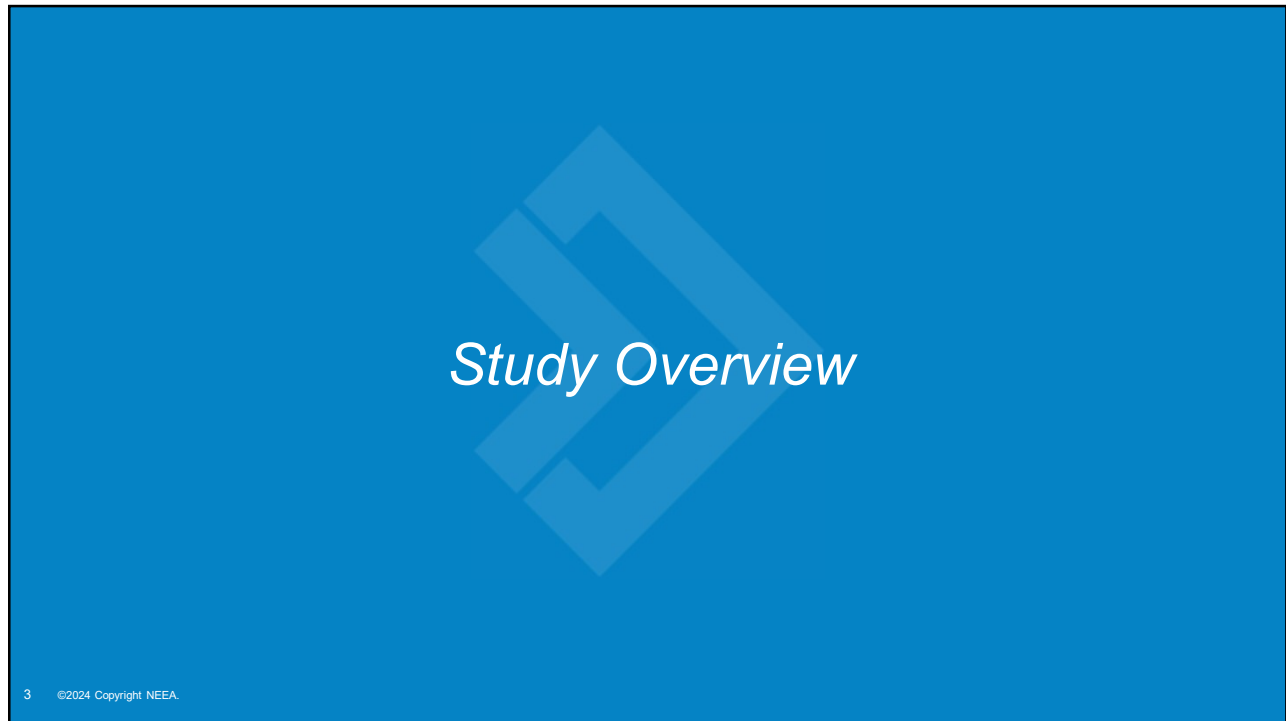
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## Agenda

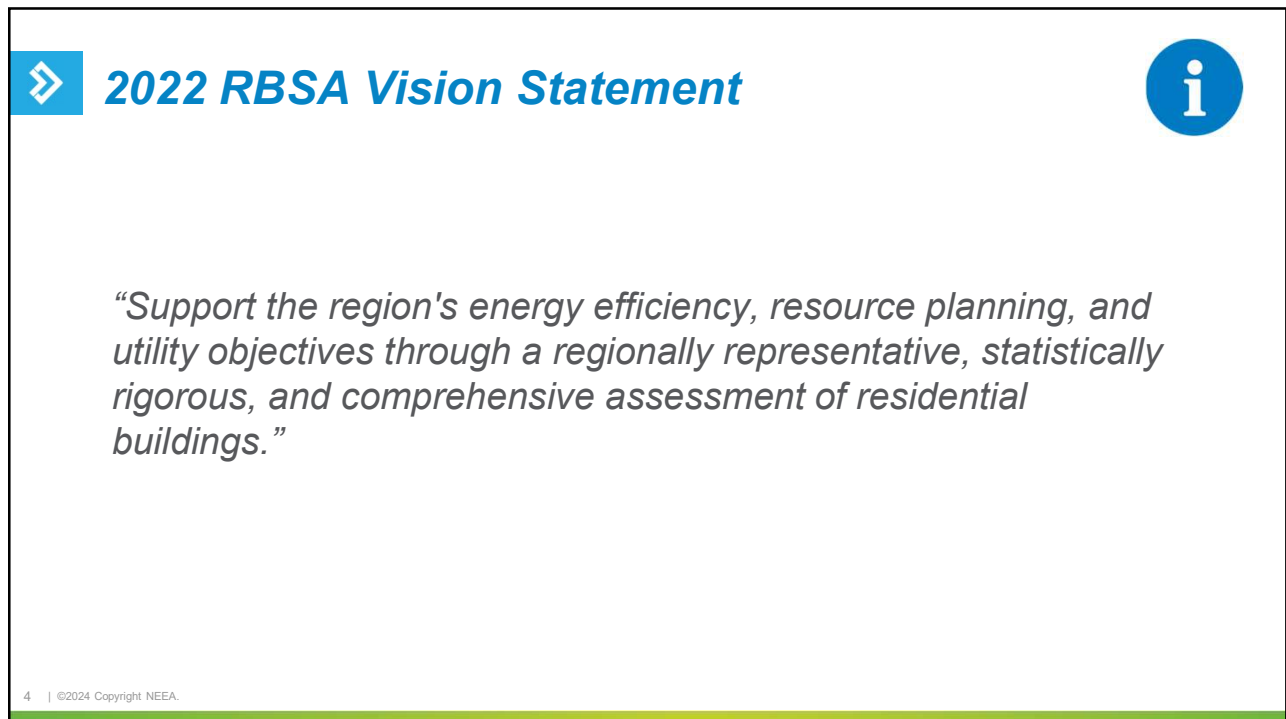
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Study Overview
-   
Findings
-   
Q&A

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A white slide with a blue header bar. On the left, there is a blue square containing a white double arrow icon, followed by the text "2022 RBSA Vision Statement" in blue. On the right, there is a blue circle containing a white lowercase letter "i". Below the header, there is a quote in italicized black text: "Support the region's energy efficiency, resource planning, and utility objectives through a regionally representative, statistically rigorous, and comprehensive assessment of residential buildings." In the bottom left corner, there is a small white number "4" followed by the text "©2024 Copyright NEEA." data-bbox="104 544 891 884"/>

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## Eligible Building Types



- **Single-family:** Detached and attached residences.
  - This includes manufactured homes, duplexes, triplexes, quadplexes, and vacation homes.
  - This does **not** include mobile homes
- **Multi-family:** Apartments and condominiums with five or more units
  - Low-rise: 1 – 3 stories
  - Mid-rise: 4 – 6 stories
  - High-rise: 7+ stories

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## Sample Design



### Single Family:

1. Heating Zone
2. Income
3. State
4. Urban/Rural

### Multi-family:

1. Height class
2. State
3. Urban/Rural



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## 2022 RBSA Workgroup



**Purpose:** The Residential Building Stock Assessment (RBSA) Work Group provided NEEA with decision support and coordination on key components of the study's design and implementation.

- Avista
- Bonneville Power Administration
- Cascade Natural Gas
- Clark PUD
- Energy Trust of Oregon
- Idaho Power
- Northwest Natural Gas
- Northwest Power and Conservation Council
- Puget Sound Energy
- Regional Technical Forum
- Seattle City Light
- Snohomish County PUD

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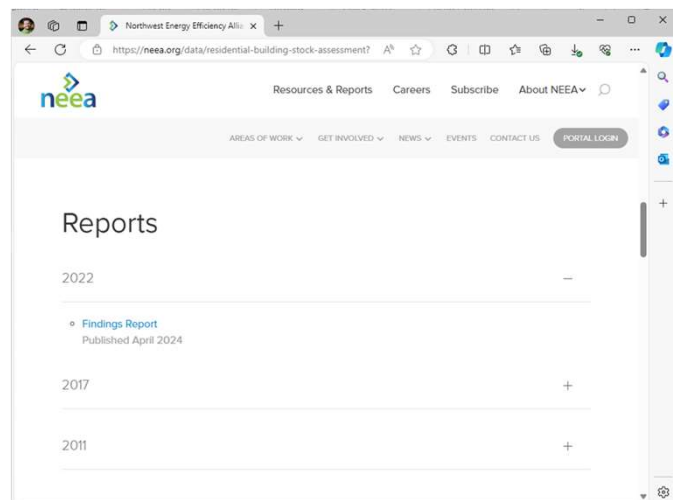
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## Study Deliverables



- Reports
  - Findings Report
- Data
  - One-line tables
  - Core tables
  - Data Dictionary
  - User Guide
- Documentation
  - Methods Report
- [neea.org/rbsa](https://www.neea.org/rbsa)



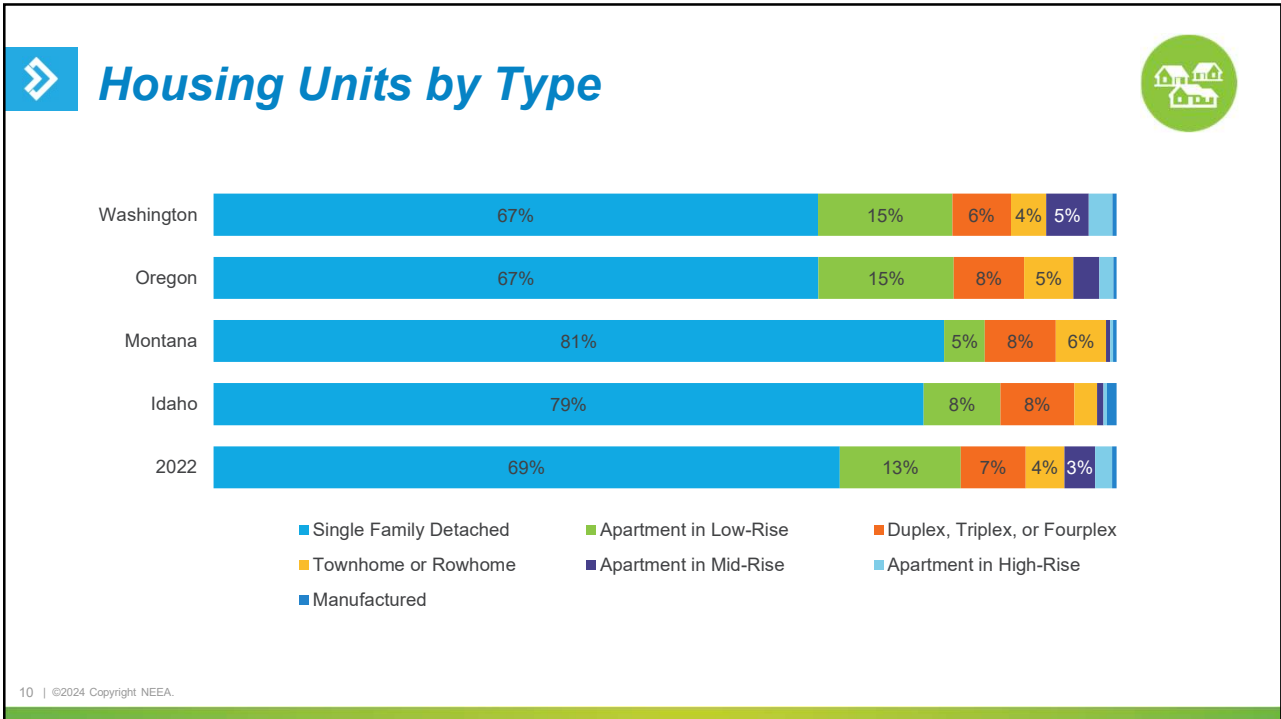
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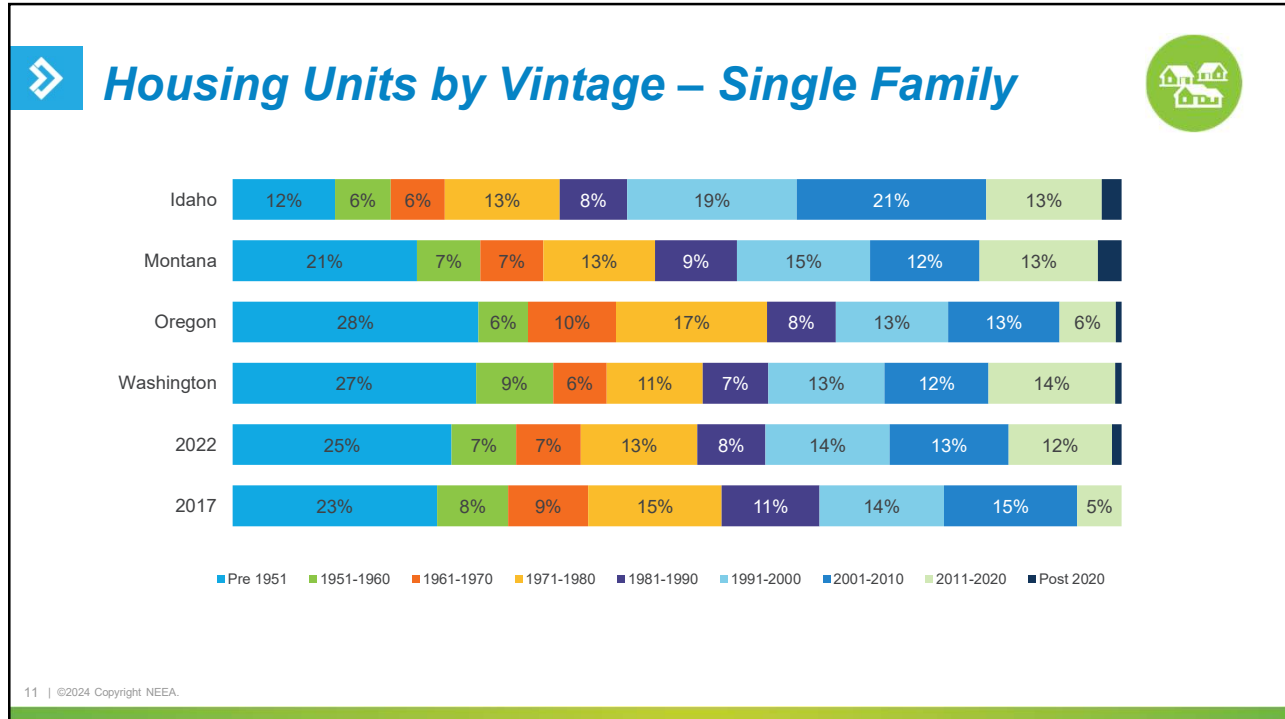


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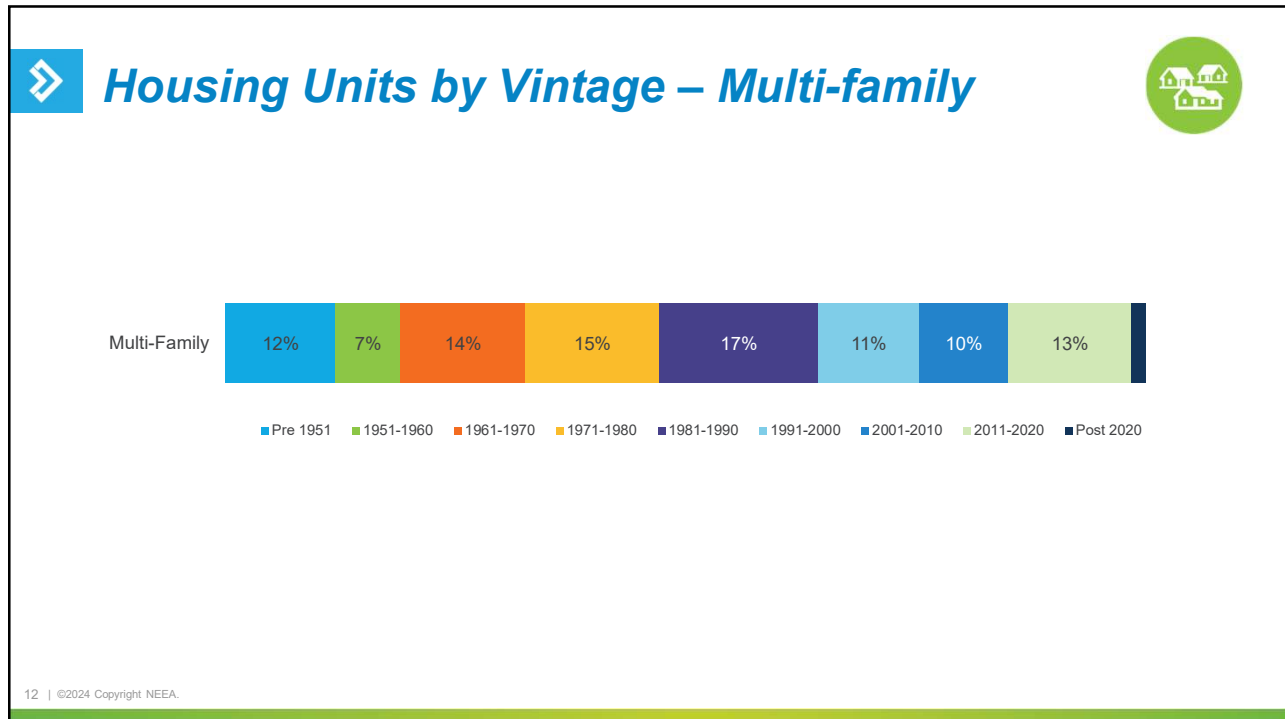
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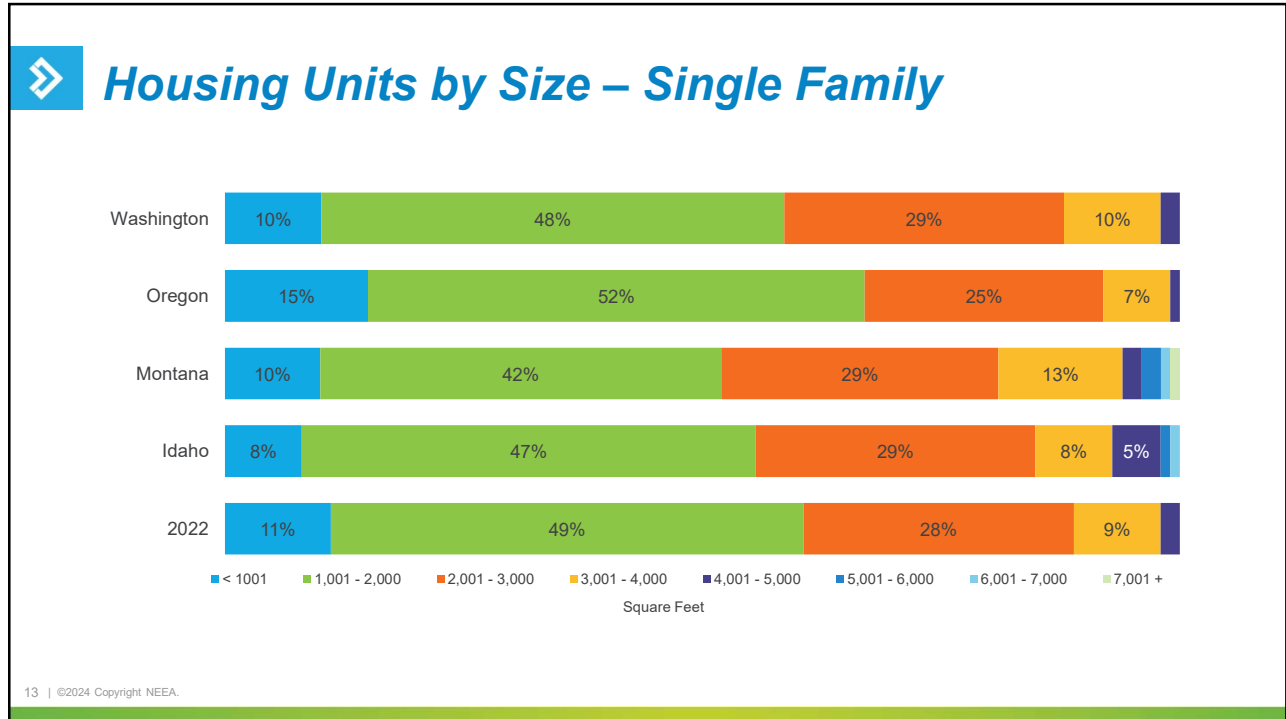
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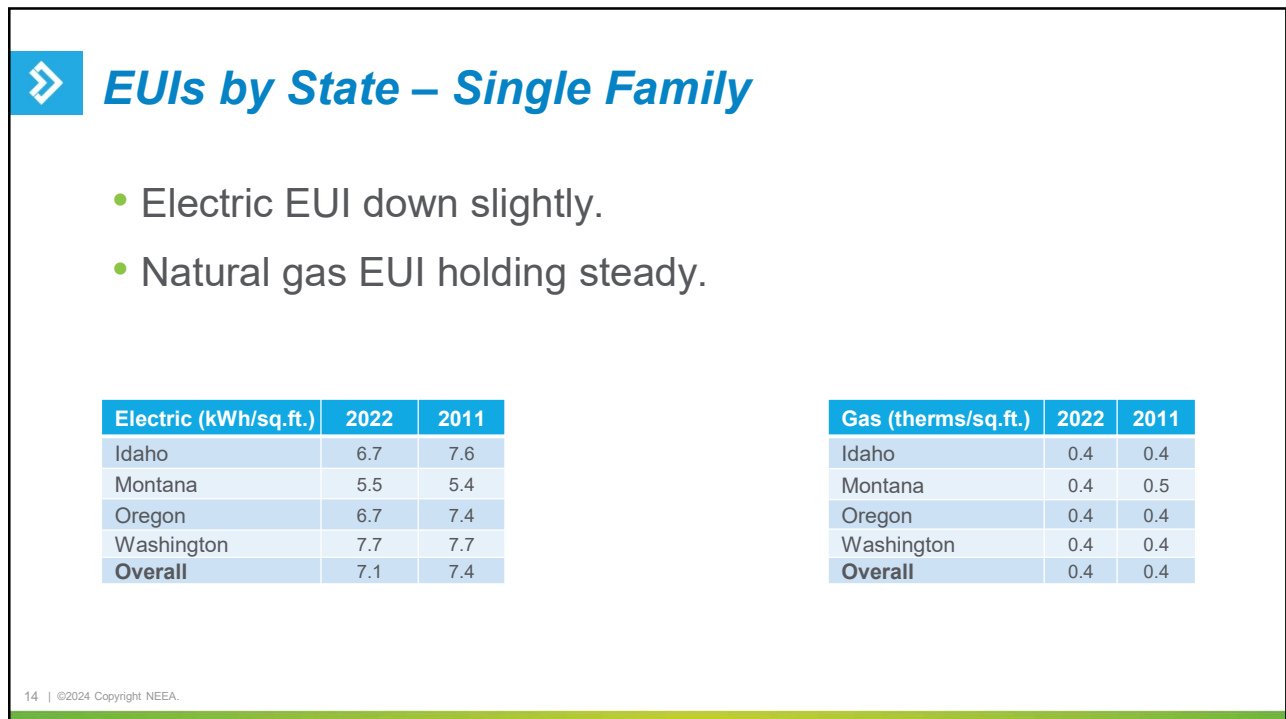
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 **Residential Lighting**

- LEDs are now the dominant lamp type in sockets across the Northwest
- Nearly all homes have LEDs

Single-Family Homes with LEDs	99%
Multi-Family Homes with LEDs	96%



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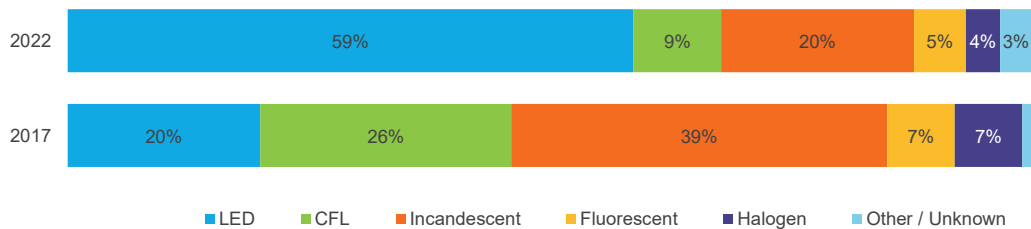
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## Residential Lighting – Single-Family Homes



- LED saturation up nearly **200%** since 2017
- Lighting power density down 43% since 2011



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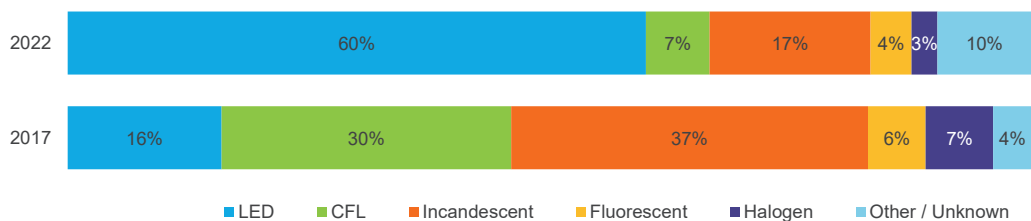
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## Residential Lighting – Multi-Family Homes



- LED saturation up **275%**
- Incandescent lamp saturation down 54%
- CFL saturation down 77%

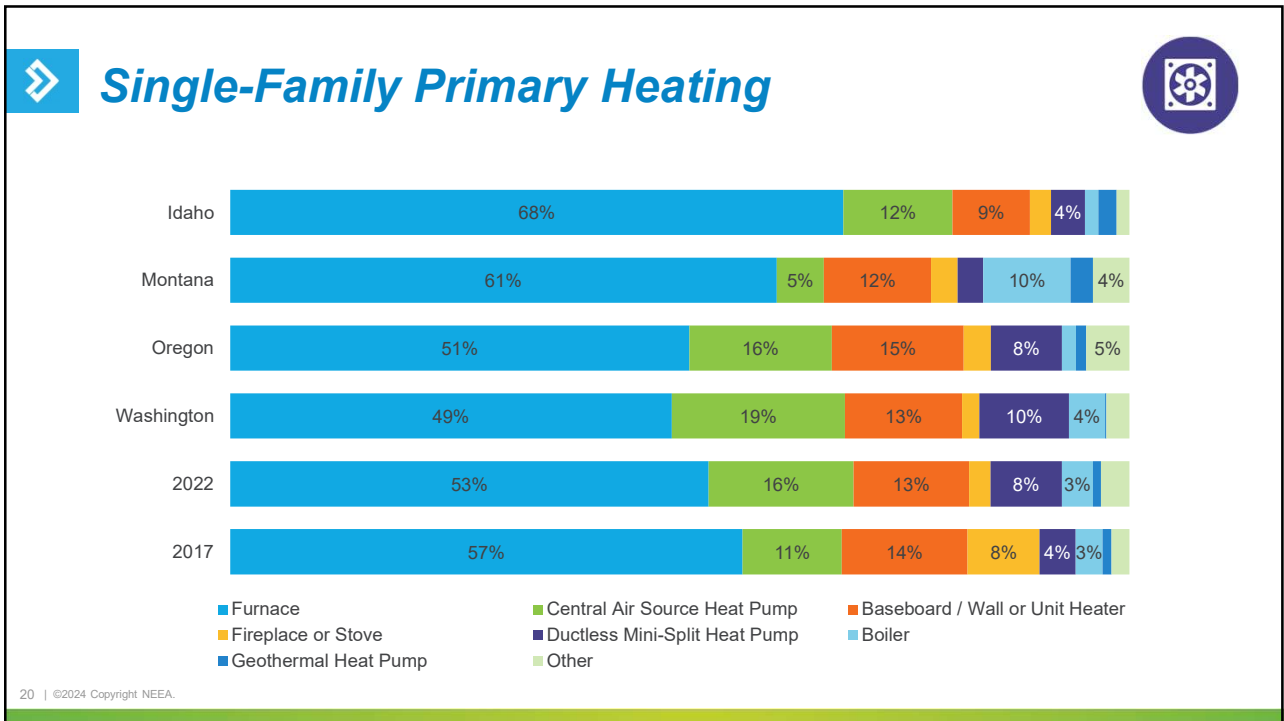


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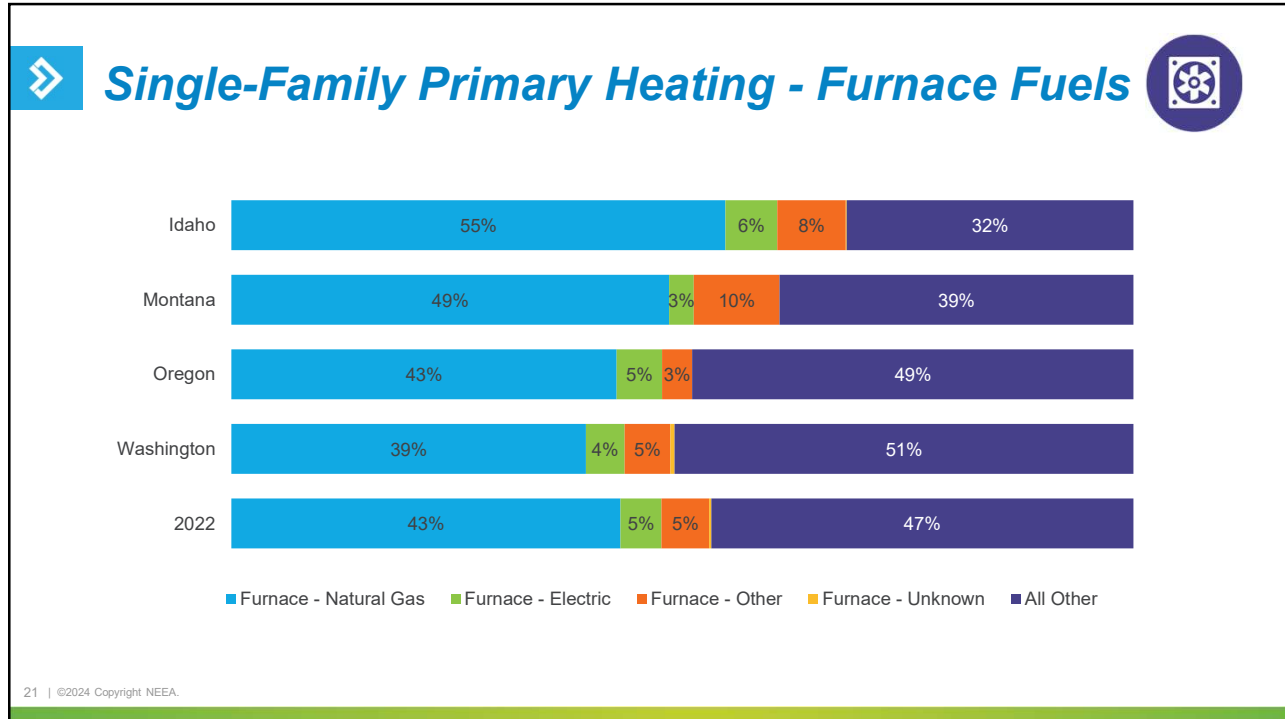
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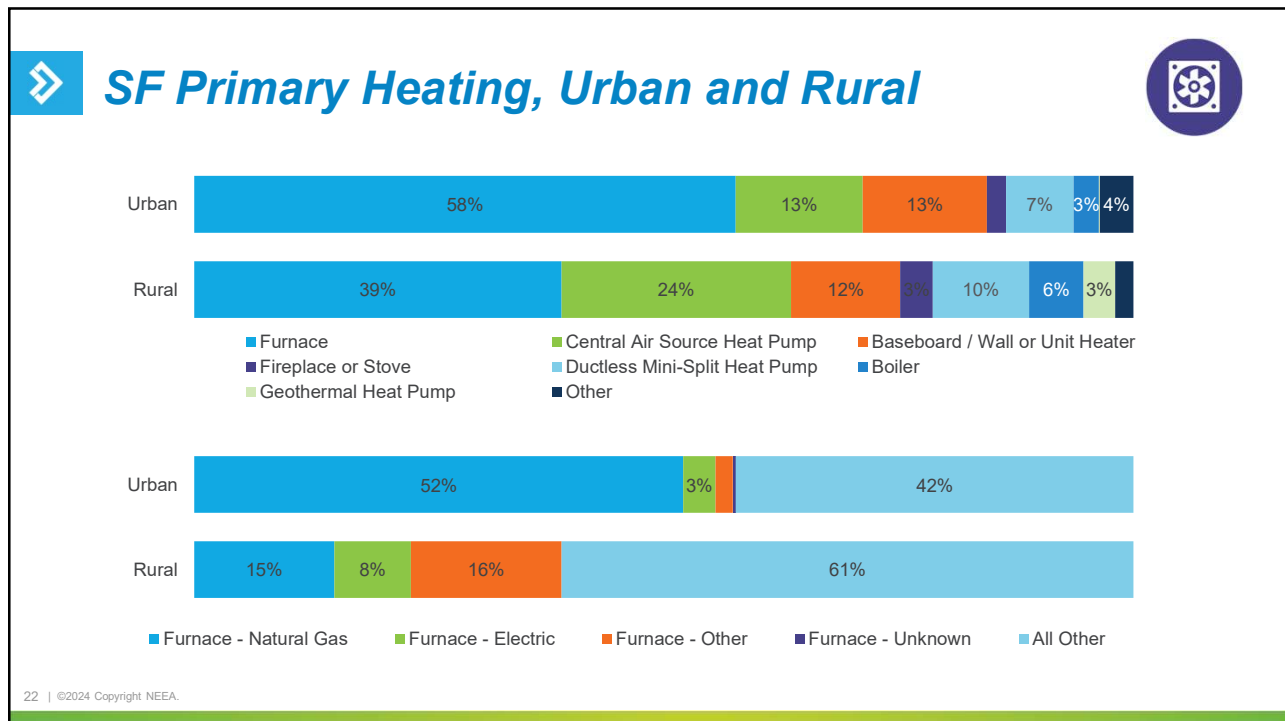
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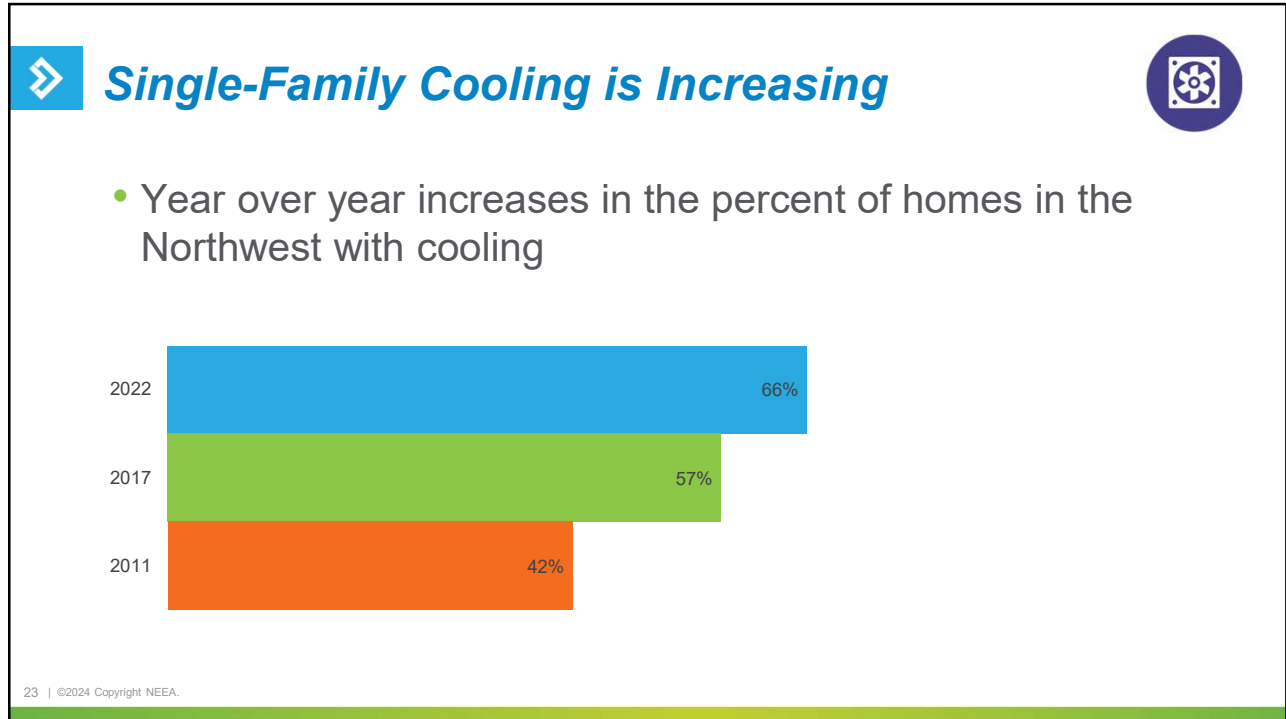
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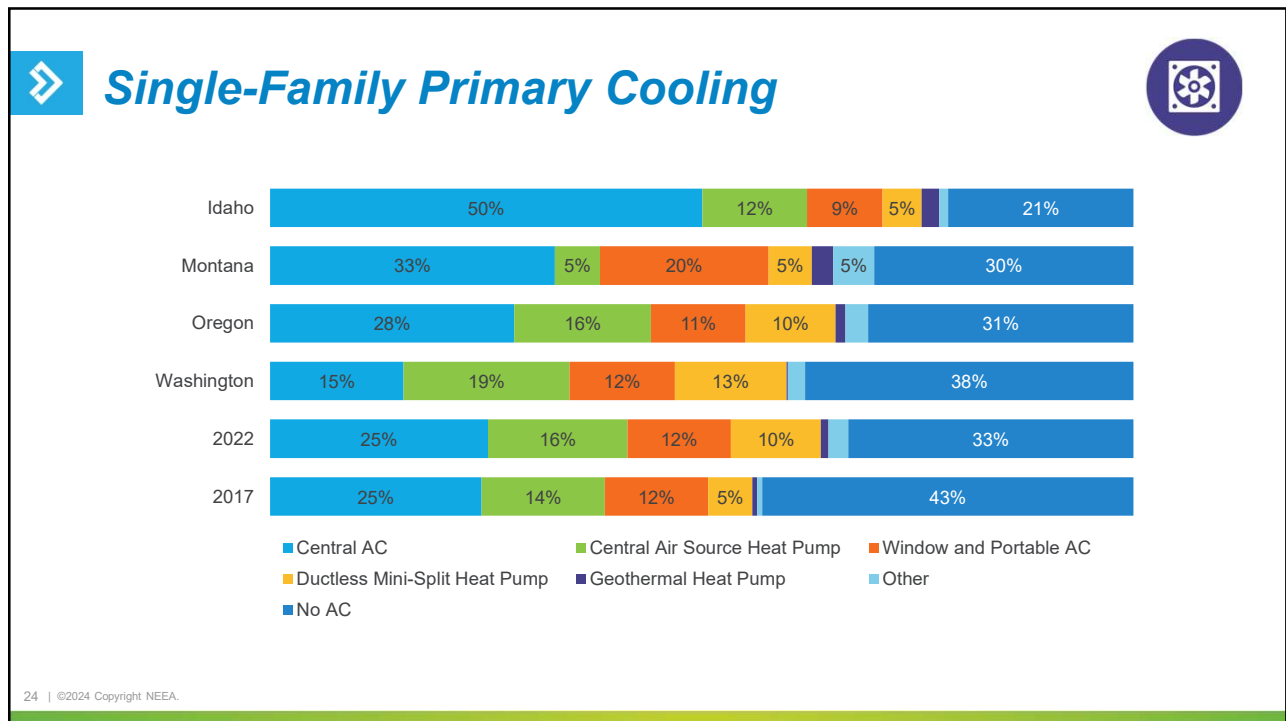
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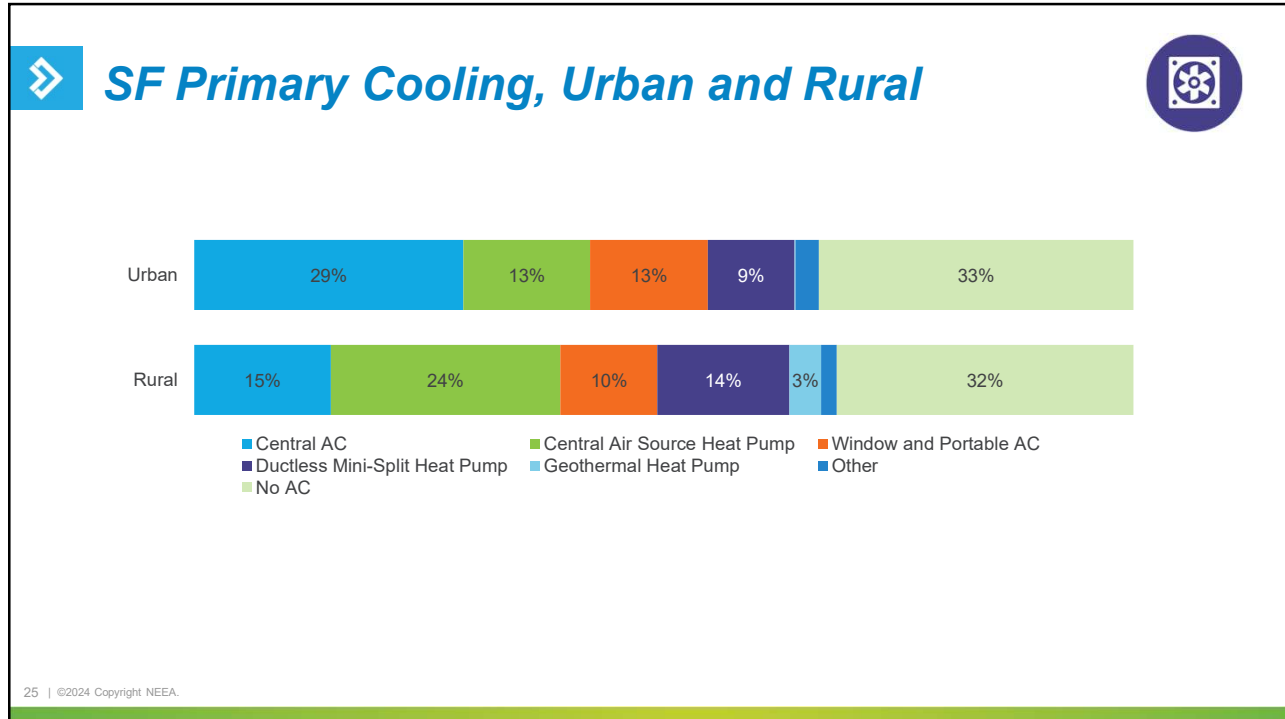
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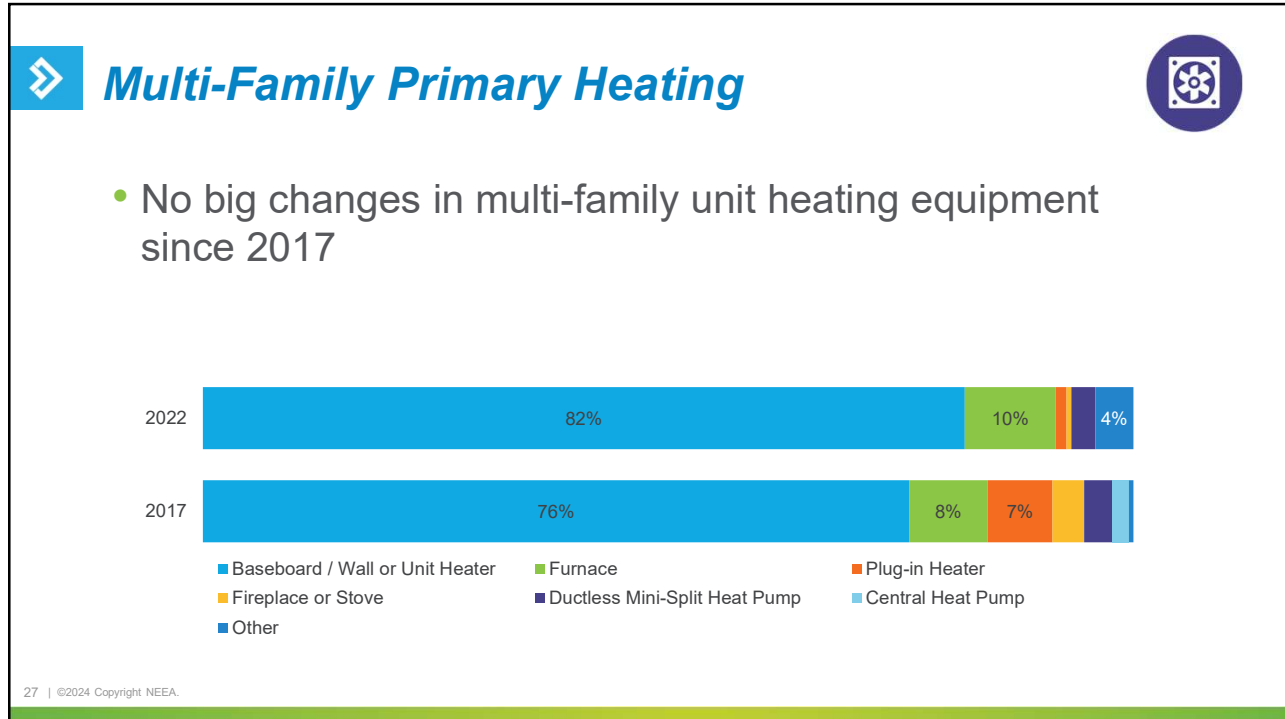
## Single Family HVAC Efficiencies

- Efficiency metrics continue to improve

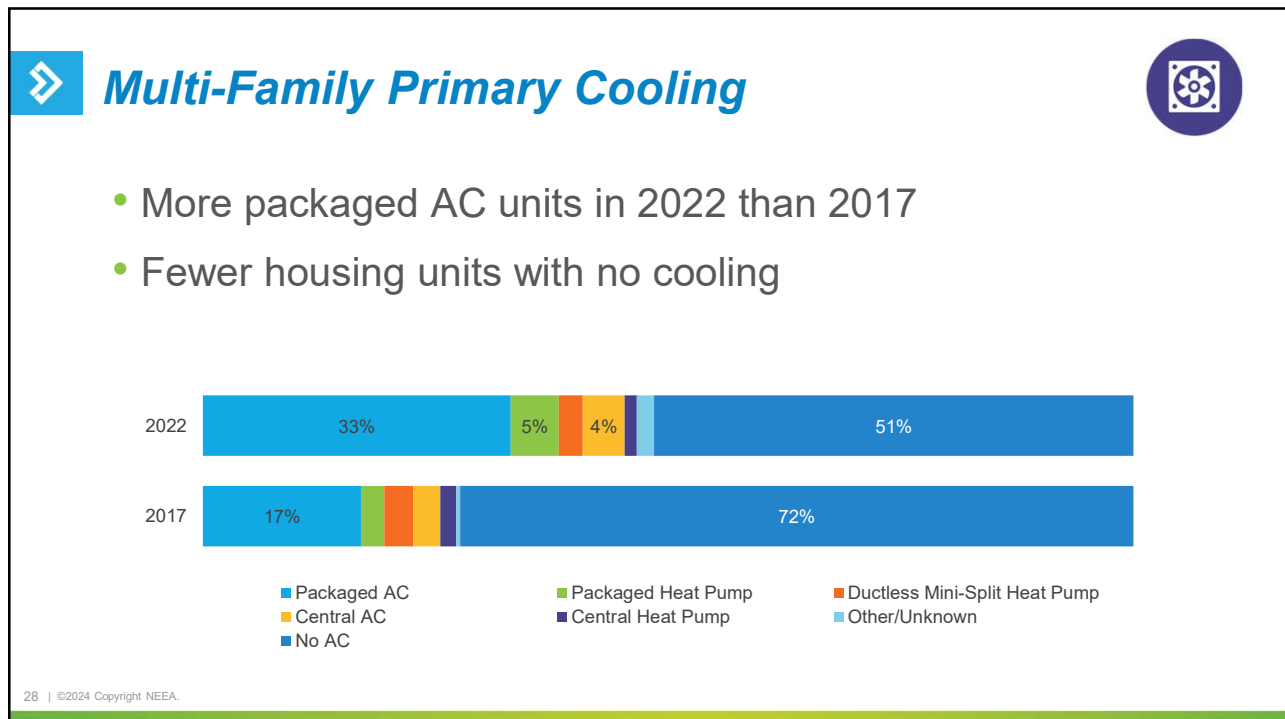
	2022	2017	2011
AFUE	86%	86%	84%
Central HP HSPF	8.9	8.3	8
DHP HSPF	10.8		
Central AC SEER	13.4	12.2	11.1
Central HP SEER	15.2	13.4	13

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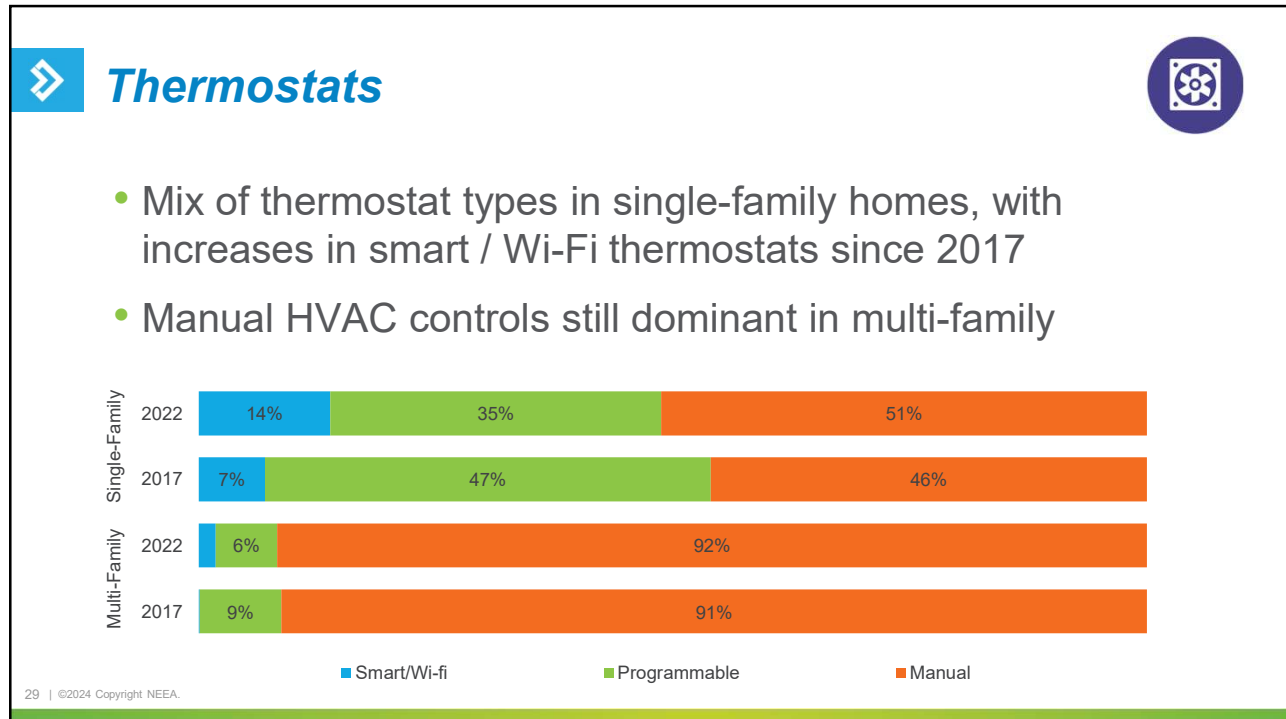
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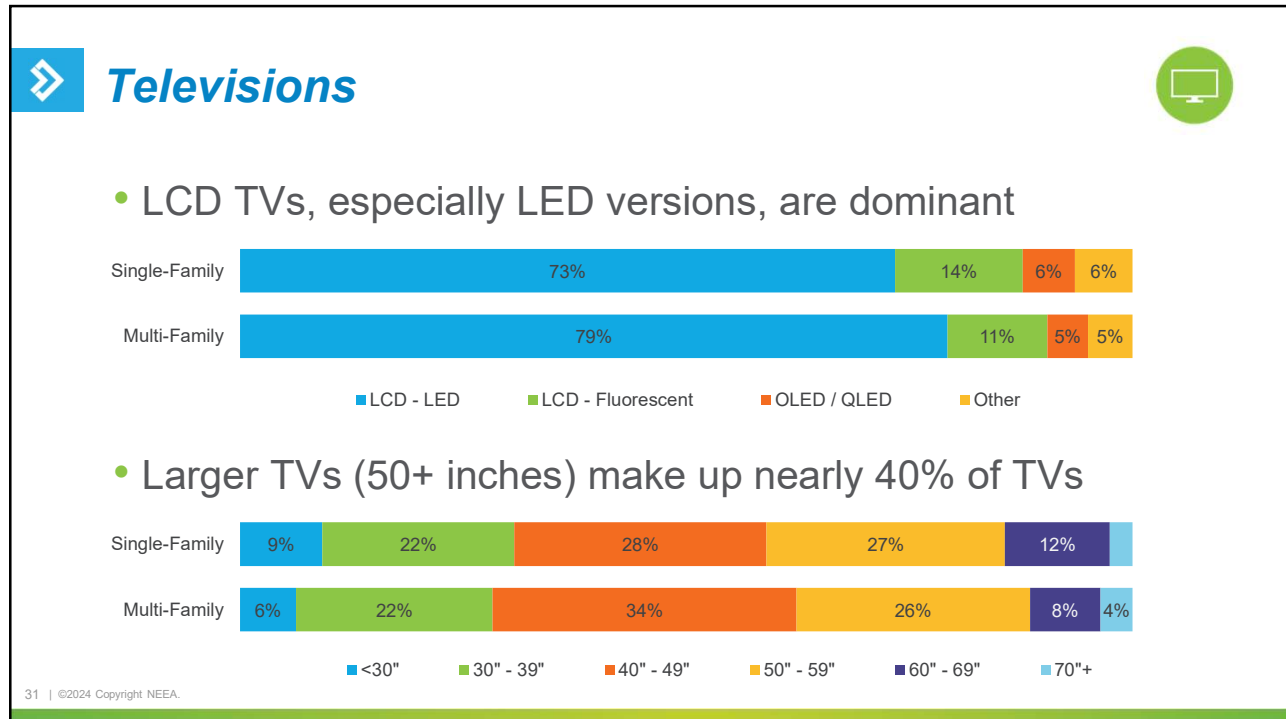


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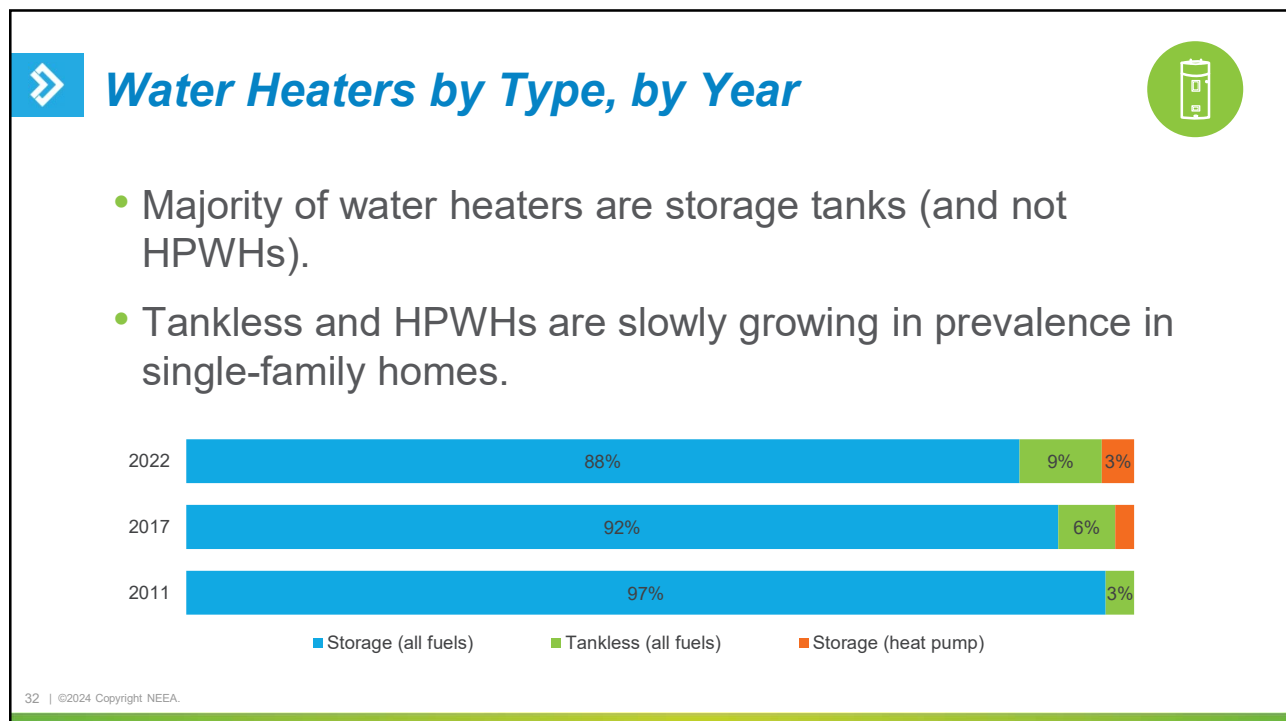


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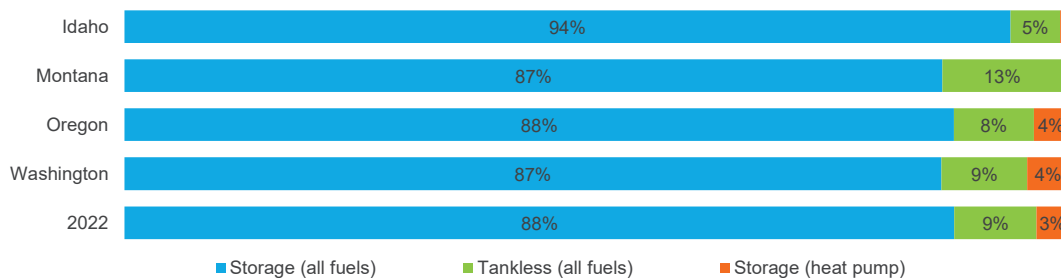


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## Water Heaters by Type, by State

- Idaho has a slightly higher prevalence of non-HP storage tanks.
- HPWHs are most prevalent in Oregon and Washington



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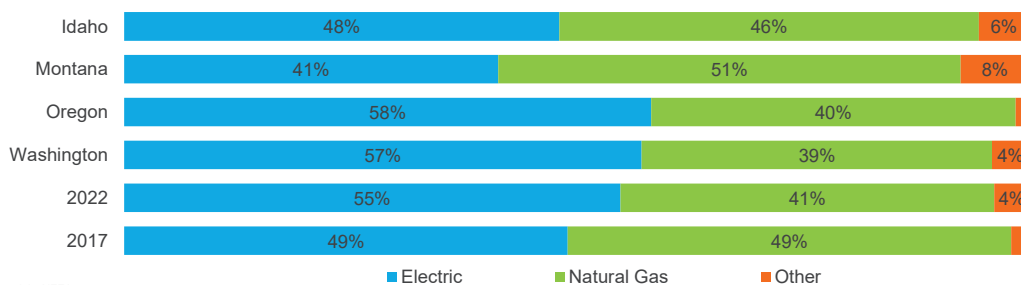
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## Water Heaters by Fuel, Single-Family



- 55% of water heaters in single-family homes are electric water heaters.
- Most of the rest are natural gas, with some variation by state (i.e., more natural gas in Montana).



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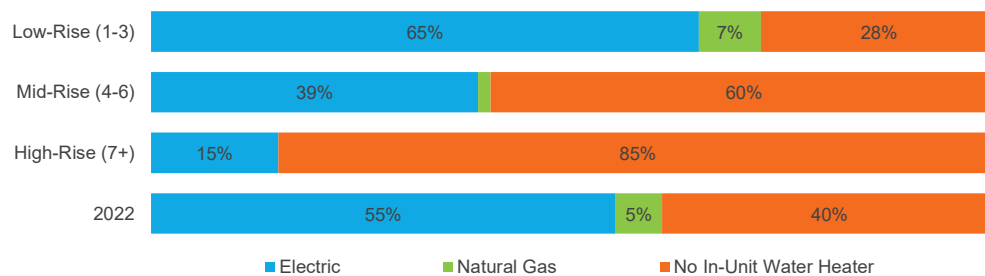
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## Water Heaters by Fuel, Multi-Family



- 55% of multi-family homes have electric water heaters.
- Considerable variation in the prevalence of in-unit water heaters by height class.



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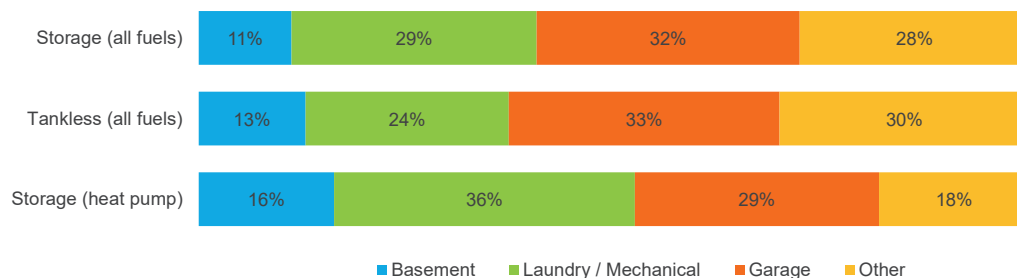
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## Water Heater Locations, Single-Family



- Most water heaters are either located in a dedicated laundry / mechanical room or in the garage.
- Water heaters are also often located in basements.



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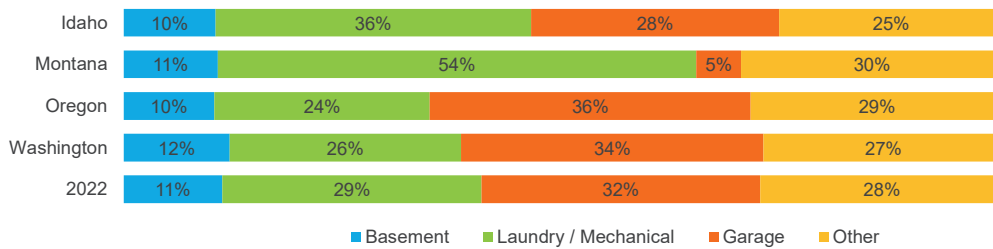
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## Storage Water Heater Locations, Single-Family



- Few storage water heaters in Montana are in garages (5%) compared to other states.
- Most water heaters in Montana are in dedicated laundry / mechanical rooms.



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*EVs and Solar*

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## Distributed Gen and Electric Vehicles



- Prevalence of solar PV has increased since 2017.

	Idaho	Montana	Oregon	Washington	Overall
2022	8%	5%	10%	12%	10%
2017	2%	1%	3%	3%	3%

- Higher percent of homes have 1+ electric vehicle (including full EVs and PHEVs)..

	Idaho	Montana	Oregon	Washington	Overall
2022	2%	3%	8%	8%	7%
2017	0%	2%	2%	1%	1%

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## Mike Psaris

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Questions?



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## Use Cases



- Conservation potential assessments (CPAs)
- Integrated resource plans (IRPs)
- Market research
- Measure development
- **Regional power planning**
- Program opportunity assessment
- Savings estimates and forecasts

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## Data Collected



- **Single-family:** On-site visit by trained engineer
  - Audit of building characteristics
  - Interview questions
  - Release of energy usage data
- **Multi-family:** On-site, or virtual site, visit by trained engineer
  - Audit of unit and building characteristics
  - Interview questions
  - Release of energy usage data for tenant units

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## ➤ Recruitment

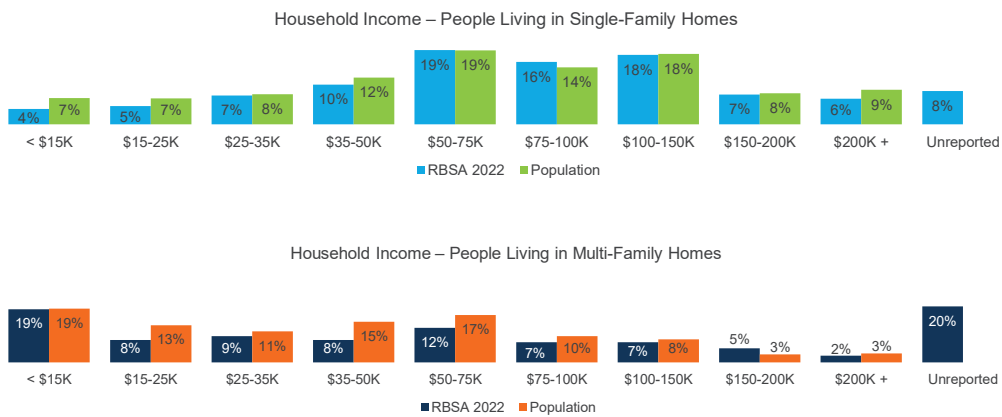


- **Single-family:** Recruitment letter or postcard mailed
  - Invites residents to take a web survey to assess eligibility
  - Schedule site visit
- **Multi-family:** Two approaches
  - Recruit property manager, then tenant unit
  - Recruit tenant unit

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## ➤ Income of Occupants of Homes



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## **Sample Design: Single Family**


**Controlled for the following:**

1. Heating Zone (cold climate)
2. Income
3. State
4. Urban/Rural
5. Utility oversamples



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## **Sample Design: Multi-family**

**Controlled for the following:**

- Height class:
  - Low-rise
  - Mid-rise
  - High-rise
- State
- Urban/Rural



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