

Seeing the Forest AND the Trees: A Top-Down Approach to Measuring Residential Market Transformation



**2025 International Energy
Program Evaluation
Conference**

October 6, 2025



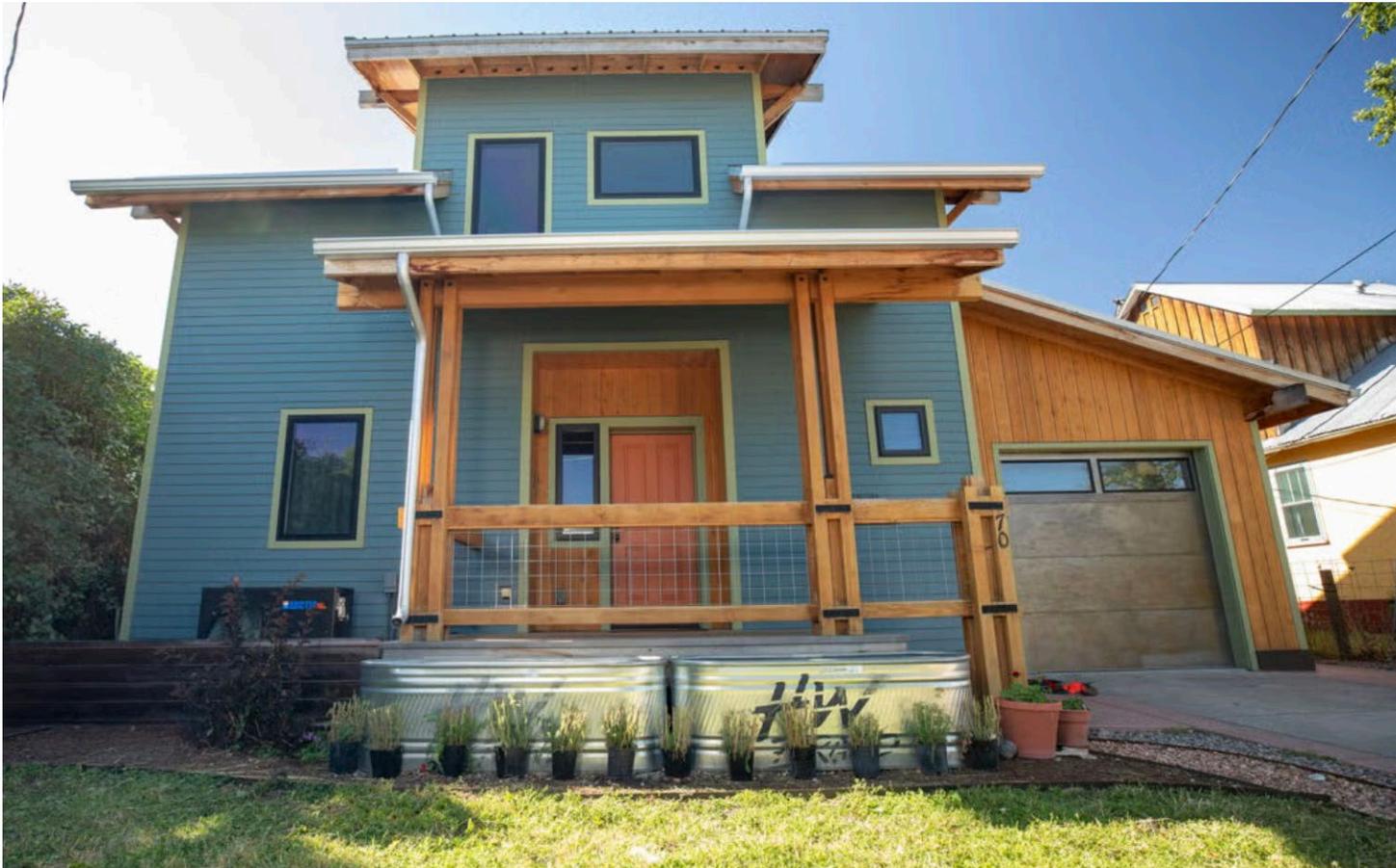
**Hans Lehndorff
Senior Consultant**

Acknowledgements!



The Northwest Energy Efficiency Alliance (NEEA) is a non-profit organization working to effect market transformation through the acceleration and adoption of energy-efficient products, services and practices. NEEA is an alliance of more than 140 Northwest utilities and energy efficiency organizations working on behalf of more than 13 million energy consumers.

Takeaways from the 2022 NEEA RBSA!

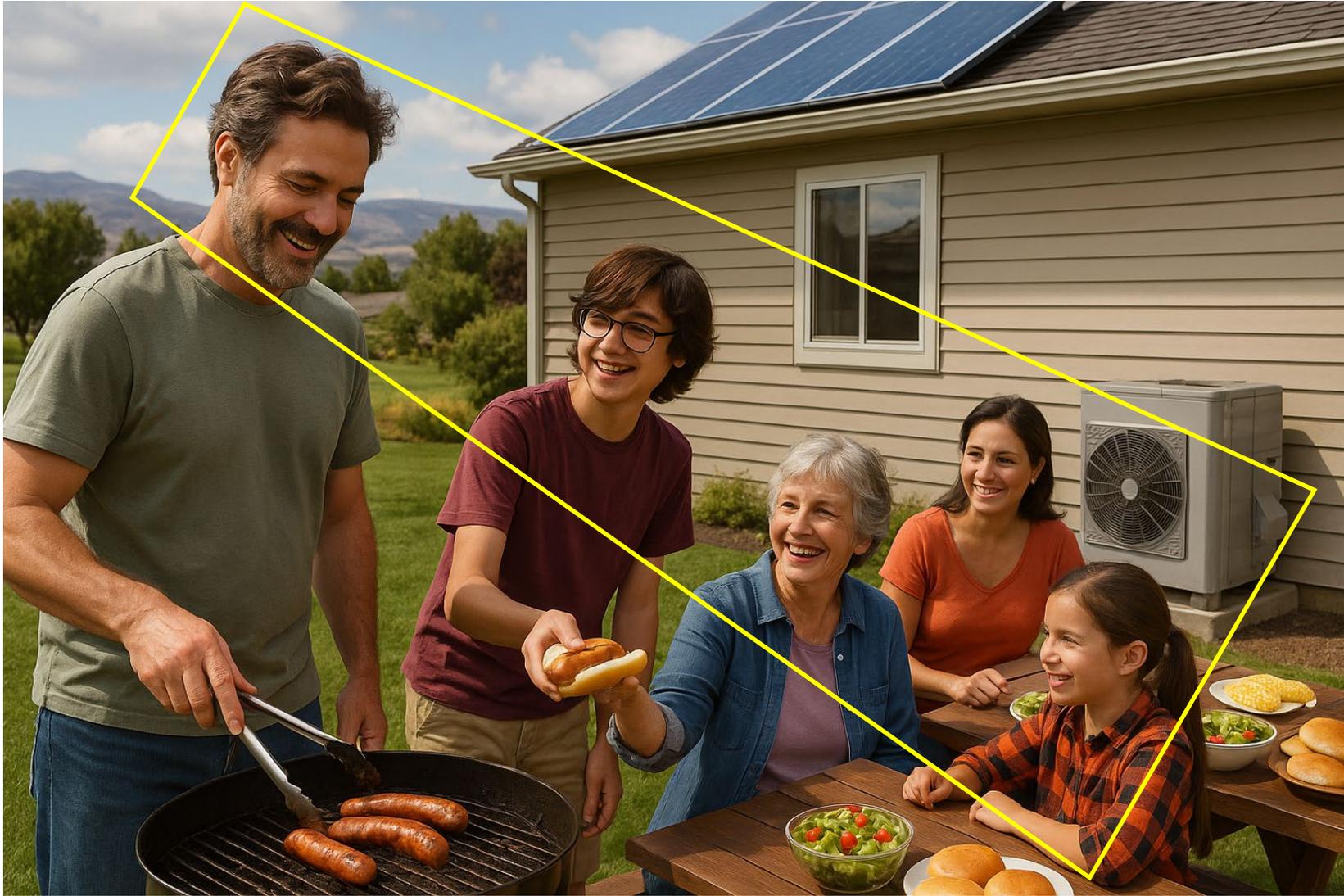


- **Data Available Now!**
- **These data support a wide-range of valuable analysis**
- **Including baseline for future research**
- **People are at the center of the data**

Meet the Smiths*!



Meet the Smiths*!



They have solar



And have a ducted air source heat pump



How do we know all of this about the Smiths*?



A real home in the 2022 NEEA RBSA



SiteDetail.csv

SiteID	Building_Category	County	State	Zip	Urban_Rural	Electric_Utility	Gas_Utility	Conditioned_Area	Qty_Bedrooms	Qty_Bathrooms	Home_Vintage
SITE_1809	Single Family Detached	YAKIMA	WA	98953	Rural	PACIFICORP (PACIFIC POWER)	No Gas Service	3000	5	3	1993

SiteInterview_HomeEnergyUse.csv

SiteID	Heating_Equipment_Used_The_Most	Heating_Setpoint	Overnight_Heating_Setpoint	Cooling_Setpoint	Overnight_Cooling_Setpoint	Outdoor_Temp_for_Cooling	Air_Quality	Primary_TV_Hours_per_Day	Qty_Clothes_Washer_Loads_per_Week
SITE_1809	Central Air Source Heat Pump	69	68	72	72	80	No, no air quality problems	4	6

Mechanical_HeatingAndCooling.csv

SiteID	System_Type	Fuel	Distribution_Type	Control_Type	Zones_Served	Make	Model	Year_of_Manufacture	Cooling_Capacity_BTUh	SEER	SEER_is_Estimated	Heating_Size_BTUh	HSPF
SITE_1809	Central Air Source Heat Pump	Electric	Ducts / Forced Air	Programmable thermostat	Whole Home	Daikin	Dv38PTCC14A8	2019	36000	14	Estimated	36000	8

Appliance_Television.csv

SiteID	TV_Screen_Type	Make	Model	Vintage	TV_Resolution	Size	Wattage	Room_Type
SITE_1809	LCD Fluorescent	Vizio	E320VA	2010	High Definition (720p)	32	100	Bedroom
SITE_1809	LCD LED	Samsung	RU65RU740DF	2018	UHD (4080p)	65	75	Living Room
SITE_1809	Plasma	Samsung	HP-S5053	2006	FHD (1080p)	50	480	Bedroom

2022 NEEA RBSA:

- 61 tables
- 1,585 variables
- 1,910 single-family residences
- 369 multi-family residences
- 219 multi-family buildings

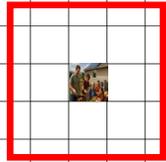
How did the Smiths* end up in the 2022 NEEA RBSA?



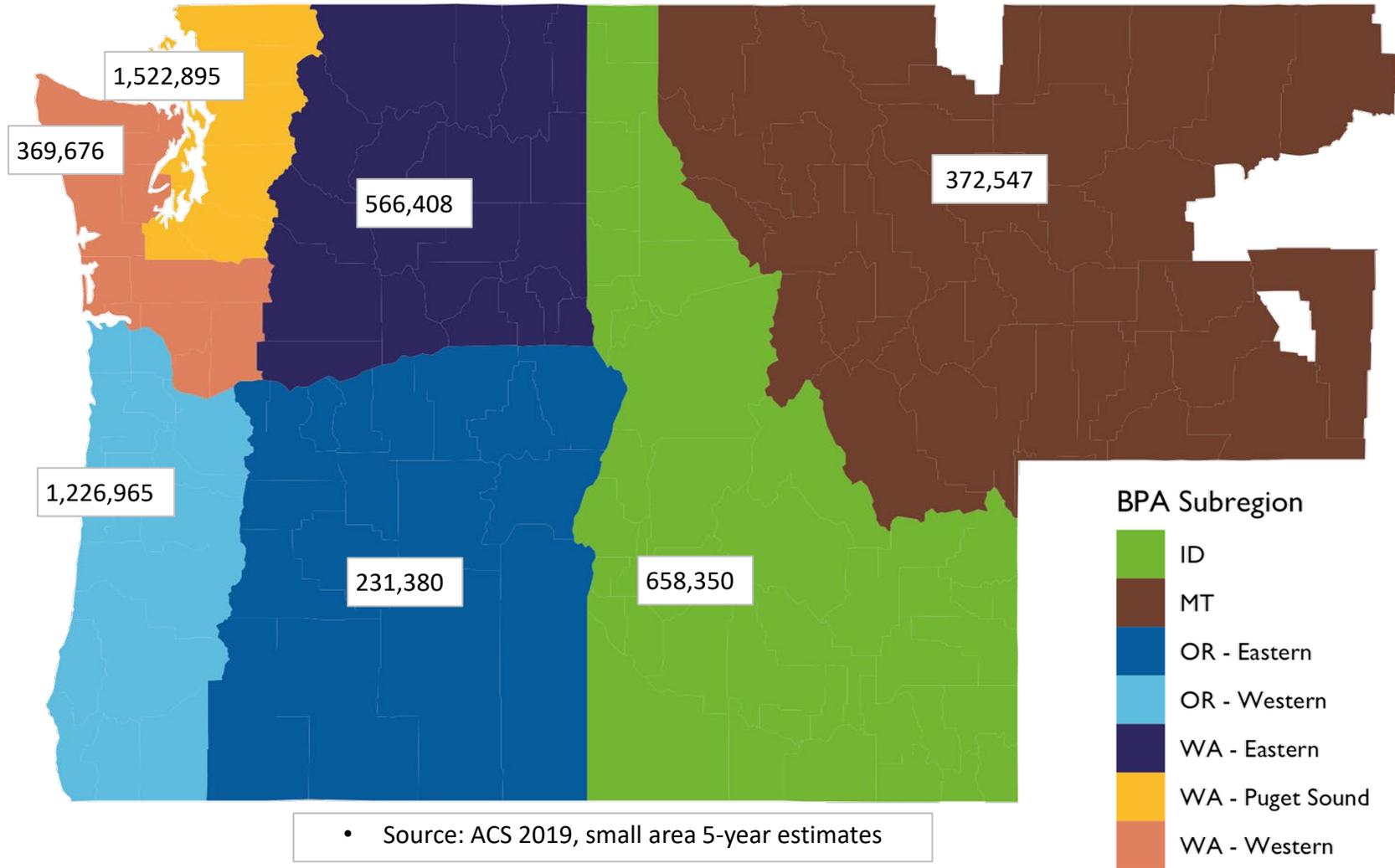
One of 1,910



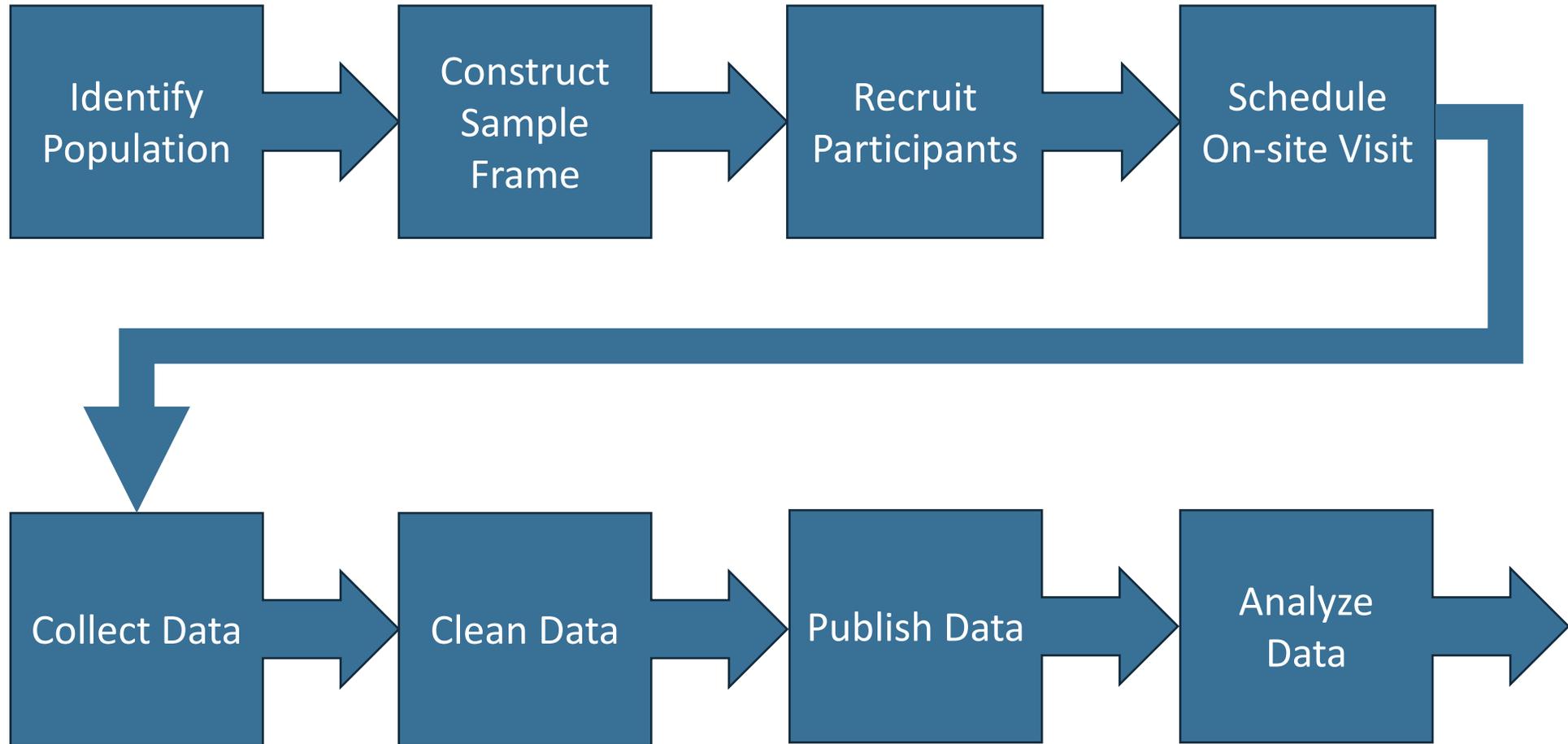
One of 1,910



The Population of Northwest Homes (SF detached)



Long and Winding Road of Data Collection



Many more details in the methods report



2022 **Residential Building** **Stock Assessment** **Methods Report**

Published April 2024



“...develop a current, robust, and representative characterization of the existing residential building stock in the Northwest.”



Data Available Now!



2022 Residential Building Stock Assessment – Datasets

April 8, 2024

Market Sectors

Regional Studies | Residential | Residential Buildings

Published April 2024

The 2022 Residential Building Stock Assessment (RBSA) datasets consist of a series of comma-separated values (CSV) files on NEEA's website, as well as an Excel file containing the data dictionary.

Once downloaded, users can view and analyze the data using Microsoft Excel, Google Sheets, Numbers (on MacOS), or any number of statistical analysis software packages (e.g., R, SPSS, Python, SAS). The use of statistical analysis software packages is advisable for more complicated analysis tasks and to ensure replicability of analysis results.

View the additional data documents at the following links:

- [2022 RBSA Data Dictionary](#)
- [2022 RBSA Data User Guide](#)

Dataset updated June 2024

Preliminary release April 2024

“...datasets consist of a series of comma-separated values files”



High-level findings available now



2022 Residential Building Stock Assessment

Findings Report

A characterization of the existing residential single-family and multi-family building stock in the Northwest

Published April 2024



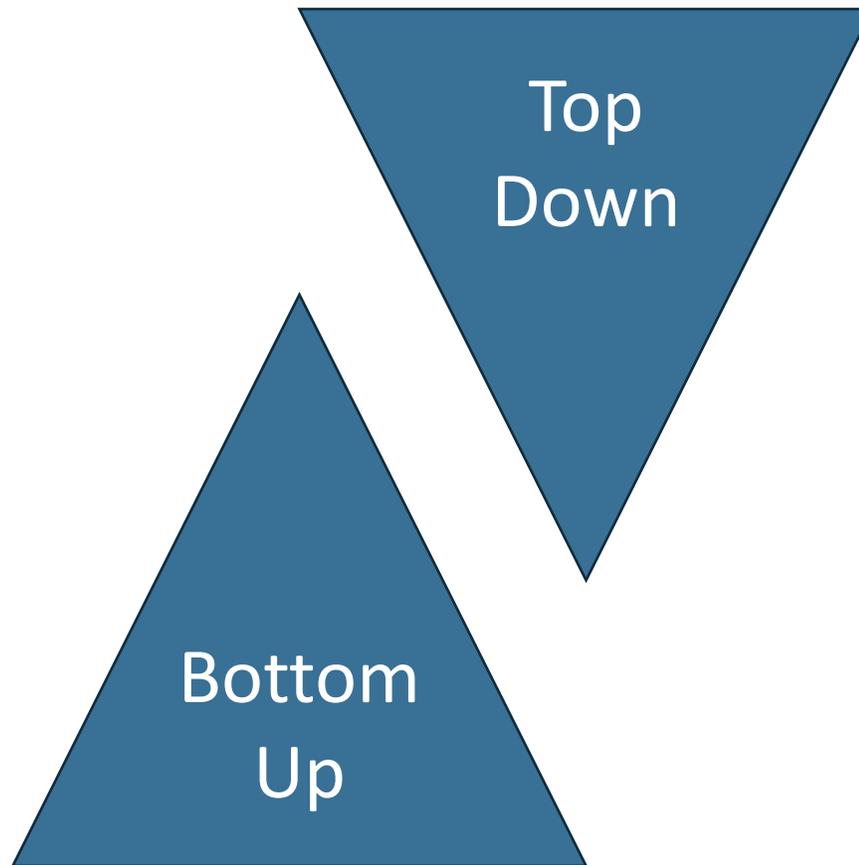
“...information about the study, including an overview of characteristics, often comparing study years.”



Bottom-Up

“The trees”

- Program participants
- Representative non-participants
- Program specific data, research
- Granular



Top-Down

“The forest”

- The population
- Various research objectives
- General
- Captures all market forces

Bottom-up: NEEA has been active in HPWH



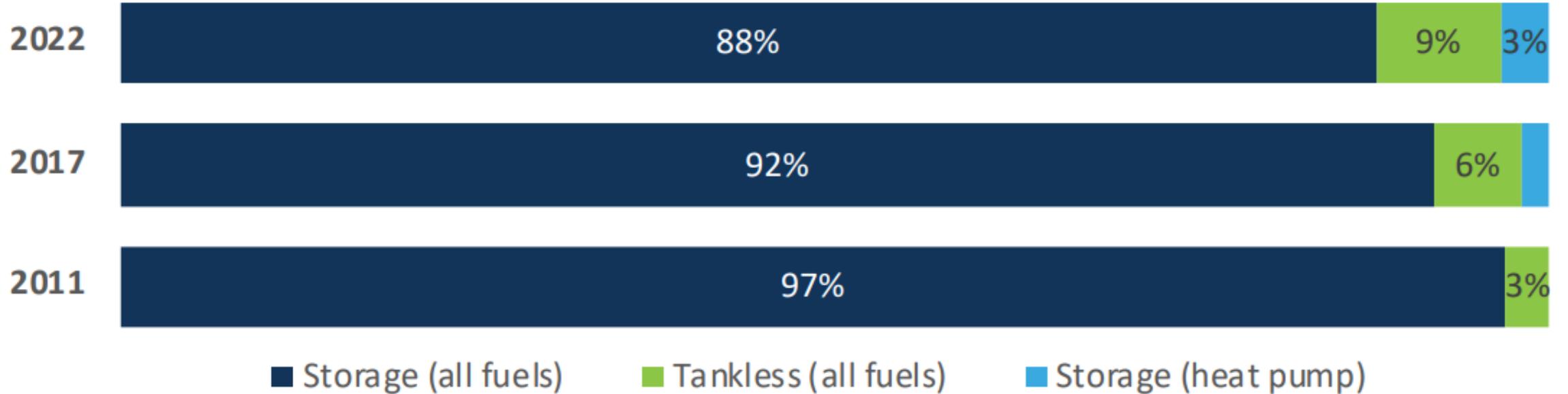
Bottom-up: NEEA has been active in HPWH



Top-down: RBSA analysis of water heaters



Distribution of Water Heaters in Single-Family Homes by Type and Year



What does the 2022 NEEA RBSA tell us?



What will be the next HPWH?



Dual-Fuel Heat Pump Systems Analysis

September 3, 2025

Products/Technologies

Heat Pumps | Heating & Cooling | HVAC | Water Heaters

Market Sectors

Heating and Cooling | Natural Gas | New Construction |
Products | Regional Studies | Residential |
Residential Buildings | Technology

The Northwest Energy Efficiency Alliance (NEEA) is exploring the potential of dual-fuel heat pumps for residential heating and cooling in the Northwest. To support this work, NEEA contracted with Larson Energy Research to develop a model that compares various technologies. The study used 2022 Residential Building Stock Assessment data to evaluate current and emerging systems, focusing on those that offer lower operating costs, reduced energy use, and fewer emissions.

The study analyzed heating performance and cost-effectiveness across five control schemes, multiple climate zones, and HP technologies. Key findings highlight design considerations and optimal switchover temperature setpoints to help balance comfort, energy use, and upfront costs.

Takeaways from the 2022 NEEA RBSA!

- **Data Available Now!**
- **These data support a wide-range of top-down analysis**
- **Including baseline for emerging technology**
- **People are at the center of the data**



A Top-Down Approach to Measuring Residential Market Transformation



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