

**Jennifer Anders**  
Chair  
Montana

**Tim Baker**  
Montana

**Guy Norman**  
Washington

**Patrick Oshie**  
Washington



## Northwest Power and Conservation Council

**Richard Devlin**  
Vice Chair  
Oregon

**Ted Ferrioli**  
Oregon

**Jim Yost**  
Idaho

**Jeffrey C. Allen**  
Idaho

April 2, 2019

### MEMORANDUM

**TO:** Power Committee Members

**FROM:** Tina Jayaweera, Massoud Jourabchi

**SUBJECT:** Findings from the Residential Building Stock Assessment

### **BACKGROUND:**

**Presenter:** Aaron James, Northwest Energy Efficiency Alliance

**Summary:** The Northwest Energy Efficiency Alliance (NEEA) periodically conducts regional studies to characterize the residential sector across the region. In 2018, the second residential building stock assessment (RBSA) report and database was released, providing detailed information on the building practices and fuel choices for each of the four Northwest states. The collected data are used by Council staff for both load forecasting and energy efficiency assessment. Aaron James will provide a high-level overview of key findings across the states and changes from the prior RBSA that was completed in 2012.

**Relevance:** Council staff rely heavily on the stock assessments in preparing for the Power Plan.

**Workplan:** Prepare for 2021 Power Plan

**More Info:** The RBSA report and database can be found on NEEA's website:  
<https://neea.org/data/residential-building-stock-assessment>

# Residential Building Stock Assessment #2

## 2016/2017



# Partners in Market Transformation





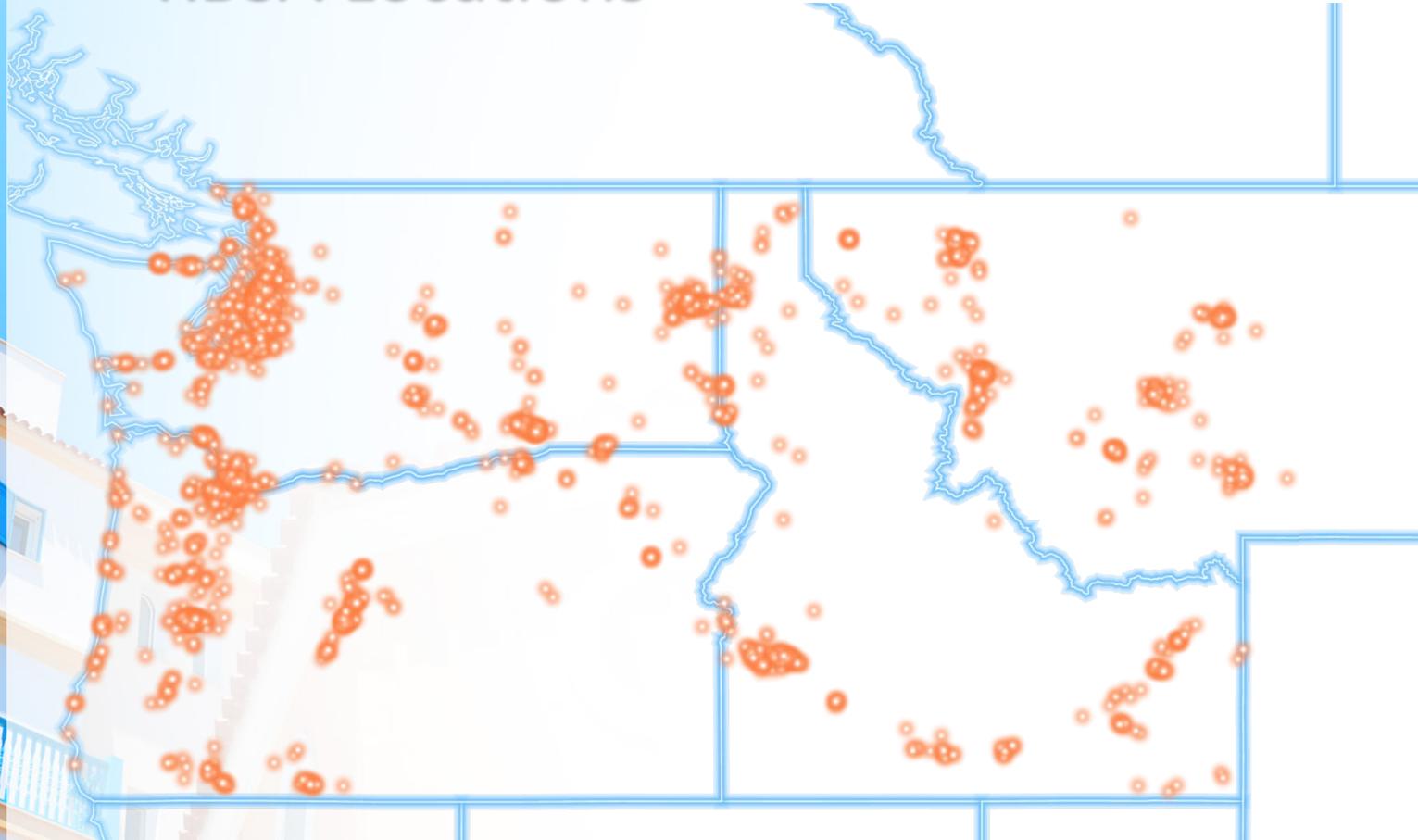
# RBSA Overview

- The primary objective of the RBSA is to develop an inventory and profile of the Northwest's existing residential building stock
- It is based on field data from a representative, random sample of existing single family, multi-family and manufactured homes.
- Sponsored by NEEA (with additional oversample funded by Seattle City Light, Snohomish PUD, and the Bonneville Power Administration).



Field surveys were conducted on 1,815 sites across the Northwest, including 930 single-family homes, 474 multi-family homes, and 411 manufactured homes.

## RBSA Locations

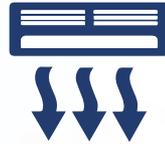


# Implementation

- **Customer Survey** - Participants completed two short surveys about their home and its occupants
- **Onsite Data Collection** – Observed Equipment and Home Characteristics including:



Building envelope (shell)



HVAC



Windows



Electronics



Insulation/Air leakage



Water Heating



Lighting



Appliances



## Significant Trends Since RBSA I

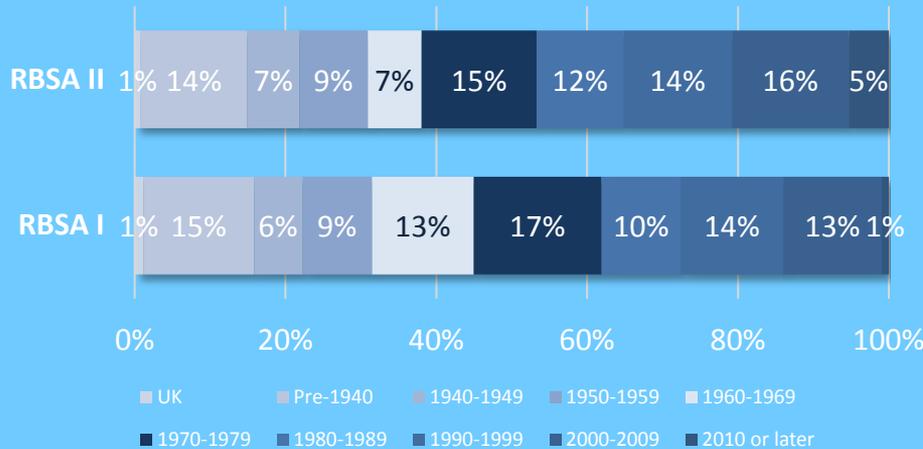
- New Construction
- HVAC
- Shift to Gas Appliances
- Consumer Electronics
- Lighting

# New Cosntruction

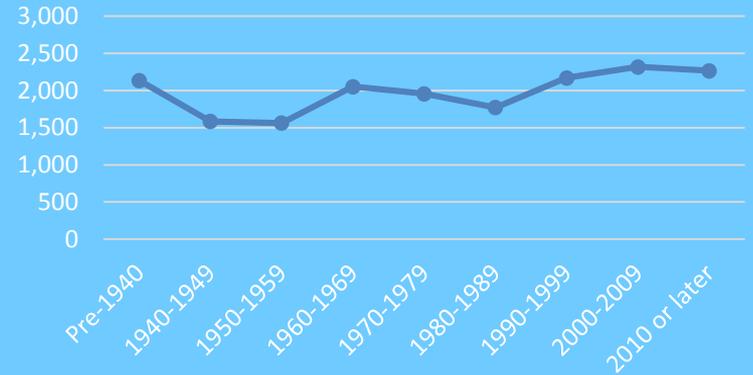


# Single Family Homes

Around 1/3 (35%) of all homes have been built since 1990, compared to just over 1/4 (28%) in RBSA I.



## Average Size (ft<sup>2</sup>)



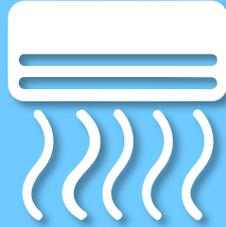
Consistent with trends seen in RBSA I, after increasing in size since the 1950's, house sizes seem to be leveling off or decreasing slightly.

# HVAC



# Single Family: HVAC

The percent of Northwest homes with mechanical cooling is increasing



Mechanical Cooling

32%

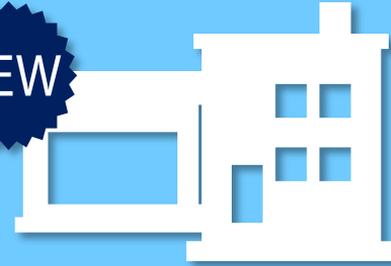
Mini Split

4%

54%

9%

NEW



75% of homes built since 2007 Have AC

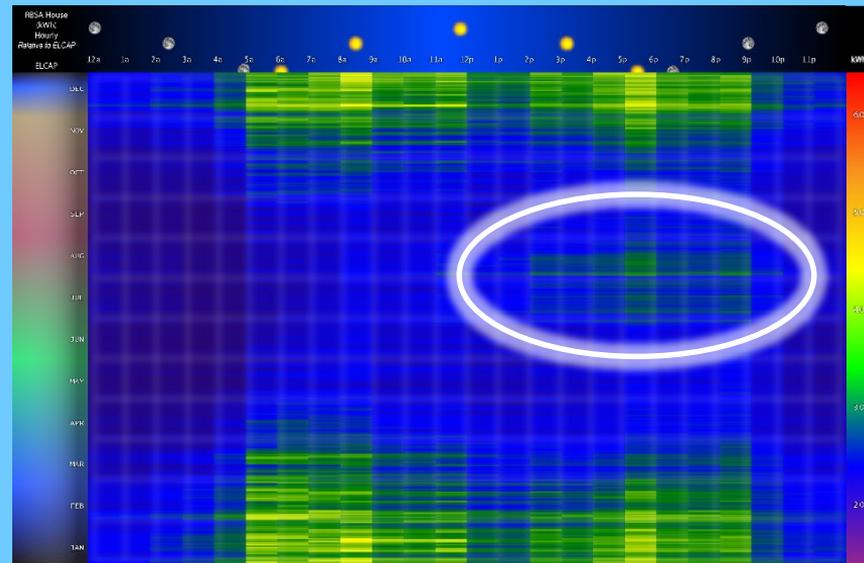
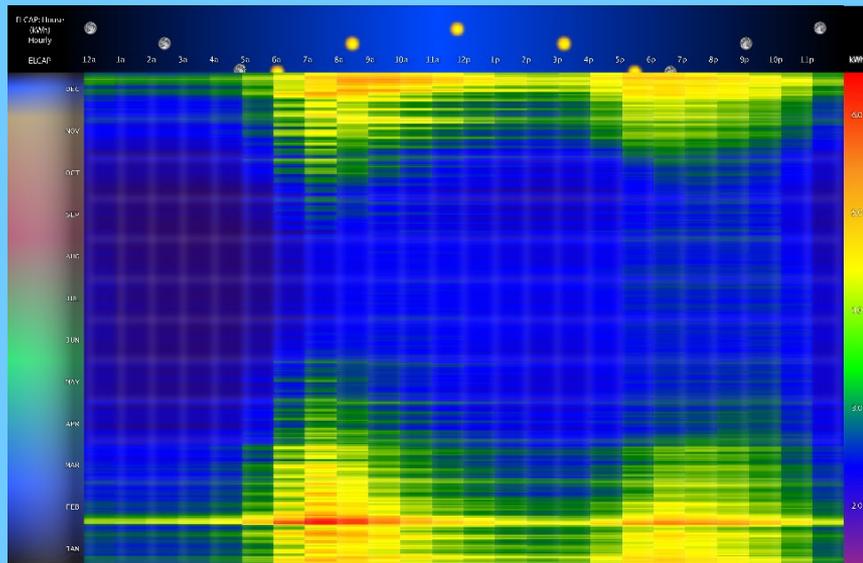
60% of homes with AC were built *before* 1992; 44% were built before 1980



# Cooling Load

## ELCAP

## RBSAM (2012-2014)



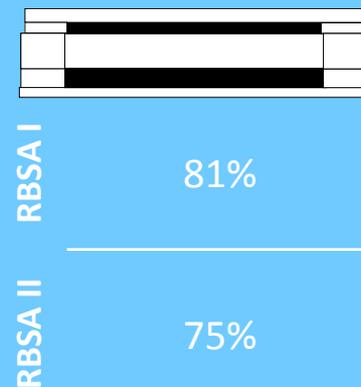
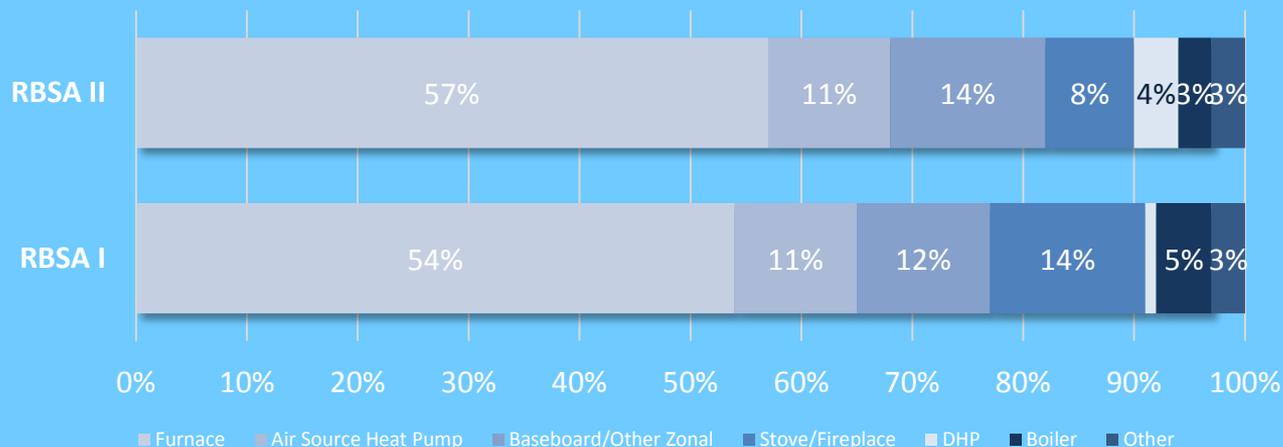
← Hour of day →

↑ Month/Day ↓

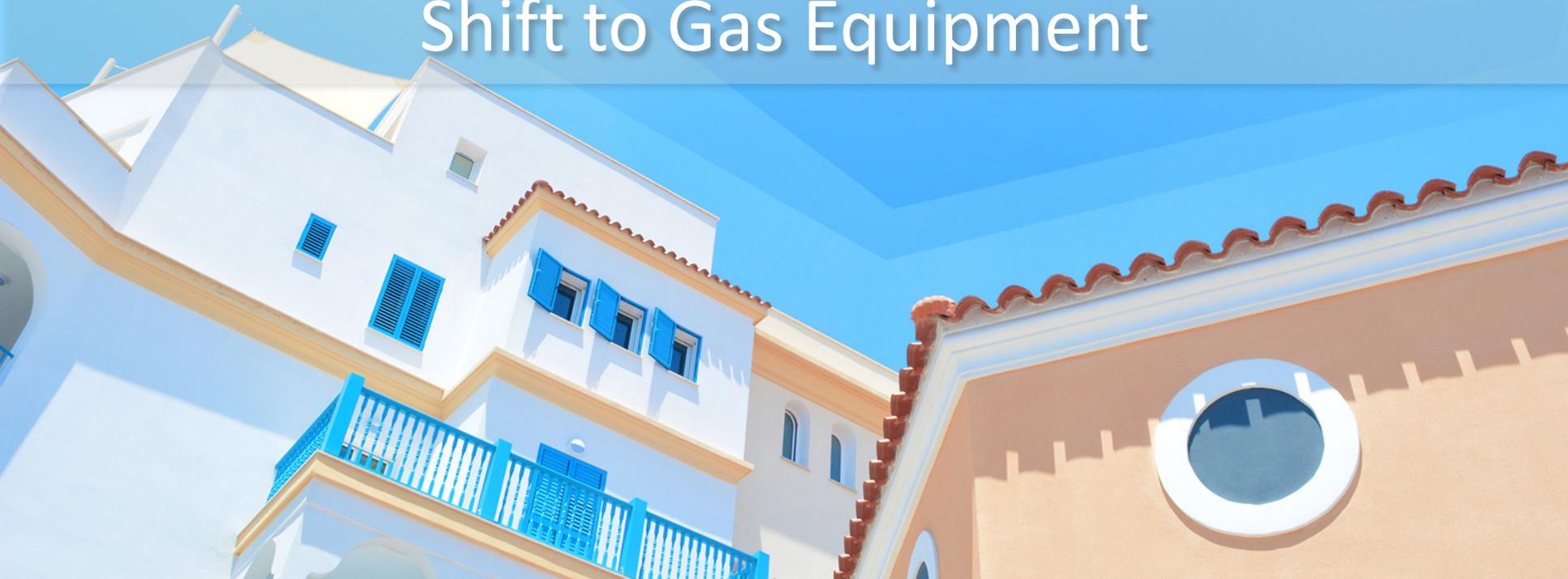
# Heating

Some shifts in Heating HVAC. Shifts to furnace and DHP and away from Zonal, stoves and boilers.

In Multi-family, Baseboard heaters continue to dominate, but appear to be dropping.



# Shift to Gas Equipment



# Gas Equipment

More homes in the Northwest are using gas equipment and appliances



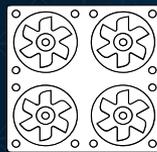
Primary Heating

50%



Water Heaters

43%



Cooktops

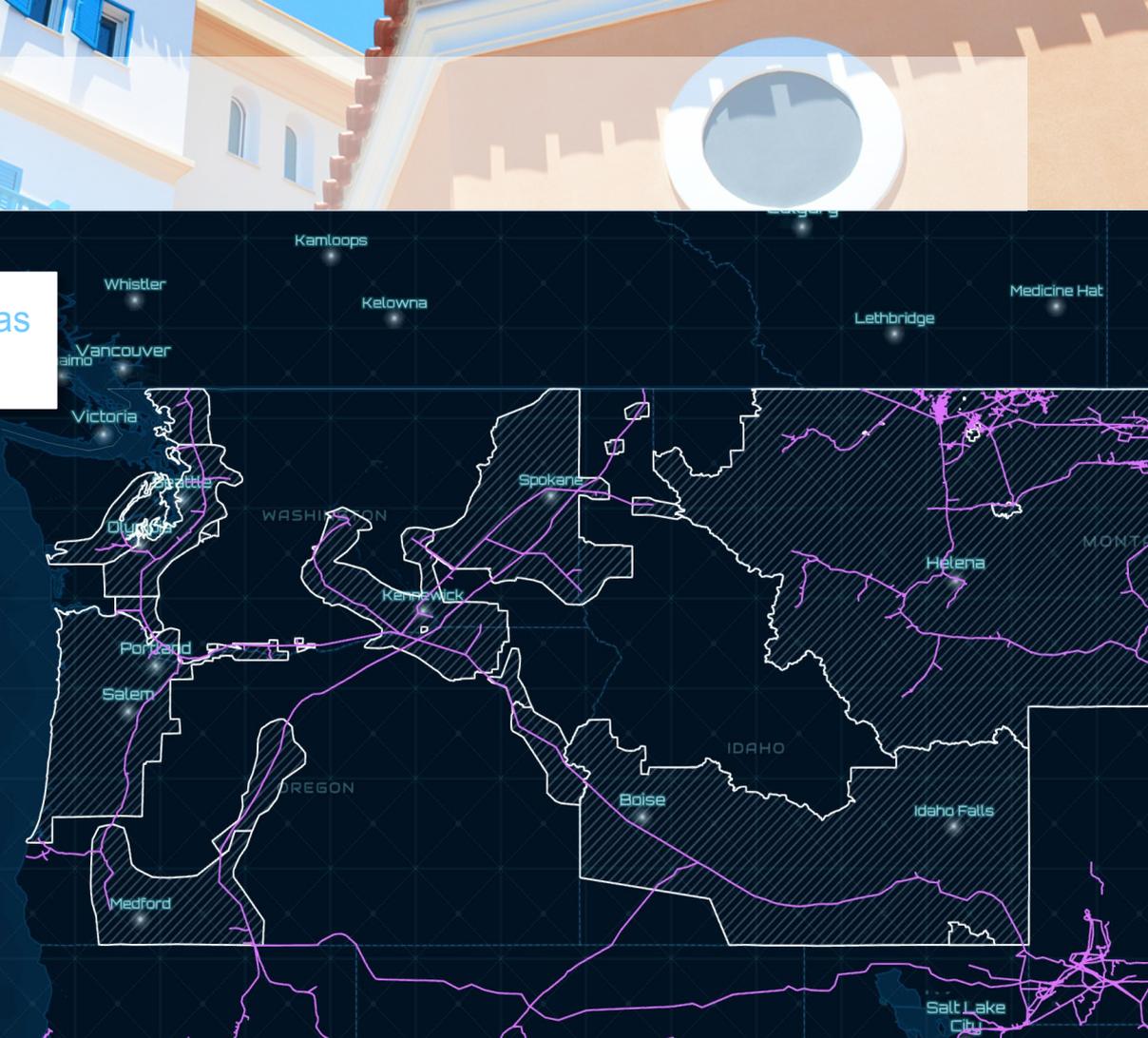
21%

RBSA I  
RBSA II

56%

49%

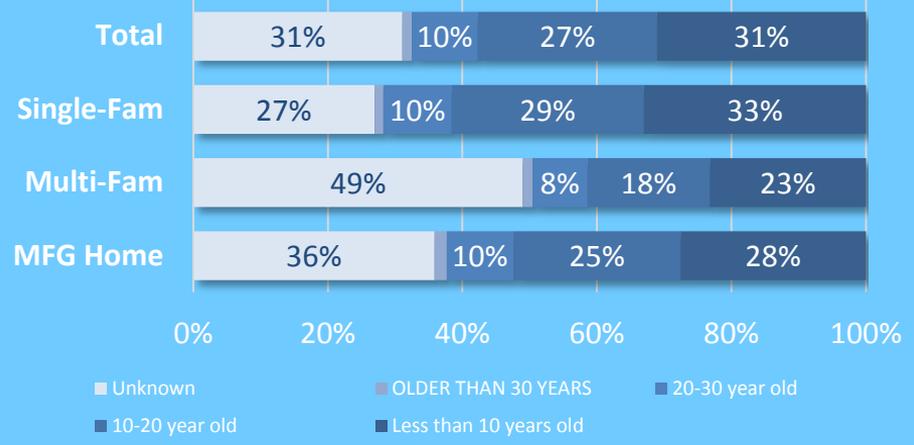
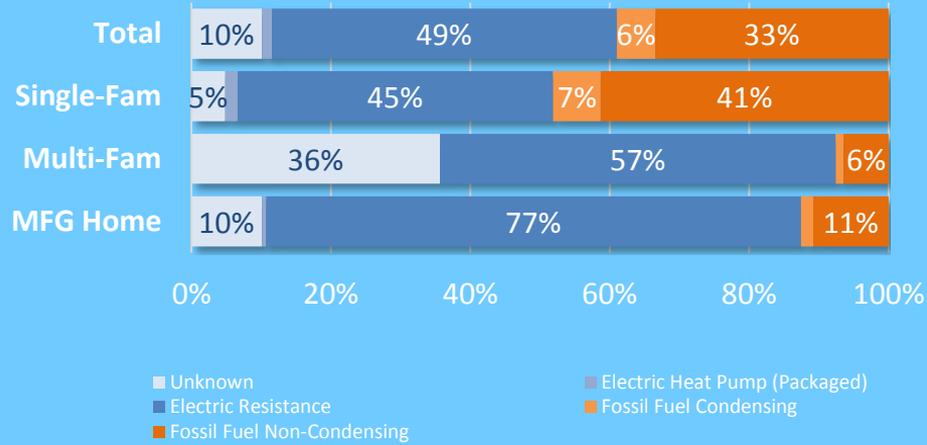
28%





Most water heaters in the region are Electric, however, in Single Family they are more likely to be Gas or Propane.

The majority of water heaters in the region are less than 20 Years old.

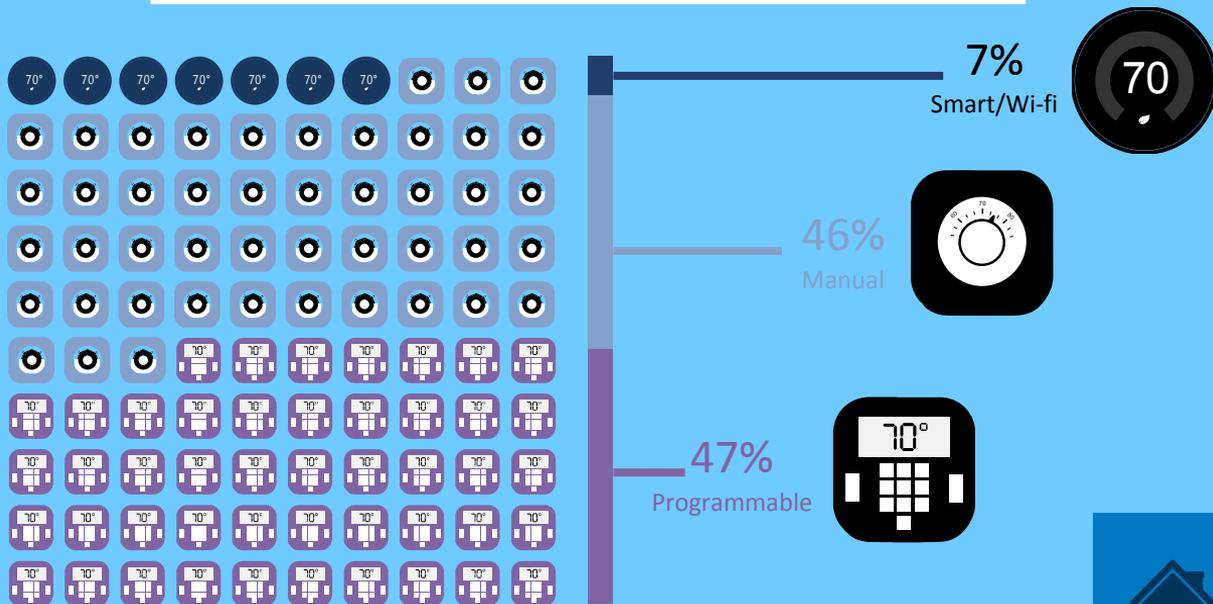


# Electronics



# Smart Devices

Connected thermostats now represent 7% of installed thermostats.



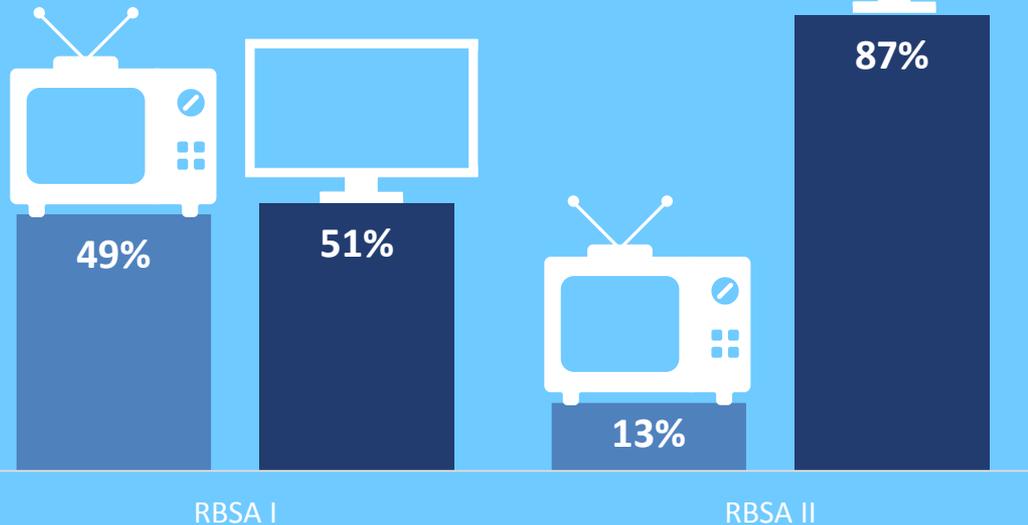
2% of all power strips are now smart power strips.



Just under **9%** of participants indicated they use any type of smart home device (such as a smart speaker)

# Changing Entertainment

CRTs have significantly decreased in share since RBSA I going from nearly half of all TVs to only 13%



The average television power  
*dropped by 29W*  
from 112W to 83W over the past 6 years



# Changing Entertainment



Gaming Systems



Set-top Box

RBSA I  
RBSA II

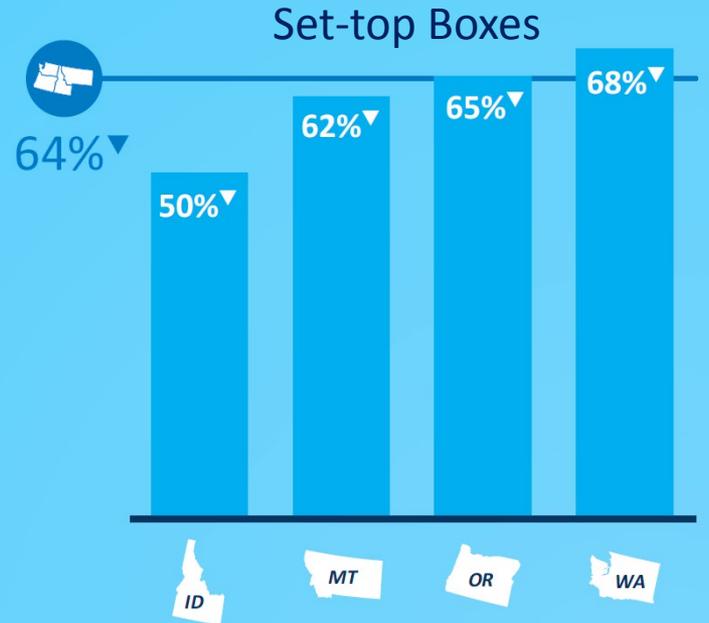
33%

81%

26%

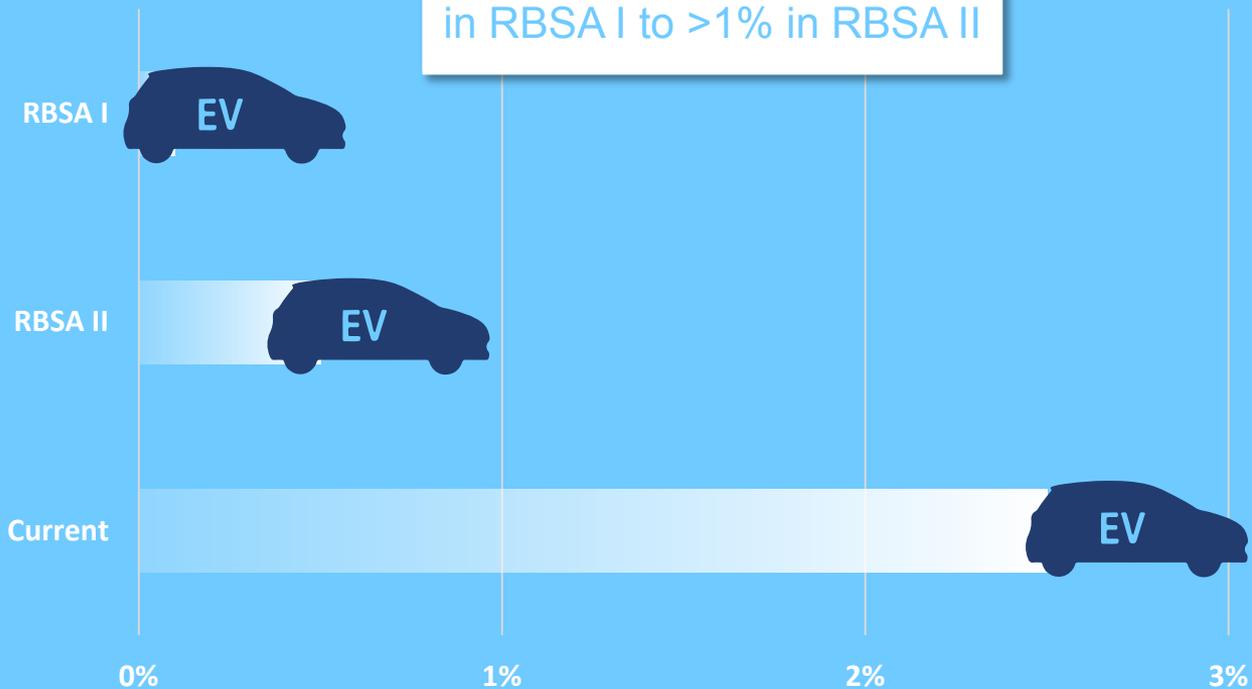
64%

Incidence of gaming systems and set top boxes have dropped significantly



# Electric Vehicles

EV's Went from non-existent in RBSA I to >1% in RBSA II



Should Approach 100,000 EVs in region by end of 2019

Region	98,894
WA	61,615
OR	33,187
ID	2,687
MT	1,405



# Lighting



# Lighting

LEDs have increased from less than one percent six years ago to nearly 1/5<sup>th</sup> of all installed bulbs



Incandescent



CFL



LED

RBSA I  
RBSA II

57%

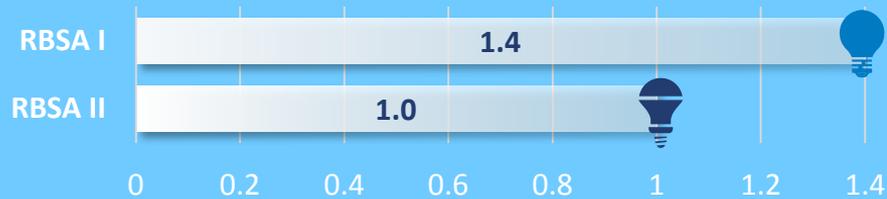
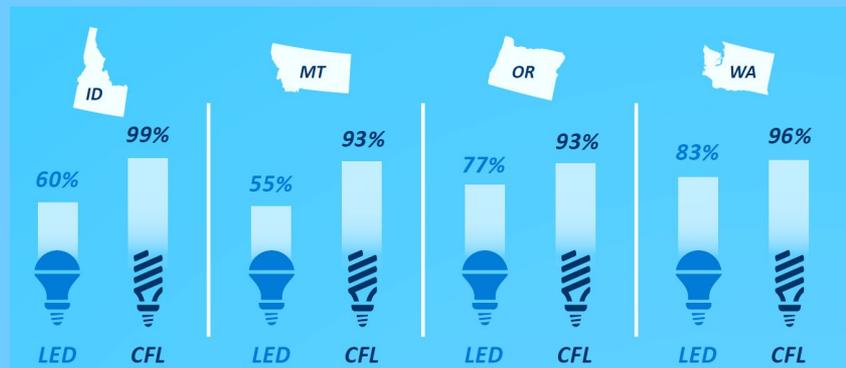
25%

1%

39%

26%

20%



The shift from incandescent bulbs to LEDs, has lowered the lighting power density (watt per sq. ft.) from 1.4 to 1.0.



# QUESTIONS

Thank You